ADDENDUM No. 1

RFP No. 26-43

WWTP Electrical Preventative Maintenance

Due: September 9, 2026, at 2:00 P.M. (local time)

The information contained herein shall take precedence over the original documents and all previous addenda (if any) and is appended thereto. **This Addendum includes one thousand six hundred and twenty nine (1,629) pages.**

The Proposer is to acknowledge receipt of this Addendum No. 1, including all attachments in its Proposal by so indicating in the proposal that the addendum has been received. Proposals submitted without acknowledgement of receipt of this addendum may be considered non-conforming.

The following forms provided within the RFP Document should be included in submitted proposal:

- **Attachment A – City of Ann Arbor Prevailing Wage Declaration of Compliance**
- **Attachment C – City of Ann Arbor Non-Discrimination Declaration of Compliance**
- **Attachment D - City of Ann Arbor Living Wage Declaration of Compliance**
- **Attachment E - Vendor Conflict of Interest Disclosure Form of the RFP Document**

Proposals that fail to provide these completed forms listed above upon proposal opening may be rejected as non-responsive and may not be considered for award.

I. CORRECTIONS/ADDITIONS/DELETIONS

Changes to the RFP documents which are outlined below are referenced to a page or Section in which they appear conspicuously. Offerors are to take note in its review of the documents and include these changes as they may affect work or details in other areas not specifically referenced here.

Page 14

Add: “Medium voltage cable testing for critical circuits shall be completed in accordance with NETA MTS, which includes the VLF Tan-Delta test.”

Add: “The Arc Flash reassessment study shall be performed by or under the direct supervision of a Michigan licensed PE and that the final report be signed/sealed by a PE.

The City would require that the contractor use one of the following arc flash assessment software programs: ETAP, EasyPower, and SKM PowerTools. The contractor shall be required to provide the City with the electronic files at the completion of the arc flash assessment..”

Page 31

Add the following two separate pay items to this sheet:

Electrical Testing & Preventative Maintenance:
_____ ($_____)

Arc Flash Reassessment Study
_____ ($_____)

II. QUESTIONS AND ANSWERS

The following Questions have been received by the City. Responses are being provided in accordance with the terms of the RFP. Respondents are directed to take note in its review of the documents of the following questions and City responses as they affect work or details in other areas not specifically referenced here.

Question 1: Could you please clarify the requirement for a "Michigan licensed electrical services firm"? Specifically, would a firm with a Michigan-licensed PE and NETA accreditation qualify for this project, or is a Michigan Electrical Contractor License also required?
Answer 1: A Michigan Electrical Contractor License is required.

Question 2: Please confirm that the Arc Flash reassessment includes an Arc Flash and Coordination Study.
Answer 2: A comprehensive NFPA 70E arc flash assessment shall included a protective device coordination study. In addition, any recommendations for revisions to trip settings shall be included in the final report.

Question 3: Does the Arc Flash Reassessment study require a PE stamp on it?
Answer 3: The Arc Flash reassessment study shall be performed by or under the direct supervision of a Michigan licensed PE and that the final report be signed/sealed by a Michigan licensed PE.

Question 4: What software will the City require for the Arc Flash Reassessment?
Answer 4: The City would require that the contractor use one of the following arc flash assessment software programs: ETAP, EasyPower, or SKM PowerTools. The contractor shall be required to provide the City with the electronic files at the completion of the arc flash assessment.

Question 5: Will we be testing NETA MTS Standards?
Answer 5: Yes.

Question 6: Is there specific color coding required for Arc Flash stickers?
Answer 6: Use Orange “Warning” as the heading for all arc flash labels. For equipment with the calculated thermal energy cal/cm2 > 40, use RED “Danger” for the heading.

Question 7: Will the 480volt circuit breakers be primary injected or secondary injected?
Answer 7: The 480v circuit breakers should be primary injected.

Question 8: Is Medium Voltage Cable testing required?
Answer 8: Medium voltage cable testing for critical circuits shall be completed in accordance with NETA MTS, which includes the VLF Tan-Delta test.

Question 9: Is the contractor required to bring in generator contractor to assess generators or provide backup power for equipment that needs to remain operational?
Answer 9: No.

Question 10: What services are to be performed on the ATS units? Infrared only or preventative Maintenance services along with infrared?
Answer 10: In general, follow applicable requirements of NETA MTS for low voltage switches. The ATS switches shall be inspected, cleaned, retorqued the connections and perform an IR scan.

Question 11: Is Battery testing Required?
Answer 11: No.

Question 12: Please provide all test forms from the last time project was completed and Arc Flash study from 2020?
Answer 12: Please see the attached Final report from Premier Power Maintenance and the 2020 Arc Flash Study.

Question 13: Can AAWRRF provide electrical one-line drawings?
Answer 13: The electrical one-line drawings will be provided once an electrical contractor is selected.

Question 14: Are all MCCs IR scan only or are there testing requirements?
Answer 14: See RFP scope for required work on MCC's.

Question 15: Are all load centers IR scanned only or are there testing requirements?
Answer 15: See RFP scope for required work on Load Centers.

Question 16: RFP #26-43 is for all services to be performed one (1) time during contract agreement?
Answer 16: Yes

Question 17: Has there been significant changes to electrical systems/electrical equipment since Arc Flash study in 2020?
Answer 17: Yes, there have been updates to UV system, Screening and grit equipment, addition of odor control to headworks, and MCC replacements to load centers in headworks and EQ/RET.

Question 18: All work to be bid/performed for normal business hours 7:00am to 4:00pm, Monday through Friday?
Answer 18: Yes, we anticipate all work to occur Monday through Friday during normal business hours (7:00 a.m. to 4:00 p.m.). However, if equipment remains down overnight or through a weekend and emergency conditions require staff to have that equipment back online, the contractor will be required to re-energize the necessary equipment.

Question 19: Will AAWRRF provide electrical assistance for infrared scan?
Answer 19: No.

Question 20: All switching and LOTO necessary to perform maintenance to be performed by wastewater plant personnel prior to contractors arrival onsite?
Answer 20: Plant operational staff will coordinate with the contractor to shut down online operational equipment. The contractor will be required to de-energize and perform Lockout/Tagout (LOTO) on the areas required for service based on the contractor's planned work.

Question 21: Can pre bid sign in sheet be provided?
Answer 21: Yes, see attached.

Question 22: Can a schedule of work be provided by AAWRRF?
Answer 22: The WRRF staff will work with the contractor to develop a schedule based on operational needs and the contractor's availability following contract award.

Offerors are responsible for any conclusions that they may draw from the information contained in the Addendum.

Engineering Report

City of Ann Arbor

Nick Jaworski
Maintenance Testing
Job Number: 230858
March 11, 2024

NETA® ACCREDITED COMPANY

Premier Power Maintenance
4035 Championship Drive
Indianapolis, IN 46268
T (317) 879-0660
www.premierpowermaintenance.com

March 11, 2024

City of Ann Arbor
49 S. Dixboro Rd.
Ann Arbor, MI 48105

Attention: Nick Jaworski

Subject: Maintenance Testing
Project No. 230858

Dear Mr. Jaworski,

Thank you for the opportunity to provide services for you during this project. Our comprehensive report and recommendations are attached. They detail the work we performed, results obtained and provide recommendations for any corrective actions. Please let us know if you have any questions or need additional information.

As an independent third party electrical testing, maintenance and engineering services firm and full member of the InterNational Electrical Testing Association (NETA), Premier Power Maintenance prides itself in the quality of our services and skills of our people. Thanks again for the opportunity to provide you with electrical testing services. If there is anything more we can do for you, please don't hesitate to contact us.

Sincerely,

Premier Power Maintenance

Steve Monte
Northern Region Operations Manager

1. Summary

- Maintenance tests and inspections of electrical equipment help assure proper and safe operation.
- This project involved testing transformers, medium voltage breakers, low voltage breakers, relays, switchgear, load break switches, low voltage MCC centers, medium voltage MCC centers, and batteries.
- Please refer to Section 5 for complete details regarding comments, deficiencies and recommendations.

2. Objectives

Maintenance Testing

- The equipment and components listed in Section 3.0 of this report have been inspected and tested to help assure their proper and safe operation. Defective or marginal equipment can be identified, repaired, replaced or scheduled for future repairs without costly or unexpected interruptions during normal operating periods.
- The test results are particularly valuable when kept for comparison with past and future maintenance test results. This historic database enables one to predict the probability of equipment failure and thus schedule facility production and financial budgets to accommodate preventive maintenance or repair rather than breakdown maintenance.

3. Service Description

- This project was initiated by Nick Jaworski with the City of Ann Arbor. All testing was performed by Premier Power Maintenance field technicians Ed Penland, Steve Fry, Colby Krout, Brian Burgess, Kien Ickes and Ken Horst from November 20, 2023 to February 14, 2024.
- For a list of equipment tested in this project, please see test sheets located in the Appendix.

4. Procedure

- All testing is performed in accordance with PPM's standard procedures including, but not limited to, selected specifications from the following: InterNational Electrical Testing Association (NETA), National Electrical Code (NEC), National Fire Protection Association 70B-Electrical Equipment Maintenance (NFPA 70B), Institute of Electrical and Electronic Engineers (IEEE), American Society for Testing and Materials (ASTM), National Electrical Manufacturer's Association (NEMA), manufacturer's instruction manuals and/or project specifications, unless otherwise noted.

5. Results: Comments, Deficiencies and Recommendations

- The following is a list of problems discovered during this testing project along with any corrective action that was made by Premier Power Maintenance. Those corrections beyond the scope of the project that require your additional corrective action are in bolded text.
  Based on the results of the inspections and tests performed, the equipment included in this project (see detailed test data in Appendix) is considered serviceable.
    - SUB 2 MAIN B 480V BREAKER: RATING PLUG IS STRIPPED WHERE THE BOLT GOES IN. ***RECOMMEND REPLACE.***
    - SUB 2 MCC-E: BUS DOES NOT MEET NETA STANDARDS FOR INSULATION RESISTANCE. DUE TO PROXIMITY AND LIMITED ACCESS TO THE BUS COMPARTMENTS AS WELL. AS CONSTRUCTION OF BUS. ***RECOMMEND REPLACEMENT OF MCC CENTER.***
    - SUB 2 MCC-E SWITCHBOARD: RB DRAIN PUMP #4 FUSE FAILED. FUSES WERE REPLACED.
    - SUB 2 MCC-F: AIR COMPRESSOR NUMBER 2 HAS A BAD FUSE ON C PHASE. FUSE WAS REPLACED. BYPASS GATE NUMBER 1- B AND C FUSES WERE BAD. FUSES WERE REPLACED.
    - SUB 2 PRIMARY SWITCH MAIN B: A PHASE ARRESTER READING LOWER THAN OTHER PHASES. ***MAY NEED REPLACEMENT.***
    - SUB 3 MCC-WBB-B: ONE OF THE SPARES HAS BURNT TERMINALS. ***RECOMMEND REPAIR/REPLACE.***
    - SUB 3 PRIMARY SWITCH MAIN A: A PHASE ARRESTER READING IS LOWER THAN OTHER PHASES. ***MAY NEED A REPLACEMENT.***
    - SUB 3 PRIMARY SWITCH MAIN B: A PHASE ARRESTER READING IS LOWER THAN OTHER PHASES. ***MAY NEED A REPLACEMENT.***
    - SUB 4 MCC-M: PEW PUMP NO. 3 AND SECONDARY EFFL. PUMP NO.6 ARE BOTH MISSING THE LINE SHIELD FOR THE MOLDED CASE SWITCHES. ***RECOMMEND REPLACING WITH GP-03 GLASTIC.***
    - SUB 4 MCC-N: PEW PUMP NO. 3 AND SECONDARY EFFL. PUMP NO.6 ARE MISSING THE LINE SHEILD FOR MOLDED CASE SWITCH. ***RECOMMEND REPLACING WITH GP-03 GLASTIC.***
    - SUB 4 MCC-Q: FLOOR DRAIN SUMP PUMP NO. 2 BUCKET'S CONTACT RESISTANCE IS OUT OF SPECIFICATION. THIS PROBLEM WAS CORRECTED.
    - SUB 4 PRIMARY SWITCH MAIN A: B PHASE ARRESTER READING IS LOWER THAN OTHER PHASES ***MAY NEED A REPLACEMENT.***
    - SUB 4 PRIMARY SWITCH MAIN B: A PHASE ARRESTER READING IS LOWER THAN OTHER PHASES ***MAY NEED A REPLACEMENT.***
    - SUB 5 FEEDER F2H SPARE: TRIP UNIT FAILED. ***RECOMMEND REPLACING TRIP UNIT.***
    - SUB 5 MCC-52-B: MCC BREAKER R02-23: ATS BREAKER COVER IS MISSING A SCREW. ***RECOMMEND REPLACE.***
    - SUB 5 MCC-56-A: SOME CONTROL WIRING WAS FOUND LOOSE AND IT WAS CORRECTED.
    - SUB 5 MCC-56-B: SOME CONTROL WIRING WAS FOUND LOOSE AND IT WAS CORRECTED.
    - SUB 5 PRIMARY SWITCH MAIN B: STORED ENERGY SPRING HAS MISSING PARTS, WASHER, AND COTTER PIN. IT WAS REPLACED IN THE FIELD.
    - SUB 5 TRANSFORMER 2: ONE BAD FAN. FRONT OF THE TRANSFORMER, CENTER PHASE, RIGHT FAN. ***RECOMMEND REPLACE.***
    - SUB 6 MCC-EBB-A: PP-EBB-A HAD LOOSE BOLT CONNECTING 400A LJ BREAKER TO THE BUS WITH VERY HIGH RESISTANCE. REMOVED THE BOLT, CHASED THE THREADS AND

RESINSTALLED BUT THE BOLTS WERE TOO LONG. PLACED A WASHER UNDER THE BOLT HEAD AND NOW IT HAS PROPER RESISTANCE.

APPENDIX

Table of Contents
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Customer CITY OF ANN ARBOR
User CITY OF ANN ARBOR
Plant

Substation	Position	Equipment	Page
ADMIN	ATS-ADM-1	54100 - AUTOMATIC TRANSFER SWITCH TEST	
ADMIN	LP-ADM-1-XFMR	56750 - XFMR MAINTENANCE AND INSP_R05-23	
ADMIN	LP-ADM-2-XFMR	56750 - XFMR MAINTENANCE AND INSP_R05-23	
ADMIN	MCC-ADM-A	30100 - MOTOR CONTROL CENTER INSULATION	
ADMIN	MCC-ADM-A	50400 - SWITCHBOARD BUSS CONNECTION TEST	
ADMIN	MCC-ADM-A 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R(	
ADMIN	PP-ADM-1 XFMR	56750 - XFMR MAINTENANCE AND INSP_R05-23	
BATTERIES	120 V DC	10200 - BATTERY CHARGER INSPECTION	
GENERATOR SWITCHGEAR	GENERATOR1	16100 - VACUUM CIRCUIT BREAKER_R01-23	
GENERATOR SWITCHGEAR	GENERATOR1	27200 - VOLTAGE TRANSFORMER TEST	
GENERATOR SWITCHGEAR	GENERATOR2	16100 - VACUUM CIRCUIT BREAKER_R01-23	
GENERATOR SWITCHGEAR	GENERATOR2	27200 - VOLTAGE TRANSFORMER TEST	
GENERATOR SWITCHGEAR	LOAD BANK	16100 - VACUUM CIRCUIT BREAKER_R01-23	
GENERATOR SWITCHGEAR	SWITCHGEAR	27200 - VOLTAGE TRANSFORMER TEST	
GENERATOR SWITCHGEAR	SWITCHGEAR	50976 - SWITCHGEAR INSP AND TEST_R03-23	
PRIMARY SWITCHGEAR	52F1SP	16100 - VACUUM CIRCUIT BREAKER_R01-23	
PRIMARY SWITCHGEAR	52F2SP	16100 - VACUUM CIRCUIT BREAKER_R01-23	
PRIMARY SWITCHGEAR	BUS 1 -2 TIE BKR 52T	16100 - VACUUM CIRCUIT BREAKER_R01-23	
PRIMARY SWITCHGEAR	BUS 1 MAIN BKR 52M1	16100 - VACUUM CIRCUIT BREAKER_R01-23	
PRIMARY SWITCHGEAR	BUS 1-2 ISOLATION BKR 521B	16100 - VACUUM CIRCUIT BREAKER_R01-23	
PRIMARY SWITCHGEAR	BUS 1-3 TIE BKR 52GT1	16100 - VACUUM CIRCUIT BREAKER_R01-23	
PRIMARY SWITCHGEAR	BUS 2 MAIN BKR 52M2	16100 - VACUUM CIRCUIT BREAKER_R01-23	
PRIMARY SWITCHGEAR	BUS 2-3 TIE BKR 52GT2	16100 - VACUUM CIRCUIT BREAKER_R01-23	
PRIMARY SWITCHGEAR	MAIN BUS 1	27200 - VOLTAGE TRANSFORMER TEST	
PRIMARY SWITCHGEAR	MAIN BUS 1	50976 - SWITCHGEAR INSP AND TEST_R03-23	
PRIMARY SWITCHGEAR	MAIN BUS 2	27200 - VOLTAGE TRANSFORMER TEST	
PRIMARY SWITCHGEAR	MAIN BUS 2	50976 - SWITCHGEAR INSP AND TEST_R03-23	
PRIMARY SWITCHGEAR	SUB 1 - RSLS 52F 21	16100 - VACUUM CIRCUIT BREAKER_R01-23	
PRIMARY SWITCHGEAR	SUB 1-RSLS 52F11	16100 - VACUUM CIRCUIT BREAKER_R01-23 (2)	
PRIMARY SWITCHGEAR	SUB 2 - EQ 52F12	16100 - VACUUM CIRCUIT BREAKER_R01-23	
PRIMARY SWITCHGEAR	SUB 2 - EQ 52F22	16100 - VACUUM CIRCUIT BREAKER_R01-23	
PRIMARY SWITCHGEAR	SUB 3 - WBB 52F13	16100 - VACUUM CIRCUIT BREAKER_R01-23 (3)	
PRIMARY SWITCHGEAR	SUB 3 - WBB 52F23	16100 - VACUUM CIRCUIT BREAKER_R01-23	
PRIMARY SWITCHGEAR	SUB 4 - TF 52F14	16100 - VACUUM CIRCUIT BREAKER_R01-23	
PRIMARY SWITCHGEAR	SUB 4 - TF 52F24	16100 - VACUUM CIRCUIT BREAKER_R01-23	
PRIMARY SWITCHGEAR	SUB 5 - SH 52F15	16100 - VACUUM CIRCUIT BREAKER_R01-23	
PRIMARY SWITCHGEAR	SUB 5-SH 52F25	16100 - VACUUM CIRCUIT BREAKER_R01-23	
PRIMARY SWITCHGEAR	SUB 7 -CEB 52F17	16100 - VACUUM CIRCUIT BREAKER_R01-23	

Table of Contents
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Substation	Position	Equipment	Page
PRIMARY SWITCHGEAR	SUB 7-CEB 52F27	16100 - VACUUM CIRCUIT BREAKER_R01-23	
PRIMARY SWITCHGEAR	SUB 8 - EBB 52F18	16100 - VACUUM CIRCUIT BREAKER_R01-23	
PRIMARY SWITCHGEAR	SUB 8-EBB 52F28	16100 - VACUUM CIRCUIT BREAKER_R01-23	
SUBSTATION 1	480V SWITCHGEAR BUS A	50976 - SWITCHGEAR INSP AND TEST_R02-23	
SUBSTATION 1	480V SWITCHGEAR BUS B	50976 - SWITCHGEAR INSP AND TEST_R02-23	
SUBSTATION 1	MAIN A 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 1	MAIN B 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 1	MCC-C 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 1	MCC-D 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 1	MCC-RLS-A	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 1	MCC-RLS-A	30100 - MOTOR CONTROL CENTER INSULATION	
SUBSTATION 1	MCC-RLS-A	50400 - SWITCHBOARD BUSS CONNECTION TEST	
SUBSTATION 1	MCC-RLS-A 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 1	MCC-RLS-B	15930 - MOLDED CASE CIRCUIT BREAKER_R02-23	
SUBSTATION 1	MCC-RLS-B	30100 - MOTOR CONTROL CENTER INSULATION	
SUBSTATION 1	MCC-RLS-B	50400 - SWITCHBOARD BUSS CONNECTION TEST	
SUBSTATION 1	MCC-RLS-B 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 1	PRIMARY SWITCH A	29000 - LOADBREAK DISCONNECT_R03-23	
SUBSTATION 1	PRIMARY SWITCH B	29000 - LOADBREAK DISCONNECT_R03-23	
SUBSTATION 1	SPARE A 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 1	SPARE B 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 1	TIE 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 1	XFMR 1	56750 - XFMR MAINTENANCE AND INSP_R05-23	
SUBSTATION 1	XFMR 2	56750 - XFMR MAINTENANCE AND INSP_R05-23	
SUBSTATION 2	480V SWITCHGEAR BUS A	50976 - SWITCHGEAR INSP AND TEST_R02-23	
SUBSTATION 2	480V SWITCHGEAR BUS B	50976 - SWITCHGEAR INSP AND TEST_R02-23	
SUBSTATION 2	MAIN A 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 2	MAIN B 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 2	MCC-E	30100 - MOTOR CONTROL CENTER INSULATION	
SUBSTATION 2	MCC-E	50400 - SWITCHBOARD BUSS CONNECTION TEST	
SUBSTATION 2	MCC-E 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 2	MCC-F	30100 - MOTOR CONTROL CENTER INSULATION (2)	
SUBSTATION 2	MCC-F	50400 - SWITCHBOARD BUSS CONNECTION TEST	
SUBSTATION 2	MCC-F 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 2	PRIMARY SWITCH MAIN A	29000 - LOADBREAK DISCONNECT_R03-23	
SUBSTATION 2	PRIMARY SWITCH MAIN B	29000 - LOADBREAK DISCONNECT_R03-23	
SUBSTATION 2	SPARE 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 2	TIE 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 2	XFMR 1	56750 - XFMR MAINTENANCE AND INSP_R05-23	
SUBSTATION 2	XFMR 2	56750 - XFMR MAINTENANCE AND INSP_R05-23	
SUBSTATION 3	480V SWITCHGEAR BUS A	50976 - SWITCHGEAR INSP AND TEST_R02-23	
SUBSTATION 3	480V SWITCHGEAR BUS B	50976 - SWITCHGEAR INSP AND TEST_R02-23	

Table of Contents
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Substation	Position	Equipment	Page
SUBSTATION 3	ISOLATION 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 3	MAIN A 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 3	MAIN B 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 3	MCC-WBB-A	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 3	MCC-WBB-A	30100 - MOTOR CONTROL CENTER INSULATION	
SUBSTATION 3	MCC-WBB-A	50400 - SWITCHBOARD BUSS CONNECTION TEST	
SUBSTATION 3	MCC-WBB-A 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 3	MCC-WBB-B	30100 - MOTOR CONTROL CENTER INSULATION	
SUBSTATION 3	MCC-WBB-B	50400 - SWITCHBOARD BUSS CONNECTION TEST	
SUBSTATION 3	MCC-WBB-B 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 3	MCC-WPB-A	15930 - MOLDED CASE CIRCUIT BREAKER_R02-23	
SUBSTATION 3	MCC-WPB-A	30100 - MOTOR CONTROL CENTER INSULATION	
SUBSTATION 3	MCC-WPB-A	50400 - SWITCHBOARD BUSS CONNECTION TEST	
SUBSTATION 3	MCC-WPB-A 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 3	MCC-WPB-B	15930 - MOLDED CASE CIRCUIT BREAKER_R02-23	
SUBSTATION 3	MCC-WPB-B	30100 - MOTOR CONTROL CENTER INSULATION	
SUBSTATION 3	MCC-WPB-B	50400 - SWITCHBOARD BUSS CONNECTION TEST	
SUBSTATION 3	MCC-WPB-B 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 3	PRIMARY SWITCH MAIN A	29000 - LOADBREAK DISCONNECT_R03-23	
SUBSTATION 3	PRIMARY SWITCH MAIN B	29000 - LOADBREAK DISCONNECT_R03-23	
SUBSTATION 3	SPARE-A 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 3	SPARE-B 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 3	TIE 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 3	XFMR 1	56750 - XFMR MAINTENANCE AND INSP_R05-23	
SUBSTATION 3	XFMR 3	56750 - XFMR MAINTENANCE AND INSP_R05-23	
SUBSTATION 4	480V SWITCHGEAR BUS A	50976 - SWITCHGEAR INSP AND TEST_R02-23	
SUBSTATION 4	480V SWITCHGEAR BUS B	50976 - SWITCHGEAR INSP AND TEST_R02-23	
SUBSTATION 4	MAIN 480V BREAKER A	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 4	MAIN 480V BREAKER B	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 4	MCC-M	30100 - MOTOR CONTROL CENTER INSULATION	
SUBSTATION 4	MCC-M	50400 - SWITCHBOARD BUSS CONNECTION TEST	
SUBSTATION 4	MCC-M FEEDER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 4	MCC-N	30100 - MOTOR CONTROL CENTER INSULATION	
SUBSTATION 4	MCC-N	50400 - SWITCHBOARD BUSS CONNECTION TEST	
SUBSTATION 4	MCC-N FEEDER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 4	MCC-P	30100 - MOTOR CONTROL CENTER INSULATION	
SUBSTATION 4	MCC-P	50400 - SWITCHBOARD BUSS CONNECTION TEST	
SUBSTATION 4	MCC-P FEEDER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 4	MCC-Q	30100 - MOTOR CONTROL CENTER INSULATION	
SUBSTATION 4	MCC-Q	50400 - SWITCHBOARD BUSS CONNECTION TEST	
SUBSTATION 4	MCC-Q FEEDER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_RC	
SUBSTATION 4	PRIMARY SWITCH MAIN A	29000 - LOADBREAK DISCONNECT_R03-23	

Table of Contents
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Substation	Position	Equipment	Page
SUBSTATION 4	PRIMARY SWITCH MAIN B	29000 - LOADBREAK DISCONNECT_R03-23	
SUBSTATION 4	TB-US 46 FEEDER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 4	TIE	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 4	UV-2A FEEDER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 4	UV-2B FEEDER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 4	XFMR 1	56750 - XFMR MAINTENANCE AND INSP_R05-23	
SUBSTATION 4	XFMR 2	56750 - XFMR MAINTENANCE AND INSP_R05-23	
SUBSTATION 5	480V SWITCHGEAR BUS A	50976 - SWITCHGEAR INSP AND TEST_R02-23	
SUBSTATION 5	480V SWITCHGEAR BUS B	50976 - SWITCHGEAR INSP AND TEST_R02-23	
SUBSTATION 5	CFG-1 FEEDER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 5	CFG-2 FEEDER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 5	FEEDER CFG-3	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 5	FEEDER F2H SPARE	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 5	FEEDER F5A SPARE	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 5	FEEDER F8D SPARE	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 5	MAIN A	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 5	MAIN B	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 5	MCC 51A FEEDER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 5	MCC 51B FEEDER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 5	MCC 52A FEEDER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 5	MCC 52B FEEDER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 5	MCC 53A FEEDER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 5	MCC 53B FEEDER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 5	MCC 54A FEEDER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 5	MCC 55A FEEDER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 5	MCC 56A FEEDER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 5	MCC-51-A	15930 - MOLDED CASE CIRCUIT BREAKER_R02-23	
SUBSTATION 5	MCC-51-A	30100 - MOTOR CONTROL CENTER INSULATION	
SUBSTATION 5	MCC-51-A	50400 - SWITCHBOARD BUSS CONNECTION TEST	
SUBSTATION 5	MCC-51-B	15930 - MOLDED CASE CIRCUIT BREAKER_R02-23	
SUBSTATION 5	MCC-51-B	30100 - MOTOR CONTROL CENTER INSULATION	
SUBSTATION 5	MCC-51-B	50400 - SWITCHBOARD BUSS CONNECTION TEST	
SUBSTATION 5	MCC-52-A	15930 - MOLDED CASE CIRCUIT BREAKER_R02-23	
SUBSTATION 5	MCC-52-A	30100 - MOTOR CONTROL CENTER INSULATION	
SUBSTATION 5	MCC-52-A	50400 - SWITCHBOARD BUSS CONNECTION TEST	
SUBSTATION 5	MCC-52-B	15930 - MOLDED CASE CIRCUIT BREAKER_R02-23	
SUBSTATION 5	MCC-52-B	30100 - MOTOR CONTROL CENTER INSULATION	
SUBSTATION 5	MCC-52-B	50400 - SWITCHBOARD BUSS CONNECTION TEST	
SUBSTATION 5	MCC-53-A	15930 - MOLDED CASE CIRCUIT BREAKER_R02-23	
SUBSTATION 5	MCC-53-A	30100 - MOTOR CONTROL CENTER INSULATION	
SUBSTATION 5	MCC-53-A	50400 - SWITCHBOARD BUSS CONNECTION TEST	
SUBSTATION 5	MCC-53-B	15930 - MOLDED CASE CIRCUIT BREAKER_R02-23	

Table of Contents
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Substation	Position	Equipment	Page
SUBSTATION 5	MCC-53-B	30100 - MOTOR CONTROL CENTER INSULATION	
SUBSTATION 5	MCC-53-B	50400 - SWITCHBOARD BUSS CONNECTION TEST	
SUBSTATION 5	MCC-54 BUS B FEEDER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 5	MCC-54-A	15930 - MOLDED CASE CIRCUIT BREAKER_R02-23	
SUBSTATION 5	MCC-54-A	30100 - MOTOR CONTROL CENTER INSULATION	
SUBSTATION 5	MCC-54-A	50400 - SWITCHBOARD BUSS CONNECTION TEST	
SUBSTATION 5	MCC-54-B	15930 - MOLDED CASE CIRCUIT BREAKER_R02-23	
SUBSTATION 5	MCC-54-B	30100 - MOTOR CONTROL CENTER INSULATION	
SUBSTATION 5	MCC-54-B	50400 - SWITCHBOARD BUSS CONNECTION TEST	
SUBSTATION 5	MCC-55 BUS B FEEDER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 5	MCC-55-A	15930 - MOLDED CASE CIRCUIT BREAKER_R02-23	
SUBSTATION 5	MCC-55-A	30100 - MOTOR CONTROL CENTER INSULATION	
SUBSTATION 5	MCC-55-A	50400 - SWITCHBOARD BUSS CONNECTION TEST	
SUBSTATION 5	MCC-55-B	15930 - MOLDED CASE CIRCUIT BREAKER_R02-23	
SUBSTATION 5	MCC-55-B	30100 - MOTOR CONTROL CENTER INSULATION	
SUBSTATION 5	MCC-55-B	50400 - SWITCHBOARD BUSS CONNECTION TEST	
SUBSTATION 5	MCC-56 BUS B FEEDER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 5	MCC-56-A	15930 - MOLDED CASE CIRCUIT BREAKER_R02-23	
SUBSTATION 5	MCC-56-A	30100 - MOTOR CONTROL CENTER INSULATION	
SUBSTATION 5	MCC-56-A	50400 - SWITCHBOARD BUSS CONNECTION TEST	
SUBSTATION 5	MCC-56-B	15930 - MOLDED CASE CIRCUIT BREAKER_R02-23	
SUBSTATION 5	MCC-56-B	30100 - MOTOR CONTROL CENTER INSULATION	
SUBSTATION 5	MCC-56-B	50400 - SWITCHBOARD BUSS CONNECTION TEST	
SUBSTATION 5	PRIMARY SWITCH MAIN A	29000 - LOADBREAK DISCONNECT_R03-23	
SUBSTATION 5	PRIMARY SWITCH MAIN B	29000 - LOADBREAK DISCONNECT_R03-23	
SUBSTATION 5	SPARE	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 5	TIE	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 5	XFMR 1	56750 - XFMR MAINTENANCE AND INSP_R05-23	
SUBSTATION 5	XFMR 2	56750 - XFMR MAINTENANCE AND INSP_R05-23	
SUBSTATION 6	480V SWITCHGEAR BUS A	50976 - SWITCHGEAR INSP AND TEST_R02-23	
SUBSTATION 6	480V SWITCHGEAR BUS B	50976 - SWITCHGEAR INSP AND TEST_R02-23	
SUBSTATION 6	MAIN A 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 6	MAIN B 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 6	MCC-EBB-A	30100 - MOTOR CONTROL CENTER INSULATION	
SUBSTATION 6	MCC-EBB-A	50400 - SWITCHBOARD BUSS CONNECTION TEST	
SUBSTATION 6	MCC-EBB-A 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 6	MCC-EBB-B	30100 - MOTOR CONTROL CENTER INSULATION	
SUBSTATION 6	MCC-EBB-B	50400 - SWITCHBOARD BUSS CONNECTION TEST	
SUBSTATION 6	MCC-EBB-B 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 6	MCC-EPB-A	15930 - MOLDED CASE CIRCUIT BREAKER_R02-23	
SUBSTATION 6	MCC-EPB-A	30100 - MOTOR CONTROL CENTER INSULATION	
SUBSTATION 6	MCC-EPB-A	50400 - SWITCHBOARD BUSS CONNECTION TEST	

Table of Contents
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Substation	Position	Equipment	Page
SUBSTATION 6	MCC-EPB-A 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 6	MCC-EPB-B	15930 - MOLDED CASE CIRCUIT BREAKER_R02-23	
SUBSTATION 6	MCC-EPB-B	30100 - MOTOR CONTROL CENTER INSULATION	
SUBSTATION 6	MCC-EPB-B	50400 - SWITCHBOARD BUSS CONNECTION TEST	
SUBSTATION 6	MCC-EPB-B 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 6	SPARE A 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 6	SPARE B 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 6	TIE 480V BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 6	XFMR 1	56750 - XFMR MAINTENANCE AND INSP_R05-23 (2)	
SUBSTATION 6	XFMR 2	56750 - XFMR MAINTENANCE AND INSP_R05-23	
SUBSTATION 7	480V SWITCHGEAR BUS A	50976 - SWITCHGEAR INSP AND TEST_R02-23	
SUBSTATION 7	480V SWITCHGEAR BUS B	50976 - SWITCHGEAR INSP AND TEST_R02-23	
SUBSTATION 7	ATS-ADM-1	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 7	ATS-ADM-1A	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 7	ISOLATION BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 7	MAIN A	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 7	MAIN B	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 7	MCC-CEB A BREAKER	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 7	MCC-CEB-A&B	15930 - MOLDED CASE CIRCUIT BREAKER_R02-23	
SUBSTATION 7	MCC-CEB-A&B	30100 - MOTOR CONTROL CENTER INSULATION	
SUBSTATION 7	MCC-CEB-A&B	50400 - SWITCHBOARD BUSS CONNECTION TEST	
SUBSTATION 7	MCC-CEB-B	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 7	PP-MTB	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 7	TIE	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 7	UV-1A	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 7	UV-1B	15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R0	
SUBSTATION 7	XFMR 1	56750 - XFMR MAINTENANCE AND INSP_R05-23	
SUBSTATION 7	XFMR 2	56750 - XFMR MAINTENANCE AND INSP_R05-23	
SUBSTATION 8		34567 - MEMO	
SUBSTATION 8		34567 - MEMO (2)	
SUBSTATION 8		34567 - MEMO (3)	
SUBSTATION 8	4160V SWITCHGEAR	50000 - MV SWITCHBOARD INSULATION	
SUBSTATION 8	4160V SWITCHGEAR	50400 - SWITCHBOARD BUSS CONNECTION TEST	
SUBSTATION 8	A-BUS CPT	27400 - CONTROL POWER TRANSFORMER TEST	
SUBSTATION 8	A-BUS VTs	27200 - VOLTAGE TRANSFORMER TEST	
SUBSTATION 8	B-BUS CPT	27400 - CONTROL POWER TRANSFORMER TEST	
SUBSTATION 8	B-BUS VTs	27200 - VOLTAGE TRANSFORMER TEST	
SUBSTATION 8	FEEDER SPARE A	16100 - VACUUM CIRCUIT BREAKER_R01-23	
SUBSTATION 8	FEEDER SPARE B	16100 - VACUUM CIRCUIT BREAKER_R01-23	
SUBSTATION 8	FEEDER SUB 6A	16100 - VACUUM CIRCUIT BREAKER_R01-23	
SUBSTATION 8	FEEDER SUB 6B	16100 - VACUUM CIRCUIT BREAKER_R01-23	
SUBSTATION 8	ISOLATION BREAKER	16100 - VACUUM CIRCUIT BREAKER_R01-23	

Table of Contents
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Substation	Position	Equipment	Page
SUBSTATION 8	MAIN A	16100 - VACUUM CIRCUIT BREAKER_R01-23	
SUBSTATION 8	MAIN B	16100 - VACUUM CIRCUIT BREAKER_R01-23	
SUBSTATION 8	PAB E1 STARTER	31000 - MOTOR STARTER TEST_R01-23	
SUBSTATION 8	PAB E2 FEEDER	16100 - VACUUM CIRCUIT BREAKER_R01-23	
SUBSTATION 8	PAB E2 STARTER	31000 - MOTOR STARTER TEST_R01-23	
SUBSTATION 8	PAB E3 FEEDER	16100 - VACUUM CIRCUIT BREAKER_R01-23	
SUBSTATION 8	PAB E3 STARTER	31000 - MOTOR STARTER TEST_R01-23	
SUBSTATION 8	PAB-E1 FEEDER	16100 - VACUUM CIRCUIT BREAKER_R01-23	
SUBSTATION 8	PRIMARY SWITCH MAIN A	29000 - LOADBREAK DISCONNECT_R03-23	
SUBSTATION 8	PRIMARY SWITCH MAIN B	29000 - LOADBREAK DISCONNECT_R03-23	
SUBSTATION 8	TIE	16100 - VACUUM CIRCUIT BREAKER_R01-23	
SUBSTATION 8	XFMR 1	56750 - XFMR MAINTENANCE AND INSP_R05-23	
SUBSTATION 8	XFMR 2	56750 - XFMR MAINTENANCE AND INSP_R05-23	

AUTOMATIC TRANSFER SWITCH TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 2/14/2024 AMBIENT TEMPERATURE 24 °C HUMIDITY 14 % EQPT. LOCATION

SUBSTATION ADMIN POSITION ATS-ADM-1

NAMEPLATE DATA

MANUFACTURER ASCO (EMERSON NETWORK POWER) SERIAL NO. 1125962 RE TYPE ATS SWITCH

CATALOG NO. H7ADTS031000N5XL SYSTEM VOLTAGE 480 AMPACITY 1000

WIRING NO. 713505-004 CONTROLS TYPE: ☐ ELECTROMECHANICAL ☑ SOLID STATE ☑ MICROPROCESSOR

INSTALLED OPTIONS CONTROLLER MANUAL 381333-126

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Good	C
INSULATING MEMBERS	☑	Good	C
MECHANICAL CONNECTIONS	☑	Good	NA
STRUCTURAL MEMBERS	☑	Good	C
CUBICLE	☑	Good	C
RACKING DEVICES	☐	N/A	NA
CONTACT FINGERS	☑	Good	C
MAIN CONTACTS	☑	Good	C
ARCING CONTACTS	☑	Good	C
ARC CHUTES	☑	Good	C
OPERATING MECHANISM	☑	Good	C/L
CONTACT SEQUENCE	☐	N/A	NA
GROUND CONNECTION	☑	Good	NA
AUXILIARY DEVICES	☑	Good	C
LOAD CONDUCTOR NO./ PHASE:	SIZE:	KCM: ☐ CU ☐ AL	

POLE RESISTANCE

EQUIPMENT TEMPERATURE 24 °C TEMPERATURE CORRECTION FACTOR 20°C, TCF 0.984526

R_T = TOTAL POLE RESISTANCE AT 85°C
R_M = TOTAL POLE RESISTANCE AT TEST TEMPERATURE
T_S = TEMPERATURE FOR DESIRED RESISTANCE (20°C)
T_M = AMBIENT TEMPERATURE
T_K = TEMP. RESISTANCE CONSTANT (°C)

COPPER = 234.5°C

$$R_T = R_M \frac{T_S + T_K}{T_M + T_K}$$

NORMAL				
POLE	AS FOUND	20°C	AS LEFT	20°C
A	98.7	97	75.4	74
B	146	144	75.8	75
C	90	89	70.5	69
N				

MICRO-OHMS LINE TO LOAD

EMERGENCY				
POLE	AS FOUND	20°C	AS LEFT	20°C
A	114.7	113	69.7	69
B	88.7	87	78.7	77
C	91.4	90	78.9	78
N				

MICRO-OHMS LINE TO LOAD

COMMENTS:

DEFICIENCIES:

TESTED BY: B. BURGESS

TRANSFORMER MAINTENANCE AND INSPECTION

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 2/14/2024 | AMBIENT TEMPERATURE: 14 °C | HUMIDITY: 19 % | EQPT. LOCATION: ADMIN BUILDING
SUBSTATION: ADMIN | POSITION: LP-ADM-1-XFMR

NAMEPLATE DATA

MANUFACTURER: SQUARE D | YR MFR: 2011 | SERIAL NO.: 2121212041A
IMPEDANCE: 3.07 % | NUMBER OF FANS: | WEIGHT: 716 LBS | TYPE: SO | CLASS: AA / /
KVA: 75 / / | WINDING MATERIAL: | TEMPERATURE RISE: 115 °C | B.I.L. RATING: /
PRIMARY V: 480 | DELTA | MFR LOCATION: MEXICO
SECONDARY V: 208 / 120.085 | WYE | ☑ EXPOSED NEUTRAL - X0 | TANK TYPE: VENTED
TAP VOLTAGES: 500 | 490 | 480 | 470 | 455 | INSULATING MATERIAL: PAPER
TAP POSITION: 1 | 2 | 3 | 4 | 5 | WINDING INSUATING SYSTEM: OPEN-WOUND
TAP SETTING: 3 | 480 V | ☑ HIGH SIDE TAP | ☐ LOW SIDE TAP

VISUAL AND MECHANICAL INSPECTION

	Description	NOTES
☑	REASON FOR INSPECTION	ROUTINE
☑	CHECK FOR SIGNS OF OVERHEATING, DISCOLORATION	GOOD
☑	ENCLOSURE (OPENINGS, COVERS, PAINT, ETC)	GOOD
☑	CHECK ALL CONNECTIONS TIGHT	GOOD
☐	IMPROPER TERMINATIONS	NA
☑	EQUIPMENT GROUND/GROUND BAR	GOOD
☐	CORE GROUND	NA
☑	NEUTRAL BAR	GOOD
☑	PRIMARY SIDE (CABLE OR BUSS)	GOOD

	Description	NOTES
☑	SECONDARY SIDE (CABLE OR BUSS)	GOOD
☑	CLEAN AND INSPECT INSULATORS, SUPPORTS, AND BARRIERS	GOOD
☑	CLEAN CORE, COIL, AND ENCLOSURE (INTERIOR/EXTERIOR)	GOOD
☑	CORE AND COIL BRACING	GOOD
☑	VIBRATION ISOLATATION PADS	GOOD
☑	PROPER CLEARANCE (36 INCHES UNOBSTRUCTED)	GOOD
☐	CONTROL WIRING	NA
☐	COOLING FANS	NA
☐	ALARMS AND INDICATORS	NA

ELECTRICAL TESTS

INSULATION RESISTANCE (M-OHM)			
MINUTES	PRIMARY TO GROUND	SECONDARY TO GROUND	PRIMARY TO SECONDARY
Test kV	1	1	1
0.50	66,400		27,700
1.00	113,400		50,700
10.00	141,700		126,100
P. I. (10min/1min)	1.25		2.49

TRANSFORMER TURN RATIO TEST				
TAP	CALC	PHASE A	PHASE B	PHASE C
3	3.997	4.005	4.005	4.005
% ERROR		0.196%	0.209%	0.196%

EXTERNAL DOCUMENTS ATTACHED TO REPORT

COMMENTS: EXCITATION CURRENT - A 9.2mA B - 10.8mA C- 11.2mA
UNABLE TO ISOLATE TRANSFORMER FROM GROUND SO COULD NOT GET A SECONDARY TO GROUND READING.

DEFICIENCIES:

TESTED BY: K. ICKES

TRANSFORMER MAINTENANCE AND INSPECTION

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 2/14/2024 | AMBIENT TEMPERATURE: 20 °C | HUMIDITY: 15 % | EQPT. LOCATION:
SUBSTATION: ADMIN | POSITION: LP-ADM-2-XFMR

NAMEPLATE DATA

MANUFACTURER: SQUARE D | YR MFR: 2011 | SERIAL NO.: 006500101776
IMPEDANCE: 3.9 % | NUMBER OF FANS: 0 | WEIGHT: 535 LBS | TYPE: S | CLASS: AA / /
KVA: 50 / / | WINDING MATERIAL: COPPER | TEMPERATURE RISE: 115 °C | B.I.L. RATING: /
PRIMARY V: 480 / 277.12 | WYE | ☑ EXPOSED NEUTRAL - H0 | MFR LOCATION: U.S.A
SECONDARY V: 240 / 138.56 | WYE | ☑ EXPOSED NEUTRAL - X0 | TANK TYPE: VENTED
TAP VOLTAGES: 506 | 493 | 480 | 467 | 454 | INSULATING MATERIAL: PAPER
TAP POSITION: 1 | 2 | 3 | 4 | 5 | WINDING INSUATING SYSTEM: OPEN-WOUND
TAP SETTING: 3 | 480 V | ☑ HIGH SIDE TAP | ☐ LOW SIDE TAP

VISUAL AND MECHANICAL INSPECTION

	Description	NOTES
☑	REASON FOR INSPECTION	ROUTINE
☑	CHECK FOR SIGNS OF OVERHEATING, DISCOLORATION	GOOD
☑	ENCLOSURE (OPENINGS, COVERS, PAINT, ETC)	GOOD
☑	CHECK ALL CONNECTIONS TIGHT	GOOD
☐	IMPROPER TERMINATIONS	NA
☑	EQUIPMENT GROUND/GROUND BAR	GOOD
☐	CORE GROUND	NA
☑	NEUTRAL BAR	GOOD
☑	PRIMARY SIDE (CABLE OR BUSS)	GOOD

	Description	NOTES
☑	SECONDARY SIDE (CABLE OR BUSS)	GOOD
☑	CLEAN AND INSPECT INSULATORS, SUPPORTS, AND BARRIERS	GOOD
☑	CLEAN CORE, COIL, AND ENCLOSURE (INTERIOR/EXTERIOR)	GOOD
☑	CORE AND COIL BRACING	GOOD
☑	VIBRATION ISOLATATION PADS	GOOD
☑	PROPER CLEARANCE (36 INCHES UNOBSTRUCTED)	GOOD
☐	CONTROL WIRING	NA
☐	COOLING FANS	NA
☐	ALARMS AND INDICATORS	NA

ELECTRICAL TESTS

INSULATION RESISTANCE (Mohm)			
MINUTES	PRIMARY TO GROUND	SECONDARY TO GROUND	PRIMARY TO SECONDARY
Test kV	1	1	1
0.50	49,600	12,500	62,100
1.00	112,300	18,700	118,600
10.00	571,000	22,400	915,000
P. I. (10min/1min)	5.09	1.20	7.71

TRANSFORMER TURN RATIO TEST				
TAP	CALC	PHASE A	PHASE B	PHASE C
3	2.000	2.004		
% ERROR		0.200%		

EXTERNAL DOCUMENTS ATTACHED TO REPORT

COMMENTS: INSULATION RESISTANCE TEST RESULTS INCLUDE PRIMARY AND SECONDARY CABLES. TRANSFORMER IS A SINGLE PHASE
DEFICIENCIES:

TESTED BY: K. ICKES

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 2/14/2024 | AMBIENT TEMPERATURE: 20 °C | HUMIDITY: 40 % | EQPT. LOCATION:
SUBSTATION: ADMIN | POSITION: MCC-ADM-A

NAMEPLATE DATA

MANUFACTURER: SQUARE D | SERIAL NO.: 0-519753 | TYPE: 12
CATALOG NO.: N/A | DRAWING NO.: N/A | VOLTAGE CLASS: 600
MAIN BUS RATING: 800 A | MAIN BUS NEUTRAL RATING: N/A A | CONDUCTOR: (●) CU ( ) AL
CURRENT WITHSTAND RATING: | NUMBER OF SECTIONS: 37 | LISTING: [x] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER: 1 | MLO: 0 | TYPE: | AMPACITY: 800 | MAIN DISCONNECT: NA | FUSE TYPE: NA | SIZE: NA
TOTAL POSITIONS EQUIPPED: 23 | NO. OF SPARE SPACES: 14 | TOTAL POSITIONS USED: 23

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Good	C
INSULATING MEMBERS	☑	Good	NA
CUBICLES	☑	Good	C
GROUND CONNECTIONS	☑	Good	NA
AUXILIARY DEVICES	☐	N/A	NA

TEST VOLTAGE: 1 KVDC | EQUIPMENT TEMPERATURE: 20 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 1

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
MCC-ADM-A MAIN BUS	RDG.	325,000	401,000	380,000		651,000	476,000	527,000			
	20°C	325,000	401,000	380,000		651,000	476,000	527,000			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS: NO NEUTRAL
DEFICIENCIES:

TESTED BY: K. ICKES

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR
PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105
JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI
TELEPHONE:

DATE: 2/14/2024 AMBIENT TEMPERATURE: 18 °C HUMIDITY: 14 % EQPT. LOCATION:
SUBSTATION: ADMIN POSITION: MCC-ADM-A

NAMEPLATE DATA

MANUFACTURER: SQUARE D SERIAL NO.: 0-519753 TYPE: UL
CATALOG NO.: NA DRAWING NO.: NA VOLTAGE CLASS: 600
PHASE AMPACITY: 800 A WITHSTAND RATING: NA KA CONDUCTOR: (•) CU ( ) AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
ML	ADM-P-3	543.3	576.7	573.9									
ML	ADM-EF-1	644.4	771.6	715									
ML	ADM-CH-1	430.7	400.8	375.8									
ML	ADM-P-4	881.7	835.2	924.2									
ML	ADM-EF-2	999.4	988.2	1125									
ML	ADM-ACU-1	464.3	446.3	423									
ML	SWP-LCP	367.9	331.7	306									
ML	ADM-ACCU-1	769	749.7	718.5									
ML	LP-ADM-1	474.8	448.2	402.3									
ML	ADM-P1	891.6	715.8	754.1									
ML	PP-ADM-1	375.9	373.5	362.4									
ML	LP-ADM-2	388	351.5	334									
ML	ADM-EWH-1	872.7	828.2	766									
ML	ADM-EWH-2	845.1	824.3	799.8									
ML	SWPSOSG	844.8	774.5	830.3									
ML	EWH-1	650	662.2	609									
ML	ECP	892.6	885	874.8									
ML	ADM-P2	860.1	949.9	953.6									
ML	ADM-HVAC-1	842.6	845.5	793									
ML	ADM-HVAC-2	859.4	838.9	840.6									
ML	END	550.4	527.1	493.5									

COMMENTS:
DEFICIENCIES:

TESTED BY: K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 2/14/2024 | AMBIENT TEMPERATURE: 21 °C | HUMIDITY: 15 % | ASSET #:
SUBSTATION: ADMIN | POSITION: MCC-ADM-A 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	064161263101	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	PL-800	SENSOR TAPS	800	MOUNTING	○ D.O. ◉ B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	N/A	ELECTRICALLY OPERATED	○ YES ◉ NO
TRIP UNIT TYPE	MICROLOGIC 6.0	TRIP UNIT CAT #	N/A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C
CONTACT FINGERS	☑	GOOD	C
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA
GROUND CONNECTION	☑	GOOD	NA
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	0.8	X	800	A =	640	A		12	NA	
SENSOR TAP	800	SHORT	☑	5	X	800	A =	4,000	A		0.1	OFF	
		INST.	☑	15	X	800	A =	12,000	A		N/A	NA	
		GRD. FLT.	☑	0.3	X	800	A =	240	A		0.2	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	0.8	X	800	A =	640	A		12	NA	
SENSOR TAP	800	SHORT	☑	5	-	4,000	A						
		INST.	☑	15	-	12,000	A					NA	
		GRD. FLT.	☑	0.3	-	240	A				0.2	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.8	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	12	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time PU	5	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant PU	15	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault PU	0.3	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	18 °C	0.924

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	651,000	601,524	476,000	439,824	527,000	486,948
POLE TO FRAME	325,000	300,300	401,000	370,524	380,000	351,120
LINE TO LOAD	1,576,000	1,456,224	1,451,000	1,340,724	1,502,000	1,387,848

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
32.3	33.8	32.7

COUNTER END:

COMMENTS: INSULATION RESISTANCE TEST RESULTS INCLUDE CABLE GOING TO TRANSFER SWITCH
DEFICIENCIES:

TESTED BY: K. ICKES

TRANSFORMER MAINTENANCE AND INSPECTION

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 2/14/2024 | AMBIENT TEMPERATURE: 20 °C | HUMIDITY: 15 % | EQPT. LOCATION:
SUBSTATION: ADMIN | POSITION: PP-ADM-1 XFMR

NAMEPLATE DATA

MANUFACTURER: SQUARE D | YR MFR: 2011 | SERIAL NO.: 2120412038A
IMPEDANCE: 5.25 % | NUMBER OF FANS: 0 | WEIGHT: 938 LBS | TYPE: SO | CLASS: AA / /
KVA: 150 / / | WINDING MATERIAL: COPPER | TEMPERATURE RISE: 150 °C | B.I.L. RATING: /
PRIMARY V: 480 | DELTA | MFR LOCATION: MEXICO
SECONDARY V: 480 / 277.12 | WYE | ☑ EXPOSED NEUTRAL - X0 | TANK TYPE: VENTED
TAP VOLTAGES: 503 | 492 | 481 | 469 | 458 | INSULATING MATERIAL: PAPER
TAP POSITION: 1 | 2 | 3 | 4 | 5 | WINDING INSUATING SYSTEM: OPEN-WOUND
TAP SETTING: 3 | 481 V | ☑ HIGH SIDE TAP | ☐ LOW SIDE TAP

VISUAL AND MECHANICAL INSPECTION

	Description	NOTES
☑	REASON FOR INSPECTION	ROUTINE
☑	CHECK FOR SIGNS OF OVERHEATING, DISCOLORATION	GOOD
☑	ENCLOSURE (OPENINGS, COVERS, PAINT, ETC)	GOOD
☑	CHECK ALL CONNECTIONS TIGHT	GOOD
☐	IMPROPER TERMINATIONS	NA
☑	EQUIPMENT GROUND/GROUND BAR	GOOD
☐	CORE GROUND	NA
☑	NEUTRAL BAR	GOOD
☑	PRIMARY SIDE (CABLE OR BUSS)	GOOD

	Description	NOTES
☑	SECONDARY SIDE (CABLE OR BUSS)	GOOD
☑	CLEAN AND INSPECT INSULATORS, SUPPORTS, AND BARRIERS	GOOD
☑	CLEAN CORE, COIL, AND ENCLOSURE (INTERIOR/EXTERIOR)	GOOD
☑	CORE AND COIL BRACING	GOOD
☑	VIBRATION ISOLATATION PADS	GOOD
☑	PROPER CLEARANCE (36 INCHES UNOBSTRUCTED)	GOOD
☐	CONTROL WIRING	NA
☐	COOLING FANS	NA
☐	ALARMS AND INDICATORS	NA

ELECTRICAL TESTS

INSULATION RESISTANCE (Mohm)			
MINUTES	PRIMARY TO GROUND	SECONDARY TO GROUND	PRIMARY TO SECONDARY
Test kV	1	1	1
0.50	72,900	14,700	112,600
1.00	129,700	34,600	179,800
10.00	600,000	97,100	509,000
P. I. (10min/1min)	4.63	2.81	2.83

TRANSFORMER TURN RATIO TEST				
TAP	CALC	PHASE A	PHASE B	PHASE C
3	1.736	1.737	1.737	1.737
% ERROR		0.074%	0.074%	0.074%

EXTERNAL DOCUMENTS ATTACHED TO REPORT

COMMENTS: RESULTS INCLUDE PRIMARY CABLE AND SECONDARY CABLE
EXCITATION CURRENT - A 13.9mA B - 10.9mA C- 13.8mA

DEFICIENCIES:

TESTED BY: K. ICKES

BATTERY CHARGER INSPECTION AND TESTING

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/22/2023 AMBIENT TEMPERATURE 19 °C HUMIDITY 50 % EQPT. LOCATION

SUBSTATION BATTERIES POSITION 120 V DC

BATTERY CHARGER NAMEPLATE INFORMATION

MANUFACTURER: SAFT APPLICATION: SWITCHGEAR MFG. DATE: NA

S/N: RA318366/867001 TYPE: AT10.1 SERVICE: MAINTENANCE`

INPUT: 480 OUTPUT: 130

INSPECTION CHECKLIST / REMARKS

☑ REASON FOR INSPECTION	MAINTENANCE
☑ CLEAN BATTERY, CUBICLES, WIRES, AND INSULATORS	GOOD
☑ CHECK FOR SIGNS OF OVERHEATING, DISCOLORATION	NONE
☑ ENCLOSURE (OPENINGS, COVERS, PAINT CONDITION, ETC.)	GOOD
☑ CHECK ALL CONNECTIONS TIGHT	GOOD
☑ LOOSE WIRING (CHECK FOR ABANDONED CIRCUITS)	GOOD
☑ IMPROPER TERMINATIONS	GOOD
☑ EQUIPMENT GROUND	NO BATTERY RACK GROUND
☑ PROPER CLEARANCE (36 INCHES UNOBSTRUCTED)	GOOD
☑ PANEL IDENTIFICATION (PANEL LABEL AND SCHEDULE)	GOOD
☑ AREA NEAT AND ORDERLY	GOOD
☑ VAULT PENETRATIONS PROPERLY FIREPROOFED	NONE
☑ INSTRUMENTATION, CONTROLS, ALARMS, AND INDICATORS	GOOD
☑ PROPER FLUID LEVELS IN BATTERIES (IF APPLICABLE)	SEALED FIAMM 4SLA100

TEST DATA

FLOAT VOLTAGE: 136.2 VOLTS / 1.7 AMPS DC VOLTS: 136.3

COMMENTS: AC RIPLE 1.4mV

DEFICIENCIES:

NEGATIVE TO GROUND 69.6 POSITIVE TO GROUND: 66.6

TESTED BY: S. FRY

125VDC BATTERY

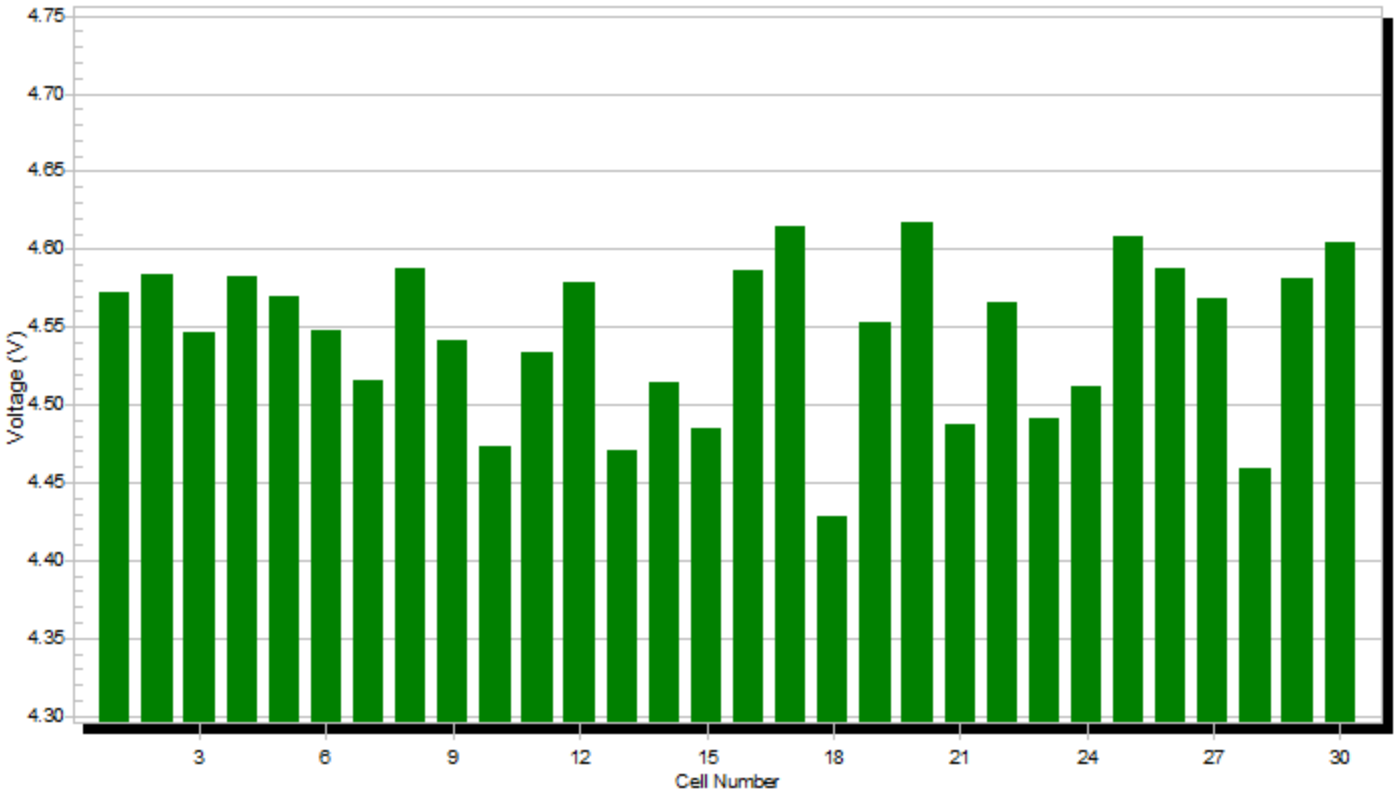
Battery Name: 125VDC BATTERY RACK
String Name: 125VDC BATTERY
Model Number: 4SLA150

Install Date: 06/20/2013
Location Name: ANN ARBOR WWTP

Readings taken on *12/22/2023*

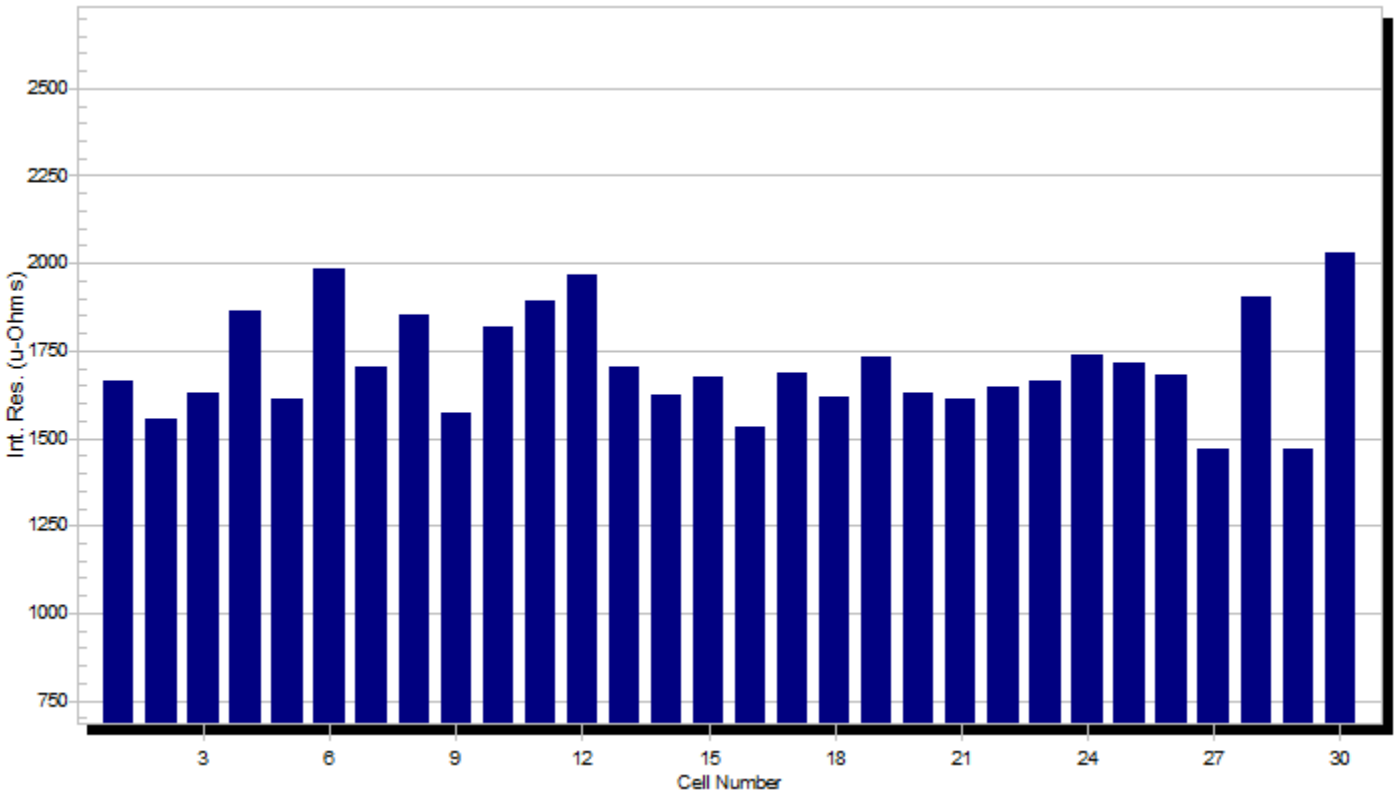
O.V. = 136.4

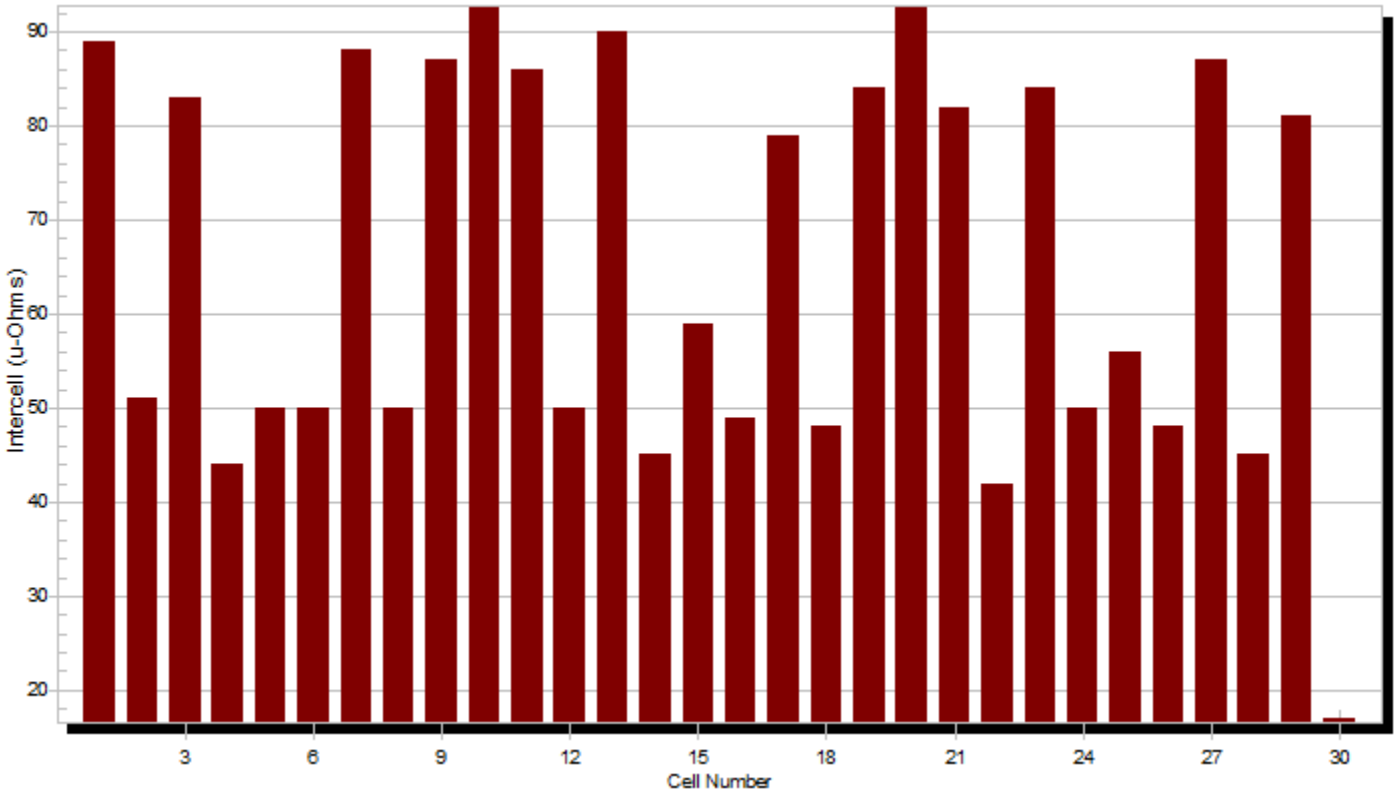
Cell/Jar	Voltage	Internal Res.	Intercell 1	Temp. (F)
1	4.572	1663	89	65.5
2	4.583	1555	51	65.5
3	4.546	1629	83	65.5
4	4.582	1862	44	65.5
5	4.569	1612	50	66.0
6	4.548	1982	50	66.0
7	4.515	1705	88	66.5
8	4.588	1852	50	66.0
9	4.541	1571	87	65.5
10	4.473	1818	322	65.5
11	4.534	1892	86	66.5
12	4.579	1964	50	65.5
13	4.470	1701	90	65.5
14	4.514	1626	45	65.5
15	4.485	1677	59	65.5
16	4.586	1531	49	65.5
17	4.615	1687	79	65.5
18	4.428	1619	48	65.5
19	4.553	1731	84	66.0
20	4.617	1627	347	66.0
21	4.487	1610	82	66.0
22	4.565	1644	42	64.5
23	4.491	1661	84	64.5
24	4.512	1736	50	64.5
25	4.608	1713	56	64.5
26	4.588	1680	48	64.5
27	4.568	1467	87	64.5
28	4.459	1904	45	64.5
29	4.581	1469	81	65.0
30	4.604	2029	17	65.0
Summary: **High**	4.617	2029	90	66.5
Avg	4.545	1707	63	65.4
Low	4.428	1467	17	64.5

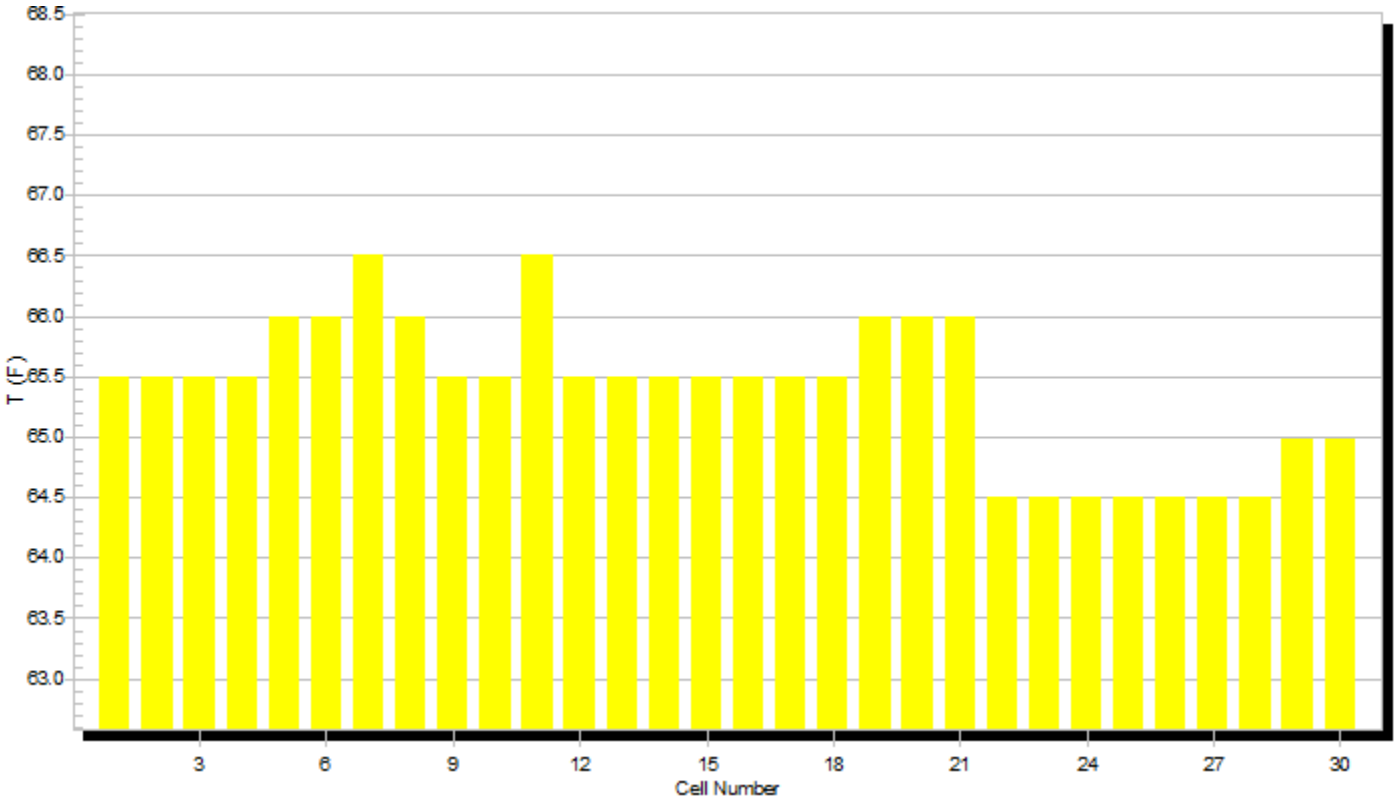


Battery Name: 125VDC BATTERY RACK
String Name: 125VDC BATTERY
Model Number: 4SLA150

Install Date: 06/20/2013
Location Name: ANN ARBOR WWTP







General Comments:

DEVIATION OF BATTERY STRAP RESISTANCES IS DUE TO THE LENGTH AND TYPE OF CONNECTION. ALL RESISTANCES ARE ACCEPTABLE.

SYSTEM POS. RESISTANCE MEASURED AT 19 MICRO OHMS

VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/21/2023 AMBIENT TEMPERATURE 19 °C HUMIDITY 23 % EQPT. LOCATION CENTRAL ELECTRICAL BUILDING

SUBSTATION GENERATOR SWITCHGEAR POSITION GENERATOR1

MANUFACTURER SQUARE D TYPE VR SERIAL NUMBER 1777420

MAXIMUM VOLTAGE 15 KV OPERATING VOLTAGE 13 KV MODEL NO. V5DB133Y000 DATE MANUFACTURED 10/2013

AMPACITY 1200 A INTERRUPTING CAPACITY 25 KA BIL 95 KV CONTROL VOLTAGE 132 VDC WEIGHT 380

TRIP COIL OPERATING VOLTAGE 70 - 140 VDC CLOSE COIL OPERATING VOLTAGE 100 - 140 VDC ELECTRICALLY OPERATED YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	19 °C	0.962

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	7,500,000	7,215,000	7,500,000	7,215,000	7,500,000	7,215,000
POLE TO FRAME	7,500,000	7,215,000	7,500,000	7,215,000	7,500,000	7,215,000
LINE TO LOAD	7,500,000	7,215,000	7,500,000	7,215,000	7,500,000	7,215,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.20	0.20	0.20
POLE RESISTANCE (½©)	34.0	30.0	30.0

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 27 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	0.0	0.0	0.0

COUNTER READING:
BEG 697
END 700

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, S. FRY

VOLTAGE TRANSFORMER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/21/2023 | AMBIENT TEMPERATURE: 19 °C | HUMIDITY: 23 % | EQPT. LOCATION: CENTRAL ELECTRICAL BUILDING
SUBSTATION: GENERATOR SWITCHGEAR | POSITION: GENERATOR1

NAMEPLATE DATA

MANUFACTURER: INSTRUMENT TRANSFORMER INC. | CATALOG NO.: PTG5-1-110-1322FC1 | TYPE: VT | NAMEPLATE RATIO: 110:1 :
PRIMARY VOLTAGE: 13,200 | SECONDARY VOLTAGE: 120 | KVA: 1.5 | CLASS: NA
Other: NA
PRIMARY FUSE: MANUFACTURER: BUSSMANN | TYPE: 15-5CAVH0-5E | SIZE: .5E | NO.: 3
SECONDARY FUSE: MANUFACTURER: BUSS | TYPE: BAF-5 | SIZE: 5AMP | NO.: 3

EQUIPMENT TEMPERATURE: 19 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 0.95

VT IDENTIFICATION: A PHASE | **SERIAL NUMBER:** 5378665961

TURNS RATIO TEST

CALCULATED TURNS RATIO: 110
MEASURED TURNS RATIO: 109.94
CONNECTIONS: H_0 H_1 X_0 X_1
POLARITY: POSATIVE | Error: 0.0545455 %

INSULATION TEST

				RDG.	20°C	
PRIMARY - SECONDARY	@ 2.5	kVDC		1,000,000	950,000	MEGOHMS
PRIMARY - GROUND	@ 2.5	kVDC		745,000	707,750	MEGOHMS
SECONDARY - GROUND	@ .5	kVDC		232,000	220,400	MEGOHMS

VT IDENTIFICATION: B PHASE | **SERIAL NUMBER:** 5378665960

TURNS RATIO TEST

CALCULATED TURNS RATIO: 110
MEASURED TURNS RATIO: 109.96
CONNECTIONS: H_0 H_2 X_0 X_2
POLARITY: POSATIVE | Error: 0.0363636 %

INSULATION TEST

				RDG.	20°C	
PRIMARY - SECONDARY	@ 2.5	kVDC		1,000,000	950,000	MEGOHMS
PRIMARY - GROUND	@ 2.5	kVDC		745,000	707,750	MEGOHMS
SECONDARY - GROUND	@ .5	kVDC		232,000	220,400	MEGOHMS

VT IDENTIFICATION: C PHASE | **SERIAL NUMBER:** 5378665959

TURNS RATIO TEST

CALCULATED TURNS RATIO: 110
MEASURED TURNS RATIO: 109.88
CONNECTIONS: H_0 H_3 X_0 X_3
POLARITY: POSATIVE | Error: 0.109091 %

INSULATION TEST

				RDG.	20°C	
PRIMARY - SECONDARY	@ 2.5	kVDC		1,000,000	950,000	MEGOHMS
PRIMARY - GROUND	@ 2.5	kVDC		745,000	707,750	MEGOHMS
SECONDARY - GROUND	@ .5	kVDC		232,000	220,400	MEGOHMS

VT CONNECTION: ○ 1 PHASE ◉ 3 PHASE | PRIMARY: ◉ WYE ○ DELTA | SECONDARY: ◉ WYE ○ DELTA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, S. FRY

VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/21/2023 AMBIENT TEMPERATURE 19 °C HUMIDITY 23 % EQPT. LOCATION

SUBSTATION GENERATOR SWITCHGEAR POSITION GENERATOR2

MANUFACTURER SQUARE D TYPE VR SERIAL NUMBER 1777419

MAXIMUM VOLTAGE 15 KV OPERATING VOLTAGE 13 KV MODEL NO. V5DB133Y000 DATE MANUFACTURED 10/2013

AMPACITY 1200 A INTERRUPTING CAPACITY 25 KA BIL 95 KV CONTROL VOLTAGE 132 VDC WEIGHT 380

TRIP COIL OPERATING VOLTAGE 70 - 140 VDC CLOSE COIL OPERATING VOLTAGE 100 - 140 VDC ELECTRICALLY OPERATED YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTIONS	☑	GOOD	C
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	19 °C	0.962

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	7,500,000	7,215,000	7,500,000	7,215,000	7,500,000	7,215,000
POLE TO FRAME	7,500,000	7,215,000	7,500,000	7,215,000	7,500,000	7,215,000
LINE TO LOAD	7,500,000	7,215,000	7,500,000	7,215,000	7,500,000	7,215,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.20	0.17	0.17
POLE RESISTANCE (½©)	30.0	31.0	29.0

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 27 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	0.0	0.0	0.0

COUNTER READING:
BEG 609
END 912

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, S. FRY

VOLTAGE TRANSFORMER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/21/2023 | AMBIENT TEMPERATURE: 19 °C | HUMIDITY: 23 % | EQPT. LOCATION: CENTRAL ELECTRICAL BUILDING
SUBSTATION: GENERATOR SWITCHGEAR | POSITION: GENERATOR2

NAMEPLATE DATA

MANUFACTURER: INSTRUMENT TRANSFORMER INC. | CATALOG NO.: PTG5-1-110-1322FC1 | TYPE: VT | NAMEPLATE RATIO: 110:1 :
PRIMARY VOLTAGE: 13,200 | SECONDARY VOLTAGE: 120 | KVA: 1.5 | CLASS: NA
Other: NA
PRIMARY FUSE: MANUFACTURER: BUSSMANN | TYPE: 15-5CAVH0-5E | SIZE: .5E | NO.: 3
SECONDARY FUSE: MANUFACTURER: BUSS | TYPE: BAF-5 | SIZE: 5AMP | NO.: 3

EQUIPMENT TEMPERATURE: 19 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 0.95

VT IDENTIFICATION: A PHASE | **SERIAL NUMBER:** 5378665958

TURNS RATIO TEST

CALCULATED TURNS RATIO: 110
MEASURED TURNS RATIO: 109.88
CONNECTIONS: H_0 H_1 X_0 X_1
POLARITY: POSATIVE | Error: 0.109091 %

INSULATION TEST

				RDG.	20°C	
PRIMARY - SECONDARY	@	2.5	kVDC	994,000	944,300	MEGOHMS
PRIMARY - GROUND	@	2.5	kVDC	1,185,000	1,125,750	MEGOHMS
SECONDARY - GROUND	@	.5	kVDC	649,000	616,550	MEGOHMS

VT IDENTIFICATION: B PHASE | **SERIAL NUMBER:** 5378665957

TURNS RATIO TEST

CALCULATED TURNS RATIO: 110
MEASURED TURNS RATIO: 109.82
CONNECTIONS: H_0 H_2 X_0 X_2
POLARITY: POSATIVE | Error: 0.163636 %

INSULATION TEST

				RDG.	20°C	
PRIMARY - SECONDARY	@	2.5	kVDC	994,000	944,300	MEGOHMS
PRIMARY - GROUND	@	2.5	kVDC	1,185,000	1,125,750	MEGOHMS
SECONDARY - GROUND	@	.5	kVDC	649,000	616,550	MEGOHMS

VT IDENTIFICATION: C PHASE | **SERIAL NUMBER:** 5378665956

TURNS RATIO TEST

CALCULATED TURNS RATIO: 110
MEASURED TURNS RATIO: 109.9
CONNECTIONS: H_0 H_3 X_0 X_3
POLARITY: POSATIVE | Error: 0.0909091 %

INSULATION TEST

				RDG.	20°C	
PRIMARY - SECONDARY	@	2.5	kVDC	994,000	944,300	MEGOHMS
PRIMARY - GROUND	@	2.5	kVDC	1,185,000	1,125,750	MEGOHMS
SECONDARY - GROUND	@	.5	kVDC	649,000	616,550	MEGOHMS

VT CONNECTION: ○ 1 PHASE ◉ 3 PHASE | PRIMARY: ◉ WYE ○ DELTA | SECONDARY: ◉ WYE ○ DELTA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, S. FRY

VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/21/2023 | AMBIENT TEMPERATURE: 19 °C | HUMIDITY: 23 % | EQPT. LOCATION: CENTRAL ELECTRIC BUILDING
SUBSTATION: GENERATOR SWITCHGEAR | POSITION: LOAD BANK

MANUFACTURER: SQUARE D | TYPE: VR | SERIAL NUMBER: 1777421
MAXIMUM VOLTAGE: 15 KV | OPERATING VOLTAGE: 13 KV | MODEL NO.: V5DB133Y000 | DATE MANUFACTURED: 10/2013
AMPACITY: 1200 A | INTERRUPTING CAPACITY: 25 KA | BIL: 95 KV | CONTROL VOLTAGE: 132 VDC | WEIGHT: 380
TRIP COIL OPERATING VOLTAGE: 70 - 140 VDC | CLOSE COIL OPERATING VOLTAGE: 100 - 140 VDC | ELECTRICALLY OPERATED: YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTIONS	☑	GOOD	C
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	19 °C	0.962

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	7,500,000	7,215,000	7,500,000	7,215,000	7,500,000	7,215,000
POLE TO FRAME	7,500,000	7,215,000	7,500,000	7,215,000	7,500,000	7,215,000
LINE TO LOAD	7,500,000	7,215,000	7,500,000	7,215,000	7,500,000	7,215,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.19	0.19	0.19
POLE RESISTANCE (½©)	28.0	29.0	30.0

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 27 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	0.0	0.0	0.0

COUNTER READING:
BEG: 131
END: 134

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, S. FRY

VOLTAGE TRANSFORMER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/21/2023 | AMBIENT TEMPERATURE: 19 °C | HUMIDITY: 23 % | EQPT. LOCATION: CENTRAL ELECTRICAL BUILDING
SUBSTATION: GENERATOR SWITCHGEAR | POSITION: SWITCHGEAR

NAMEPLATE DATA

MANUFACTURER: INSTRUMENT TRANSFORMER INC. | CATALOG NO.: PTG5-1-110-1322FC1 | TYPE: VT | NAMEPLATE RATIO: 110:1 :
PRIMARY VOLTAGE: 13,200 | SECONDARY VOLTAGE: 120 | KVA: 1.5 | CLASS: NA
Other: NA
PRIMARY FUSE: MANUFACTURER: BUSSMANN | TYPE: 15-5CAVH0-5E | SIZE: .5E | NO.: 3
SECONDARY FUSE: MANUFACTURER: BUSS | TYPE: BAF-5 | SIZE: 5AMP | NO.: 3

EQUIPMENT TEMPERATURE: 19 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 0.95

VT IDENTIFICATION: A PHASE | **SERIAL NUMBER:** 53786655

TURNS RATIO TEST

CALCULATED TURNS RATIO: 110
MEASURED TURNS RATIO: 109.9
CONNECTIONS: H_0 H_1 X_0 X_1
POLARITY: POSATIVE | Error: 0.0909091 %

INSULATION TEST

				RDG.	20°C	
PRIMARY - SECONDARY	@ 2.5	kVDC		1,080,000	1,026,000	MEGOHMS
PRIMARY - GROUND	@ 2.5	kVDC		871,000	827,450	MEGOHMS
SECONDARY - GROUND	@ .5	kVDC		1,500,000	1,425,000	MEGOHMS

VT IDENTIFICATION: B PHASE | **SERIAL NUMBER:** 53786654

TURNS RATIO TEST

CALCULATED TURNS RATIO: 110
MEASURED TURNS RATIO: 109.96
CONNECTIONS: H_0 H_2 X_0 X_2
POLARITY: POSATIVE | Error: 0.0363636 %

INSULATION TEST

				RDG.	20°C	
PRIMARY - SECONDARY	@ 2.5	kVDC		1,080,000	1,026,000	MEGOHMS
PRIMARY - GROUND	@ 2.5	kVDC		871,000	827,450	MEGOHMS
SECONDARY - GROUND	@ .5	kVDC		1,500,000	1,425,000	MEGOHMS

VT IDENTIFICATION: C PHASE | **SERIAL NUMBER:** 53786653

TURNS RATIO TEST

CALCULATED TURNS RATIO: 110
MEASURED TURNS RATIO: 109.88
CONNECTIONS: H_0 H_3 X_0 X_3
POLARITY: POSATIVE | Error: 0.109091 %

INSULATION TEST

				RDG.	20°C	
PRIMARY - SECONDARY	@ 2.5	kVDC		1,080,000	1,026,000	MEGOHMS
PRIMARY - GROUND	@ 2.5	kVDC		871,000	827,450	MEGOHMS
SECONDARY - GROUND	@ .5	kVDC		1,500,000	1,425,000	MEGOHMS

VT CONNECTION: ○ 1 PHASE ◉ 3 PHASE | PRIMARY: ◉ WYE ○ DELTA | SECONDARY: ◉ WYE ○ DELTA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, S. FRY

SWITCHGEAR INSPECTION AND TEST REPORT

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/21/2023 AMBIENT TEMPERATURE 19 °C HUMIDITY 23 % EQPT. LOCATION CENTRAL ELECTRICAL BUILDING

SUBSTATION GENERATOR SWITCHGEAR POSITION SWITCHGEAR

SWITCHGEAR NAMEPLATE

MANUFACTURER SQUARE D TYPE NA SN / SO NO. 17-28142137-001 MFG DATE NA

STYLE / CAT # / BUILD NUMBER NA SYSTEM VOLTAGE 13,200 RATED VOLTAGE 15,000 SERVICE 3 WIRE

BUS AMPACITIES 1200 OVERCURRENT DEVICE TYPE/CAT. RELAY INTERRUPT RATINGS 95KV/20KA

NEUTRAL NA Other NA

INSPECTION CHECKLIST / REMARKS

☑ REASON FOR INSPECTION	ROUTINE MAINTENANCE
☑ CLEAN SWITCHGEAR, CUBICLES, BUS, AND INSULATORS	NA
☑ OVERHEATING (CHECK FOR HOT SURFACES, DISCOLORATION)	NA
☑ CHECK FOR UNUSED OPENINGS	NA
☑ CHECK ELECTRICAL CONNECTIONS	NA
☑ VENTS AND FILTER	NA
☑ PROPER CLEARANCE	NA
☑ PANEL ID AND ARC FLASH WARNING (PANEL LABEL)	NEED ARC FLASH STICKERS
☑ INDICATING LIGHTS	NA
☑ INTERLOCKS	NA
☑ HEATERS	NONE
☑ PANEL SCREWS (MISSING, STRIPPED, ETC)	NA
☑ BARRIER BOARDS AND SHUTTER OPERATION	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	19 °C	0.962

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
PHASE TO PHASE	6,550,000	6,301,100	6,370,000	6,127,940	6,240,000	6,002,880
PHASE TO GND	3,090,000	2,972,580	3,500,000	3,367,000	3,400,000	3,270,800

DIELECTRIC WITHSTAND (mA)			
TEST VOLTAGE 27 KV			
Phase #1	Phase #2	Phase #3	Neutral
4	4	4	N/A

BUS BAR RESISTANCE (µ©)				
Ground	NEUTRAL	Phase #1	Phase #2	Phase #3
206	N/A	162	149	136

COMMENTS: CABLE 52G1 A-G 603,000 MEG OHM B-G 663,000 MEG OHMS C-G 603,000 MEG OHMS A-B 1,484,000 MEG OHMS B-C 1,403,000 MEG OHMS C-A 1,407,000 MEG OHMS. CABLE 52G2 A-G 519,000 MEG OHM B-G 526,000 MEG OHMS C-G 519,000 MEG OHMS A-B 1,208,000 MEG OHMS B-C 1,248,000 MEG OHMS C-A 1,268,000 MEG OHMS

DEFICIENCIES:

TESTED BY: K. HORST, S. FRY

VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 1/5/2024 AMBIENT TEMPERATURE 21 °C HUMIDITY 19 % EQPT. LOCATION CENTRAL ELECTRICAL BUILDING

SUBSTATION PRIMARY SWITCHGEAR POSITION 52F1SP

MANUFACTURER SQUARE D TYPE VR SERIAL NUMBER 17 77448

MAXIMUM VOLTAGE 15 KV OPERATING VOLTAGE 13 KV MODEL NO. V5DB133Y000 DATE MANUFACTURED 10/2013

AMPACITY 1200 A INTERRUPTING CAPACITY 25 KA BIL 95 KV CONTROL VOLTAGE 132 VDC WEIGHT 380

TRIP COIL OPERATING VOLTAGE 70 - 140 VDC CLOSE COIL OPERATING VOLTAGE 100 - 140 VDC ELECTRICALLY OPERATED YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	NEW	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	21 °C	1.05

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,290,000	3,454,500	2,920,000	3,066,000	2,900,000	3,045,000
POLE TO FRAME	3,120,000	3,276,000	1,272,000	1,335,600	7,500,000	7,875,000
LINE TO LOAD	7,500,000	7,875,000	7,500,000	7,875,000	7,500,000	7,875,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.19	0.19	0.19
POLE RESISTANCE (½©)	28.8	29.7	30.8

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 27 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	0.0	0.0	0.0

COUNTER READING:
BEG 552
END 553

COMMENTS:
DEFICIENCIES:

TESTED BY: K.HORST, C. KROUT, S. FRY, K. ICKES

VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 1/4/2024 | AMBIENT TEMPERATURE: 22 °C | HUMIDITY: 19 % | EQPT. LOCATION: CENTRAL ELECTRICAL BUILDING
SUBSTATION: PRIMARY SWITCHGEAR | POSITION: 52F2SP

MANUFACTURER: SQUARE D | TYPE: VR | SERIAL NUMBER: 17 77463
MAXIMUM VOLTAGE: 15 KV | OPERATING VOLTAGE: 13 KV | MODEL NO.: V5DB133Y000 | DATE MANUFACTURED: 10/2013
AMPACITY: 1200 A | INTERRUPTING CAPACITY: 25 KA | BIL: 95 KV | CONTROL VOLTAGE: 132 VDC | WEIGHT: 380
TRIP COIL OPERATING VOLTAGE: 70 - 140 VDC | CLOSE COIL OPERATING VOLTAGE: 100 - 140 VDC | ELECTRICALLY OPERATED: YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	NEW	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	22 °C	1.1

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,320,000	3,652,000	3,680,000	4,048,000	4,590,000	5,049,000
POLE TO FRAME	3,630,000	3,993,000	3,580,000	3,938,000	3,510,000	3,861,000
LINE TO LOAD	3,750,000	4,125,000	3,080,000	3,388,000	3,660,000	4,026,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.20	0.20	0.20
POLE RESISTANCE (½©)	28.5	28.4	29.1

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 27 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	0.0	0.0	0.0

COUNTER READING:
BEG 445
END 447

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY, K. ICKES

VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 1/5/2024 | AMBIENT TEMPERATURE: 21 °C | HUMIDITY: 19 % | EQPT. LOCATION: CENTRAL ELECTRICAL BUILDING
SUBSTATION: PRIMARY SWITCHGEAR | POSITION: BUS 1 -2 TIE BKR 52T

MANUFACTURER: SQUARE D | TYPE: VR | SERIAL NUMBER: 17 77451
MAXIMUM VOLTAGE: 15 KV | OPERATING VOLTAGE: 13 KV | MODEL NO.: V5DB133Y000 | DATE MANUFACTURED: 10/2013
AMPACITY: 1200 A | INTERRUPTING CAPACITY: 25 KA | BIL: 95 KV | CONTROL VOLTAGE: 132 VDC | WEIGHT: 380
TRIP COIL OPERATING VOLTAGE: 70 - 140 VDC | CLOSE COIL OPERATING VOLTAGE: 100 - 140 VDC | ELECTRICALLY OPERATED: YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	NEW	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	21 °C	1.05

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,350,000	3,517,500	4,230,000	4,441,500	7,500,000	7,875,000
POLE TO FRAME	2,390,000	2,509,500	3,380,000	3,549,000	3,560,000	3,738,000
LINE TO LOAD	3,010,000	3,160,500	4,240,000	4,452,000	3,290,000	3,454,500

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.18	0.18	0.18
POLE RESISTANCE (½©)	29.7	30.8	29.7

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 27 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	0.0	0.0	0.0

COUNTER READING:
BEG 584
END 586

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY, K. ICKES

VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 1/5/2024 | AMBIENT TEMPERATURE: 21 °C | HUMIDITY: 19 % | EQPT. LOCATION: CENTRAL ELECTRICAL BUILDING
SUBSTATION: PRIMARY SWITCHGEAR | POSITION: BUS 1 MAIN BKR 52M1

MANUFACTURER: SQUARE D | TYPE: VR | SERIAL NUMBER: 17 77443
MAXIMUM VOLTAGE: 15 KV | OPERATING VOLTAGE: 13 KV | MODEL NO.: V5DB133Y000 | DATE MANUFACTURED: 10/2013
AMPACITY: 1200 A | INTERRUPTING CAPACITY: 25 KA | BIL: 95 KV | CONTROL VOLTAGE: 132 VDC | WEIGHT: 380
TRIP COIL OPERATING VOLTAGE: 70 - 140 VDC | CLOSE COIL OPERATING VOLTAGE: 100 - 140 VDC | ELECTRICALLY OPERATED: YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	NEW	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	21 °C	1.05

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	7,500,000	7,875,000	7,500,000	7,875,000	7,500,000	7,875,000
POLE TO FRAME	7,500,000	7,875,000	7,500,000	7,875,000	7,500,000	7,875,000
LINE TO LOAD	7,500,000	7,875,000	7,500,000	7,875,000	7,500,000	7,875,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.18	0.18	0.18
POLE RESISTANCE (½©)	28.7	28.9	28.4

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 27 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	0.0	0.0	0.0

COUNTER READING:
BEG: 538
END: 540

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY, K. ICKES

VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 1/4/2024 | AMBIENT TEMPERATURE: 22.2 °C | HUMIDITY: 20 % | EQPT. LOCATION: CENTRAL ELECTRICAL BUILDING
SUBSTATION: PRIMARY SWITCHGEAR | POSITION: BUS 1-2 ISOLATION BKR 521B

MANUFACTURER: SQUARE D | TYPE: VR | SERIAL NUMBER: 17 77456
MAXIMUM VOLTAGE: 15 KV | OPERATING VOLTAGE: 13 KV | MODEL NO.: V5DB133Y000 | DATE MANUFACTURED: 10/2013
AMPACITY: 1200 A | INTERRUPTING CAPACITY: 25 KA | BIL: 95 KV | CONTROL VOLTAGE: 132 VDC | WEIGHT: 380
TRIP COIL OPERATING VOLTAGE: 70 - 140 VDC | CLOSE COIL OPERATING VOLTAGE: 100 - 140 VDC | ELECTRICALLY OPERATED: YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	NEW	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	22 °C	1.1

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,400,000	3,740,000	4,830,000	5,313,000	4,830,000	5,313,000
POLE TO FRAME	4,140,000	4,554,000	3,800,000	4,180,000	3,830,000	4,213,000
LINE TO LOAD	4,400,000	4,840,000	5,500,000	6,050,000	5,420,000	5,962,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.20	0.20	0.20
POLE RESISTANCE (½©)	28.6	29.4	27.9

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 27 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	0.0	0.0	0.0

COUNTER READING:
BEG: 129
END: 130

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY, K. ICKES

VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 1/5/2024 | AMBIENT TEMPERATURE: 21 °C | HUMIDITY: 19 % | EQPT. LOCATION: CENTRAL ELECTRICAL BUILDING
SUBSTATION: PRIMARY SWITCHGEAR | POSITION: BUS 1-3 TIE BKR 52GT1

MANUFACTURER: SQUARE D | TYPE: VR | SERIAL NUMBER: 17 77444
MAXIMUM VOLTAGE: 15 KV | OPERATING VOLTAGE: 13 KV | MODEL NO.: V5DB133Y000 | DATE MANUFACTURED: 10/2013
AMPACITY: 1200 A | INTERRUPTING CAPACITY: 25 KA | BIL: 95 KV | CONTROL VOLTAGE: 132 VDC | WEIGHT: 380
TRIP COIL OPERATING VOLTAGE: 70 - 140 VDC | CLOSE COIL OPERATING VOLTAGE: 100 - 140 VDC | ELECTRICALLY OPERATED: YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	NEW	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	21 °C	1.05

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	7,500,000	7,875,000	7,500,000	7,875,000	7,500,000	7,875,000
POLE TO FRAME	7,500,000	7,875,000	7,500,000	7,875,000	7,500,000	7,875,000
LINE TO LOAD	7,500,000	7,875,000	7,500,000	7,875,000	7,500,000	7,875,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.19	0.19	0.19
POLE RESISTANCE (½©)	30.3	28.8	303.0

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 27 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	0.0	0.0	0.0

COUNTER READING:
BEG: 482
END: 483

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY, K. ICKES

VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 1/4/2024 | AMBIENT TEMPERATURE: 22 °C | HUMIDITY: 22 % | EQPT. LOCATION: CENTRAL ELECTRICAL BUILDING
SUBSTATION: PRIMARY SWITCHGEAR | POSITION: BUS 2 MAIN BKR 52M2

MANUFACTURER: SQUARE D | TYPE: VR | SERIAL NUMBER: 1777420
MAXIMUM VOLTAGE: 15 KV | OPERATING VOLTAGE: 13 KV | MODEL NO.: V5DB133Y000 | DATE MANUFACTURED: 10/2013
AMPACITY: 1200 A | INTERRUPTING CAPACITY: 25 KA | BIL: 95 KV | CONTROL VOLTAGE: 132 VDC | WEIGHT: 380
TRIP COIL OPERATING VOLTAGE: 70 - 140 VDC | CLOSE COIL OPERATING VOLTAGE: 100 - 140 VDC | ELECTRICALLY OPERATED: YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	22 °C	1.1

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,860,000	3,146,000	2,960,000	3,256,000	3,080,000	3,388,000
POLE TO FRAME	2,070,000	2,277,000	2,680,000	2,948,000	1,847,000	2,031,700
LINE TO LOAD	2,890,000	3,179,000	2,990,000	3,289,000	3,010,000	3,311,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.15	0.14	0.15
POLE RESISTANCE (½©)	28.8	29.1	30.1

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 27 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	0.0	0.0	0.0

COUNTER READING:
BEG 426
END 427

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY, K. ICKES

VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 1/4/2024 | AMBIENT TEMPERATURE: 22.2 °C | HUMIDITY: 20 % | EQPT. LOCATION: CENTRAL ELECTRICAL BUILDING
SUBSTATION: PRIMARY SWITCHGEAR | POSITION: BUS 2-3 TIE BKR 52GT2

MANUFACTURER: SQUARE D | TYPE: VR | SERIAL NUMBER: 17 77461
MAXIMUM VOLTAGE: 15 KV | OPERATING VOLTAGE: 13 KV | MODEL NO.: V5DB133Y000 | DATE MANUFACTURED: 10/2013
AMPACITY: 1200 A | INTERRUPTING CAPACITY: 25 KA | BIL: 95 KV | CONTROL VOLTAGE: 132 VDC | WEIGHT: 380
TRIP COIL OPERATING VOLTAGE: 70 - 140 VDC | CLOSE COIL OPERATING VOLTAGE: 100 - 140 VDC | ELECTRICALLY OPERATED: YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	NEW	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	22 °C	1.1

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	7,500,000	8,250,000	7,500,000	8,250,000	7,500,000	8,250,000
POLE TO FRAME	7,500,000	8,250,000	7,500,000	8,250,000	75,000,000	82,500,000
LINE TO LOAD	7,500,000	8,250,000	7,500,000	8,250,000	7,500,000	8,250,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.20	0.20	0.20
POLE RESISTANCE (½©)	30.6	30.3	30.5

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 27 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	0.0	0.0	0.0

COUNTER READING:
BEG: 468
END: 470

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY, K. ICKES

VOLTAGE TRANSFORMER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 1/5/2024 | AMBIENT TEMPERATURE: 22 °C | HUMIDITY: 15 % | EQPT. LOCATION: CENTRAL ELECTRICAL BUILDING
SUBSTATION: PRIMARY SWITCHGEAR | POSITION: MAIN BUS 1

NAMEPLATE DATA

MANUFACTURER: INSTRUMENT TRANSFORMER INC. | CATALOG NO.: PTG5-1-110-1322FC1 | TYPE: VT | NAMEPLATE RATIO: 110:1 :
PRIMARY VOLTAGE: 13,200 | SECONDARY VOLTAGE: 120 | KVA: 1.5 | CLASS: NA
Other: NA
PRIMARY FUSE: MANUFACTURER: BUSSMANN | TYPE: 15-5CAVH0-5E | SIZE: .5E | NO.: 3
SECONDARY FUSE: MANUFACTURER: BUSS | TYPE: BAF-5 | SIZE: 5AMP | NO.: 3

EQUIPMENT TEMPERATURE: 22 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 1.12

VT IDENTIFICATION: A PHASE | **SERIAL NUMBER:** 53740856

TURNS RATIO TEST

CALCULATED TURNS RATIO: 110
MEASURED TURNS RATIO: 109.98
CONNECTIONS: H_1 H_2 X_1 X_2
POLARITY: POSATIVE | Error: 0.0181818 %

INSULATION TEST

				RDG.	20°C	
PRIMARY - SECONDARY	@	2.5	kVDC	921,000	1,031,520	MEGOHMS
PRIMARY - GROUND	@	2.5	kVDC	652,000	730,240	MEGOHMS
SECONDARY - GROUND	@	.5	kVDC	733,000	820,960	MEGOHMS

VT IDENTIFICATION: B PHASE | **SERIAL NUMBER:** 53740855

TURNS RATIO TEST

CALCULATED TURNS RATIO: 110
MEASURED TURNS RATIO: 109.86
CONNECTIONS: H_1 H_2 X_1 X_2
POLARITY: POSATIVE | Error: 0.127273 %

INSULATION TEST

				RDG.	20°C	
PRIMARY - SECONDARY	@	2.5	kVDC	921,000	1,031,520	MEGOHMS
PRIMARY - GROUND	@	2.5	kVDC	652,000	730,240	MEGOHMS
SECONDARY - GROUND	@	.5	kVDC	733,000	820,960	MEGOHMS

VT IDENTIFICATION: C PHASE | **SERIAL NUMBER:** 53740854

TURNS RATIO TEST

CALCULATED TURNS RATIO: 110
MEASURED TURNS RATIO: 109.9
CONNECTIONS: H_1 H_2 X_1 X_2
POLARITY: POSATIVE | Error: 0.0909091 %

INSULATION TEST

				RDG.	20°C	
PRIMARY - SECONDARY	@	2.5	kVDC	921,000	1,031,520	MEGOHMS
PRIMARY - GROUND	@	2.5	kVDC	652,000	730,240	MEGOHMS
SECONDARY - GROUND	@	.5	kVDC	733,000	820,960	MEGOHMS

VT CONNECTION: ○ 1 PHASE ◉ 3 PHASE | PRIMARY: ◉ WYE ○ DELTA | SECONDARY: ◉ WYE ○ DELTA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY, K. ICKES

SWITCHGEAR INSPECTION AND TEST REPORT

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 1/4/2024 AMBIENT TEMPERATURE 21 °C HUMIDITY 19 % EQPT. LOCATION CENTRAL ELECTRICAL BUILDING

SUBSTATION PRIMARY SWITCHGEAR POSITION MAIN BUS 1

SWITCHGEAR NAMEPLATE

MANUFACTURER SQUARE D TYPE SN / SO NO. 17-28142137-002 MFG DATE NA

STYLE / CAT # / BUILD NUMBER NA SYSTEM VOLTAGE 13,200 RATED VOLTAGE 15,000 SERVICE 3 WIRE

BUS AMPACITIES 1200 OVERCURRENT DEVICE TYPE/CAT. RELAY INTERRUPT RATINGS 95KV/20KA

NEUTRAL NA Other NA

INSPECTION CHECKLIST / REMARKS

☑ REASON FOR INSPECTION	ROUTINE MAINTENANCE
☑ CLEAN SWITCHGEAR, CUBICLES, BUS, AND INSULATORS	NA
☑ OVERHEATING (CHECK FOR HOT SURFACES, DISCOLORATION)	NA
☑ CHECK FOR UNUSED OPENINGS	NA
☑ CHECK ELECTRICAL CONNECTIONS	NA
☑ VENTS AND FILTER	NA
☑ PROPER CLEARANCE	NA
☑ PANEL ID AND ARC FLASH WARNING (PANEL LABEL)	NEED ARC FLASH STICKERS
☑ INDICATING LIGHTS	NA
☑ INTERLOCKS	NA
☑ HEATERS	NONE
☑ PANEL SCREWS (MISSING, STRIPPED, ETC)	NA
☑ BARRIER BOARDS AND SHUTTER OPERATION	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	21 °C	1.05

INSULATION RESISTANCE	POLE 1 (M-OHM) (P1-P2)		POLE 2 (M-OHM) (P2-P3)		POLE 3 (M-OHM) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
PHASE TO PHASE	1,083,000	1,137,150	1,295,000	1,359,750	1,334,000	1,400,700
PHASE TO GND	615,000	645,750	582,000	611,100	641,000	673,050

DIELECTRIC WITHSTAND (mA)			
TEST VOLTAGE 27 KV			
Phase #1	Phase #2	Phase #3	Neutral
8	8	8	N/A

BUS BAR RESISTANCE (µ-OHM)				
Ground	NEUTRAL	Phase #1	Phase #2	Phase #3
145	N/A	146	152	160

COMMENTS:

DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY, K. ICKES

VOLTAGE TRANSFORMER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 1/4/2023 | AMBIENT TEMPERATURE: 22 °C | HUMIDITY: 17 % | EQPT. LOCATION: CENTRAL ELECTRICAL BUILDING
SUBSTATION: PRIMARY SWITCHGEAR | POSITION: MAIN BUS 2

NAMEPLATE DATA

MANUFACTURER: INSTRUMENT TRANSFORMER INC. | CATALOG NO.: PTG5-1-110-1322FC1 | TYPE: VT | NAMEPLATE RATIO: 110:1 :
PRIMARY VOLTAGE: 13,200 | SECONDARY VOLTAGE: 120 | KVA: 1.5 | CLASS: NA
Other: NA
PRIMARY FUSE: MANUFACTURER: BUSSMANN | TYPE: 15-5CAVH0-5E | SIZE: 0.5E | NO.: 3
SECONDARY FUSE: MANUFACTURER: BUSS | TYPE: BAF-5 | SIZE: 5AMP | NO.: 3

EQUIPMENT TEMPERATURE: 22 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 1.12

VT IDENTIFICATION: A PHASE | **SERIAL NUMBER:** 53740853

TURNS RATIO TEST

CALCULATED TURNS RATIO: 110
MEASURED TURNS RATIO: 109.88
CONNECTIONS: H_0 H_1 X_0 X_1
POLARITY: POSATIVE | Error: 0.109091 %

INSULATION TEST

				RDG.	20°C	
PRIMARY - SECONDARY	@	2.5	kVDC	106,500	119,280	MEGOHMS
PRIMARY - GROUND	@	2.5	kVDC	278,000	311,360	MEGOHMS
SECONDARY - GROUND	@	.5	kVDC	1,500,000	1,680,000	MEGOHMS

VT IDENTIFICATION: B PHASE | **SERIAL NUMBER:** 53740852

TURNS RATIO TEST

CALCULATED TURNS RATIO: 110
MEASURED TURNS RATIO: 109.8
CONNECTIONS: H_0 H_2 X_0 X_2
POLARITY: POSATIVE | Error: 0.181818 %

INSULATION TEST

				RDG.	20°C	
PRIMARY - SECONDARY	@	2.5	kVDC	106,500	119,280	MEGOHMS
PRIMARY - GROUND	@	2.5	kVDC	278,000	311,360	MEGOHMS
SECONDARY - GROUND	@	.5	kVDC	1,500,000	1,680,000	MEGOHMS

VT IDENTIFICATION: C PHASE | **SERIAL NUMBER:** 53740851

TURNS RATIO TEST

CALCULATED TURNS RATIO: 110
MEASURED TURNS RATIO: 109.88
CONNECTIONS: H_0 H_3 X_0 X_3
POLARITY: POSATIVE | Error: 0.109091 %

INSULATION TEST

				RDG.	20°C	
PRIMARY - SECONDARY	@	2.5	kVDC	106,500	119,280	MEGOHMS
PRIMARY - GROUND	@	2.5	kVDC	278,000	311,360	MEGOHMS
SECONDARY - GROUND	@	.5	kVDC	1,500,000	1,680,000	MEGOHMS

VT CONNECTION: ○ 1 PHASE ◉ 3 PHASE | PRIMARY: ◉ WYE ○ DELTA | SECONDARY: ◉ WYE ○ DELTA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY, K. ICKES

SWITCHGEAR INSPECTION AND TEST REPORT

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 1/4/2024 AMBIENT TEMPERATURE 22 °C HUMIDITY 17 % EQPT. LOCATION CENTRAL ELECTRICAL BUILDING

SUBSTATION PRIMARY SWITCHGEAR POSITION MAIN BUS 2

SWITCHGEAR NAMEPLATE

MANUFACTURER SQUARE D TYPE NA SN / SO NO. 17-28142137-002 MFG DATE NA

STYLE / CAT # / BUILD NUMBER NA SYSTEM VOLTAGE 13,200 RATED VOLTAGE 15,000 SERVICE 3 WIRE

BUS AMPACITIES 1200 OVERCURRENT DEVICE TYPE/CAT. RELAY INTERRUPT RATINGS 95KV/20KA

NEUTRAL NA Other NA

INSPECTION CHECKLIST / REMARKS

☑ REASON FOR INSPECTION	ROUTINE MAINTENANCE
☑ CLEAN SWITCHGEAR, CUBICLES, BUS, AND INSULATORS	NA
☑ OVERHEATING (CHECK FOR HOT SURFACES, DISCOLORATION)	NA
☑ CHECK FOR UNUSED OPENINGS	NA
☑ CHECK ELECTRICAL CONNECTIONS	NA
☑ VENTS AND FILTER	NA
☑ PROPER CLEARANCE	NA
☑ PANEL ID AND ARC FLASH WARNING (PANEL LABEL)	NEED ARC FLASH STICKERS
☑ INDICATING LIGHTS	NA
☑ INTERLOCKS	NA
☑ HEATERS	NONE
☑ PANEL SCREWS (MISSING, STRIPPED, ETC)	NA
☑ BARRIER BOARDS AND SHUTTER OPERATION	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	22 °C	1.1

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
PHASE TO PHASE	1,182,000	1,300,200	1,235,000	1,358,500	1,507,000	1,657,700
PHASE TO GND	729,000	801,900	623,000	685,300	525,000	577,500

DIELECTRIC WITHSTAND (mA)			
TEST VOLTAGE 27 KV			
Phase #1	Phase #2	Phase #3	Neutral
8	8	8	N/A

BUS BAR RESISTANCE (µ©)				
Ground	NEUTRAL	Phase #1	Phase #2	Phase #3
0.99	N/A	0.99	0.99	0.99

COMMENTS:

DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY, K. ICKES

VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 1/4/2024 | AMBIENT TEMPERATURE: 22 °C | HUMIDITY: 19 % | EQPT. LOCATION: CENTRAL ELECTRICAL BUILDING
SUBSTATION: PRIMARY SWITCHGEAR | POSITION: SUB 1 - RSLS 52F 21

MANUFACTURER: SQUARE D | TYPE: VR | SERIAL NUMBER: 17 77458
MAXIMUM VOLTAGE: 15 KV | OPERATING VOLTAGE: 13 KV | MODEL NO.: V5DB133Y000 | DATE MANUFACTURED: 10/2013
AMPACITY: 1200 A | INTERRUPTING CAPACITY: 25 KA | BIL: 95 KV | CONTROL VOLTAGE: 132 VDC | WEIGHT: 380
TRIP COIL OPERATING VOLTAGE: 70 - 140 VDC | CLOSE COIL OPERATING VOLTAGE: 100 - 140 VDC | ELECTRICALLY OPERATED: YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	22 °C	1.1

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	4,160,000	4,576,000	4,180,000	4,598,000	3,990,000	4,389,000
POLE TO FRAME	2,320,000	2,552,000	3,030,000	3,333,000	7,500,000	8,250,000
LINE TO LOAD	3,380,000	3,718,000	4,030,000	4,433,000	3,603,000	3,963,300

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.19	0.19	0.19
POLE RESISTANCE (½©)	29.2	28.3	28.3

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 27 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	0.0	0.0	0.0

COUNTER READING:
BEG 409
END 412

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY, K. ICKES

VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 1/5/2024 | AMBIENT TEMPERATURE: 21 °C | HUMIDITY: 19 % | EQPT. LOCATION: CENTRAL ELECTRICAL BUILDING
SUBSTATION: PRIMARY SWITCHGEAR | POSITION: SUB 1-RSLS 52F11

MANUFACTURER: SQUARE D | TYPE: VR | SERIAL NUMBER: 17 77455
MAXIMUM VOLTAGE: 15 KV | OPERATING VOLTAGE: 13 KV | MODEL NO.: V5DB133Y000 | DATE MANUFACTURED: 10/2013
AMPACITY: 1200 A | INTERRUPTING CAPACITY: 25 KA | BIL: 95 KV | CONTROL VOLTAGE: 132 VDC | WEIGHT: 380
TRIP COIL OPERATING VOLTAGE: 70 - 140 VDC | CLOSE COIL OPERATING VOLTAGE: 100 - 140 VDC | ELECTRICALLY OPERATED: YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	NEW	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	22 °C	1.1

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	7,500,000	8,250,000	7,500,000	8,250,000	7,500,000	8,250,000
POLE TO FRAME	7,500,000	8,250,000	7,500,000	8,250,000	7,500,000	8,250,000
LINE TO LOAD	7,500,000	8,250,000	7,500,000	8,250,000	7,500,000	8,250,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.19	0.18	0.19
POLE RESISTANCE (½©)	27.2	29.4	29.3

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 27 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	0.0	0.0	0.0

COUNTER READING:
BEG: 157
END: 159

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY, K. ICKES

DEVICE TEST RESULTS

Routine : SEL-551.FST_LIB **AF/AL :** AL **Test Date :** 1/5/2024
Version : 8.2 **Pass/Fail :** PASS

Device Data:

Customer:	City of Ann Arbor	Job_Number:	230858
SUBSTATION:	CEB	Relay_ID:	SUB 1-RSLS 52F11
PHASE_ZONE:	3 Phase	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	NA
SERIAL_NUMBER:	1132620128		
FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408		
NERC_AUDITABLE:	0	MAINT_INTERVAL:	0
PREVIOUS_TESTDATE:	2/28/2020	CURRENT_TESTDATE:	1/5/2024
NEXT_TESTDATE:	1/5/2024	TESTSET_CALDATE:	2/15/2023
Tested_BY:	COLBY KROUT		

Routine Notes:

Device Settings Used for Testing:

```
RID$=     "52F11"          TID$=     "SUB 1 RSLS"    CTR=      120
CTRN=     120              TDURD=    9.000           s50P1P=   13.0
s50P2P=   1.8              s50P3P$=  "OFF"           s50P4P$=  "OFF"
s50P5P$=  "OFF"            s50P6P$=  "OFF"           s50ABCP$= "OFF"
s51P1P=   0.7              s51P1C$=  "C3"            s51P1TD=  1.00
s51P1RS$= "N"              s51P2P$=  "OFF"           s51P2C$=  "U3"
s51P2TD=  15.00            s51P2RS$= "N"             s50N1P$=  "OFF"
s50N2P$=  "OFF"            s51N1P$=  "OFF"           s51N1C$=  "U4"
s51N1TD=  3.00             s51N1RS$= "N"             s50G1P=   5.4
s50G2P$=  "OFF"            s51G1P=   0.5             s51G1C$=  "U1"
s51G1TD=  0.50             s51G1RS$= "N"             s50Q1P$=  "OFF"
s50Q2P$=  "OFF"            s51Q1P$=  "OFF"           s51Q1C$=  "U3"
s51Q1TD=  15.00            s51Q1RS$= "N"             s51Q2P$=  "OFF"
s51Q2C$=  "U3"             s51Q2TD=  15.00           s51Q2RS$= "N"
s79OI1=   0.000            s79OI2=   600.000         s79OI3=   0.000
s79OI4=   0.000            s79RSD=   1800.000        s79RSLD=  300.000
CFD=      60.000           DMTC=     5               PDEMP=    5.00
NDEMP=    1.50             GDEMP=    1.50            QDEMP=    1.50
SV5PU=    0.000            SV5DO=    0.000           SV6PU=    0.000
SV6DO=    0.000            SV7PU=    0.000           SV7DO=    0.000
SV8PU=    0.000            SV8DO=    0.000           SV9PU=    0.000
SV9DO=    0.000            SV10PU=   0.000           SV10DO=   0.000
SV11PU=   0.000            SV11DO=   0.000           SV12PU=   0.000
SV12DO=   0.000            SV13PU=   0.000           SV13DO=   0.000
SV14PU=   0.000            SV14DO=   0.000           NFREQ=    60
PHROT$=   "ABC"            DATE_F$=  "MDY"
TR$=      "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "

ULTR$=    "!(51P1 + 51G1)"s51P1TC=  1               s51P2TC=  1
s51N1TC=  1                s51G1TC=  1               s51Q1TC=  1
s51Q2TC=  1                s52A$=    "IN1"           CL$=      "LB4"
ULCL$=    "TRIP"           s79RI$=   "TRIP"          s79RIS$=  "IN1"
s79DTL$=  "!LB1 + LB3"     s79DLS$=  "79LO"          s79SKP$=  "50P2 * SH0"
s79STL$=  "TRIP"           s79BRS$=  "(51P1 + 51G1) * (79RS + 79CY)"

s79SEQ=   0                ER1$=     "51P1 + 51G1 + 51N1"

ER2=      0                SV1=      0               SV2=      0
SV3=      0                SV4=      0               SV5=      0
SV6=      0                SV7=      0               SV8=      0
SV9=      0                SV10=     0               SV11=     0
SV12=     0                SV13=     0               SV14=     0
OUT1$=    "TRIP"           OUT2=     0               OUT3=     0
OUT4=     0                DP1$=     "IN1"           DP2$=     "LB2"
DP3=      0                DP4=      0               DP5=      0
DP6=      0                DP7=      0               DP8=      0
```

Global Defines:

```
CONTACT$="4"         'OUTPUT CONTACT TO MASK
SEL_AUTO=1           '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1           'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1             'NO ERROR MESSAGE IF NO OPERATION
```

Device Test Results for: RELAY STATUS CHECK

N/A

Additional Data:
STA

52F11 Date: 01/05/24 Time: 10:27:30.898
SUB 1 RSLS

FID=SEL-551-R514-Vf-Z002002-D20110408 CID=CCFD

SELF TESTS

W=Warn F=Fail

	IA	IB	IC	IN	MOF
OS	3	3	3	3	0

	+5V_PS	+5V_REG	-5V_REG	+10V_PS	-10V_PS	VBAT
PS	4.98	5.03	-4.98	9.85	-9.90	3.49

TEMP	RAM	ROM	CR_RAM	EEPROM
28.6	OK	OK	OK	OK

Relay Enabled

=>>

Device Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	214.0	-0.9	PASS
B-N	0.0	0.0	0.0	240.0	240.0	0.0	PASS
C-N	0.0	0.0	0.0	264.0	261.0	-1.1	PASS

Device Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	13.130	13.000	1.00	PASS
B-N	13.000	13.000	0.00	PASS
C-N	13.000	13.000	0.00	PASS

Device Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	1.782	1.800	-1.00	PASS
B-N	1.800	1.800	0.00	PASS
C-N	1.800	1.800	0.00	PASS

Device Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.400	5.400	0.00	PASS

Device Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		0.721	0.700	3.00	PASS
B-N		0.707	0.700	1.00	PASS
C-N		0.700	0.700	0.00	PASS

Device Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

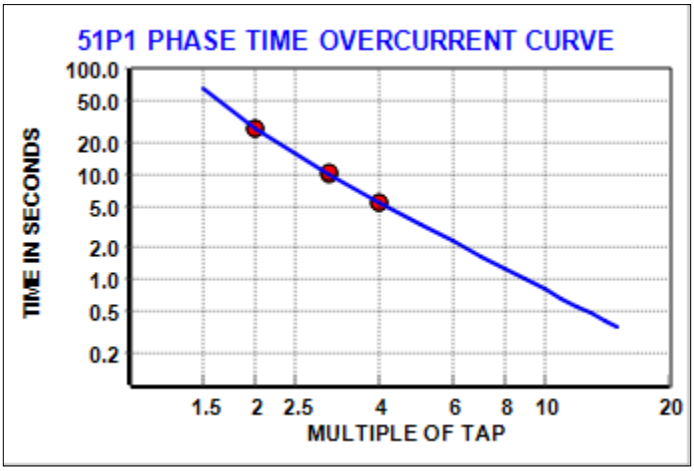
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.400	1641.63	27.360	26.667	2.60	PASS
3.00	2.100	606.11	10.102	10.000	1.02	PASS
4.00	2.800	320.24	5.337	5.333	0.07	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.400	1640.06	27.334	26.667	2.50	PASS
3.00	2.100	602.76	10.046	10.000	0.46	PASS
4.00	2.800	323.37	5.390	5.333	1.05	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.400	1641.86	27.364	26.667	2.62	PASS
3.00	2.100	614.05	10.234	10.000	2.34	PASS
4.00	2.800	324.13	5.402	5.333	1.29	PASS



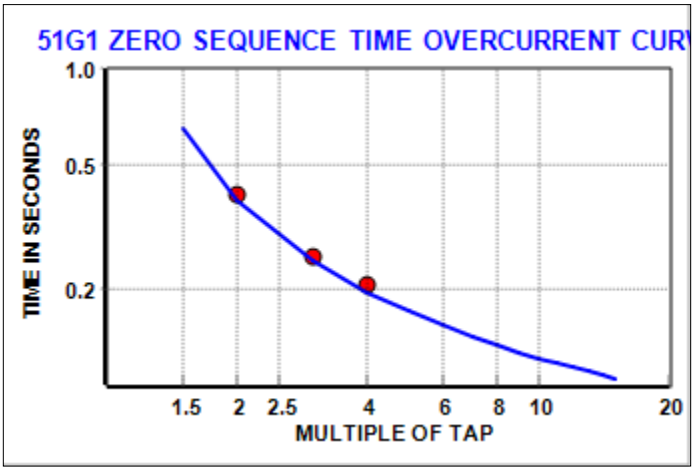
DEVICE TEST RESULTS

Device Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.525	0.500	5.00	PASS

Device Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE			OK?
2.00	1.000	23.80	0.397	0.340	TO	0.428	PASS
3.00	1.500	15.14	0.252	0.208	TO	0.283	PASS
4.00	2.000	12.37	0.206	0.161	TO	0.231	PASS



VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 1/5/2024 | AMBIENT TEMPERATURE: 21 °C | HUMIDITY: 19 % | EQPT. LOCATION: CENTRAL ELECTRICAL BUILDING
SUBSTATION: PRIMARY SWITCHGEAR | POSITION: SUB 2 - EQ 52F12

MANUFACTURER: SQUARE D | TYPE: VR | SERIAL NUMBER: 17 77443
MAXIMUM VOLTAGE: 15 KV | OPERATING VOLTAGE: 13 KV | MODEL NO.: V5DB133Y000 | DATE MANUFACTURED: 10/2013
AMPACITY: 1200 A | INTERRUPTING CAPACITY: 25 KA | BIL: 95 KV | CONTROL VOLTAGE: 132 VDC | WEIGHT: 380
TRIP COIL OPERATING VOLTAGE: 70 - 140 VDC | CLOSE COIL OPERATING VOLTAGE: 100 - 140 VDC | ELECTRICALLY OPERATED: YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	NEW	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	22 °C	1.1

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	7,500,000	8,250,000	7,500,000	8,250,000	7,500,000	8,250,000
POLE TO FRAME	7,500,000	8,250,000	7,500,000	8,250,000	7,500,000	8,250,000
LINE TO LOAD	7,500,000	8,250,000	7,500,000	8,250,000	7,500,000	8,250,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.19	0.19	0.18
POLE RESISTANCE (½©)	28.9	30.3	29.8

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 27 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	0.0	0.0	0.0

COUNTER READING:
BEG: 588
END: 591

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY, K. ICKES

DEVICE TEST RESULTS

Routine : SEL-551.FST_LIB **AF/AL :** AL **Test Date :** 1/5/2024
Version : 8.2 **Pass/Fail :** PASS

Device Data:

Customer:	City of Ann Arbor	Job_Number:	230858
SUBSTATION:	CEB	Relay_ID:	SUB 2-EQ 52F12
PHASE_ZONE:	3 Phase	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	NA
SERIAL_NUMBER:	1132620134		
FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408		
NERC_AUDITABLE:	0	MAINT_INTERVAL:	3
PREVIOUS_TESTDATE:	5/8/2020	CURRENT_TESTDATE:	1/5/2024
NEXT_TESTDATE:	1/5/2024	TESTSET_CALDATE:	2/15/2023
Tested_BY:	COLBY KROUT		

Routine Notes:

Device Settings Used for Testing:

```
RID$=     "52F12"          TID$=     "SUB 2 EQ"       CTR=      120
CTRN=     120              TDURD=    9.000            s50P1P=   13.0
s50P2P=   1.3              s50P3P$=  "OFF"            s50P4P$=  "OFF"
s50P5P$=  "OFF"            s50P6P$=  "OFF"            s50ABCP$= "OFF"
s51P1P=   0.6              s51P1C$=  "C3"             s51P1TD=  1.00
s51P1RS$= "N"              s51P2P$=  "OFF"            s51P2C$=  "U3"
s51P2TD=  15.00            s51P2RS$= "N"              s50N1P$=  "OFF"
s50N2P$=  "OFF"            s51N1P$=  "OFF"            s51N1C$=  "U4"
s51N1TD=  3.00             s51N1RS$= "N"              s50G1P=   5.4
s50G2P$=  "OFF"            s51G1P=   0.5              s51G1C$=  "U1"
s51G1TD=  0.50             s51G1RS$= "N"              s50Q1P$=  "OFF"
s50Q2P$=  "OFF"            s51Q1P$=  "OFF"            s51Q1C$=  "U3"
s51Q1TD=  15.00            s51Q1RS$= "N"              s51Q2P$=  "OFF"
s51Q2C$=  "U3"             s51Q2TD=  15.00            s51Q2RS$= "N"
s79OI1=   0.000            s79OI2=   600.000          s79OI3=   0.000
s79OI4=   0.000            s79RSD=   1800.000         s79RSLD=  300.000
CFD=      60.000           DMTC=     5                PDEMP=    5.00
NDEMP=    1.50             GDEMP=    1.50             QDEMP=    1.50
SV5PU=    0.000            SV5DO=    0.000            SV6PU=    0.000
SV6DO=    0.000            SV7PU=    0.000            SV7DO=    0.000
SV8PU=    0.000            SV8DO=    0.000            SV9PU=    0.000
SV9DO=    0.000            SV10PU=   0.000            SV10DO=   0.000
SV11PU=   0.000            SV11DO=   0.000            SV12PU=   0.000
SV12DO=   0.000            SV13PU=   0.000            SV13DO=   0.000
SV14PU=   0.000            SV14DO=   0.000            NFREQ=    60
PHROT$=   "ABC"            DATE_F$=  "MDY"
TR$=      "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "

ULTR$=    "!(51P1 + 51G1)"s51P1TC=  1                s51P2TC=  1
s51N1TC=  1                s51G1TC=  1                s51Q1TC=  1
s51Q2TC=  1                s52A$=    "IN1"            CL$=      "LB4"
ULCL$=    "TRIP"           s79RI$=   "TRIP"           s79RIS$=  "IN1"
s79DTL$=  "!LB1 + LB3"     s79DLS$=  "79LO"           s79SKP$=  "50P2 * SH0"
s79STL$=  "TRIP"           s79BRS$=  "(51P1 + 51G1) * (79RS + 79CY)"

s79SEQ=   0                ER1$=     "51P1 + 51G1 + 51N1"

ER2=      0                SV1=      0                SV2=      0
SV3=      0                SV4=      0                SV5=      0
SV6=      0                SV7=      0                SV8=      0
SV9=      0                SV10=     0                SV11=     0
SV12=     0                SV13=     0                SV14=     0
OUT1$=    "TRIP"           OUT2=     0                OUT3=     0
OUT4=     0                DP1$=     "IN1"            DP2$=     "LB2"
DP3=      0                DP4=      0                DP5=      0
DP6=      0                DP7=      0                DP8=      0
```

Global Defines:

```
CONTACT$="4"         'OUTPUT CONTACT TO MASK
SEL_AUTO=1           '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1           'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1             'NO ERROR MESSAGE IF NO OPERATION
```

Device Test Results for: RELAY STATUS CHECK

N/A

Additional Data:
STA

52F12 Date: 01/05/24 Time: 09:35:18.083
SUB 2 EQ

FID=SEL-551-R514-Vf-Z002002-D20110408 CID=CCFD

SELF TESTS

W=Warn F=Fail

	IA	IB	IC	IN	MOF
OS	3	3	3	3	0

	+5V_PS	+5V_REG	-5V_REG	+10V_PS	-10V_PS	VBAT
PS	5.03	5.06	-4.91	9.99	-9.95	3.48

TEMP	RAM	ROM	CR_RAM	EEPROM
30.7	OK	OK	OK	OK

Relay Enabled

=>>

Device Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	215.0	-0.5	PASS
B-N	0.0	0.0	0.0	240.0	242.0	0.8	PASS
C-N	0.0	0.0	0.0	264.0	262.0	-0.8	PASS

Device Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	13.000	13.000	0.00	PASS
B-N	13.000	13.000	0.00	PASS
C-N	13.000	13.000	0.00	PASS

Device Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	1.313	1.300	1.00	PASS
B-N	1.300	1.300	-0.00	PASS
C-N	1.326	1.300	2.00	PASS

Device Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.400	5.400	0.00	PASS

Device Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		0.618	0.600	3.00	PASS
B-N		0.588	0.600	-2.00	PASS
C-N		0.600	0.600	0.00	PASS

Device Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

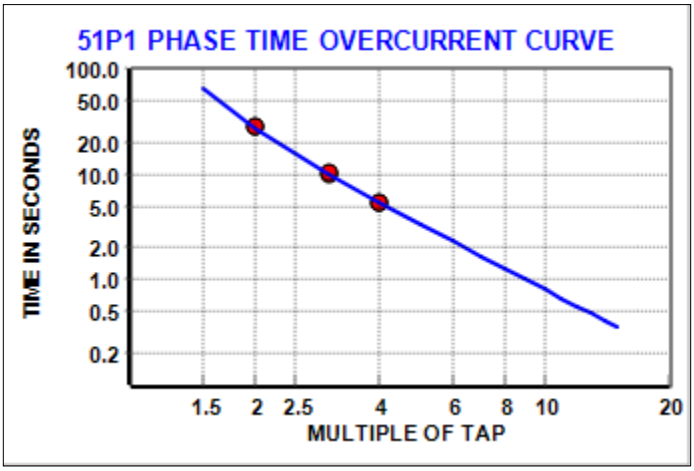
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1657.21	27.620	26.667	3.58	PASS
3.00	1.800	605.39	10.090	10.000	0.90	PASS
4.00	2.400	320.09	5.335	5.333	0.03	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1658.24	27.637	26.667	3.64	PASS
3.00	1.800	599.87	9.998	10.000	-0.02	PASS
4.00	2.400	319.99	5.333	5.333	-0.00	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1652.13	27.536	26.667	3.26	PASS
3.00	1.800	605.64	10.094	10.000	0.94	PASS
4.00	2.400	322.75	5.379	5.333	0.86	PASS

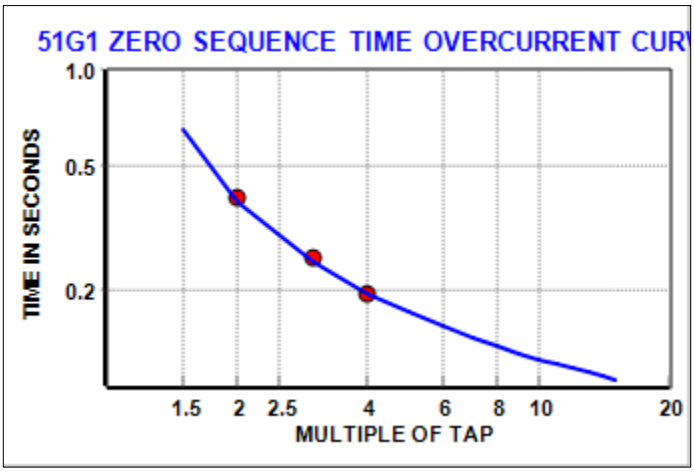


Device Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.505	0.500	1.00	PASS

Device Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.000	23.74	0.396	0.384	3.07	PASS
3.00	1.500	15.22	0.254	0.245	3.35	PASS
4.00	2.000	11.78	0.196	0.196	0.02	PASS



VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 1/4/2024 | AMBIENT TEMPERATURE: 22 °C | HUMIDITY: 19 % | EQPT. LOCATION: CENTRAL ELECTRICAL BUILDING
SUBSTATION: PRIMARY SWITCHGEAR | POSITION: SUB 2 - EQ 52F22

MANUFACTURER: SQUARE D | TYPE: VR | SERIAL NUMBER: 17 77454
MAXIMUM VOLTAGE: 15 KV | OPERATING VOLTAGE: 13 KV | MODEL NO.: V5DB133Y000 | DATE MANUFACTURED: 10/2013
AMPACITY: 1200 A | INTERRUPTING CAPACITY: 25 KA | BIL: 95 KV | CONTROL VOLTAGE: 132 VDC | WEIGHT: 380
TRIP COIL OPERATING VOLTAGE: 70 - 140 VDC | CLOSE COIL OPERATING VOLTAGE: 100 - 140 VDC | ELECTRICALLY OPERATED: YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	NEW	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	22 °C	1.1

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	7,500,000	8,250,000	7,500,000	8,250,000	7,500,000	8,250,000
POLE TO FRAME	2,370,000	2,607,000	7,500,000	8,250,000	7,500,000	8,250,000
LINE TO LOAD	7,500,000	8,250,000	7,500,000	8,250,000	7,500,000	8,250,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.20	0.20	0.20
POLE RESISTANCE (½©)	28.3	28.2	27.8

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 27 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	0.0	0.0	0.0

COUNTER READING:
BEG: 440
END: 442

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY, K. ICKES

VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 1/5/2024 | AMBIENT TEMPERATURE: 21 °C | HUMIDITY: 19 % | EQPT. LOCATION: CENTRAL ELECTRICAL BUILDING
SUBSTATION: PRIMARY SWITCHGEAR | POSITION: SUB 3 - WBB 52F13

MANUFACTURER: SQUARE D | TYPE: VR | SERIAL NUMBER: 17 77460
MAXIMUM VOLTAGE: 15 KV | OPERATING VOLTAGE: 13 KV | MODEL NO.: V5DB133Y000 | DATE MANUFACTURED: 10/2013
AMPACITY: 1200 A | INTERRUPTING CAPACITY: 25 KA | BIL: 95 KV | CONTROL VOLTAGE: 132 VDC | WEIGHT: 380
TRIP COIL OPERATING VOLTAGE: 70 - 140 VDC | CLOSE COIL OPERATING VOLTAGE: 100 - 140 VDC | ELECTRICALLY OPERATED: YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	NEW	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	21 °C	1.05

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	7,500,000	7,875,000	4,710,000	4,945,500	4,930,000	5,176,500
POLE TO FRAME	4,080,000	4,284,000	4,710,000	4,945,500	4,650,000	4,882,500
LINE TO LOAD	3,640,000	3,822,000	3,480,000	3,654,000	4,770,000	5,008,500

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.18	0.18	0.18
POLE RESISTANCE (½©)	28.8	28.6	29.9

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 27 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	0.0	0.0	0.0

COUNTER READING:
BEG 550
END 551

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY, K. ICKES

DEVICE TEST RESULTS

Routine : SEL-551.FST_LIB **AF/AL :** AL **Test Date :** 1/5/2024
Version : 8.2 **Pass/Fail :** PASS

Device Data:

Customer:	City of Ann Arbor	Job_Number:	230858
SUBSTATION:	CEB	Relay_ID:	SUB 3-WBB 52F13
PHASE_ZONE:	3 Phase	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	NA
SERIAL_NUMBER:	1132620136		
FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408		
NERC_AUDITABLE:	0	MAINT_INTERVAL:	0
PREVIOUS_TESTDATE:	2/28/2021	CURRENT_TESTDATE:	1/5/2024
NEXT_TESTDATE:	1/5/2024	TESTSET_CALDATE:	2/15/2023
Tested_BY:	COLBY KROUT		

Routine Notes:

Device Settings Used for Testing:

```
RID$=     "52F13"          TID$=     "SUB 3 WBB"     CTR=      120
CTRN=     120              TDURD=    9.000           s50P1P=   16.5
s50P2P=   3.7              s50P3P$=  "OFF"           s50P4P$=  "OFF"
s50P5P$=  "OFF"            s50P6P$=  "OFF"           s50ABCP$= "OFF"
s51P1P=   1.2              s51P1C$=  "C3"            s51P1TD=  1.00
s51P1RS$= "N"              s51P2P$=  "OFF"           s51P2C$=  "U3"
s51P2TD=  15.00            s51P2RS$= "N"             s50N1P$=  "OFF"
s50N2P$=  "OFF"            s51N1P$=  "OFF"           s51N1C$=  "U4"
s51N1TD=  3.00             s51N1RS$= "N"             s50G1P=   5.4
s50G2P$=  "OFF"            s51G1P=   0.5             s51G1C$=  "U1"
s51G1TD=  0.50             s51G1RS$= "N"             s50Q1P$=  "OFF"
s50Q2P$=  "OFF"            s51Q1P$=  "OFF"           s51Q1C$=  "U3"
s51Q1TD=  15.00            s51Q1RS$= "N"             s51Q2P$=  "OFF"
s51Q2C$=  "U3"             s51Q2TD=  15.00           s51Q2RS$= "N"
s79OI1=   0.000            s79OI2=   600.000         s79OI3=   0.000
s79OI4=   0.000            s79RSD=   1800.000        s79RSLD=  300.000
CFD=      60.000           DMTC=     5               PDEMP=    5.00
NDEMP=    1.50             GDEMP=    1.50            QDEMP=    1.50
SV5PU=    0.000            SV5DO=    0.000           SV6PU=    0.000
SV6DO=    0.000            SV7PU=    0.000           SV7DO=    0.000
SV8PU=    0.000            SV8DO=    0.000           SV9PU=    0.000
SV9DO=    0.000            SV10PU=   0.000           SV10DO=   0.000
SV11PU=   0.000            SV11DO=   0.000           SV12PU=   0.000
SV12DO=   0.000            SV13PU=   0.000           SV13DO=   0.000
SV14PU=   0.000            SV14DO=   0.000           NFREQ=    60
PHROT$=   "ABC"            DATE_F$=  "MDY"
TR$=      "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "

ULTR$=    "!(51P1 + 51G1)"s51P1TC=  1               s51P2TC=  1
s51N1TC=  1                s51G1TC=  1               s51Q1TC=  1
s51Q2TC=  1                s52A$=    "IN1"           CL$=      "LB4"
ULCL$=    "TRIP"           s79RI$=   "TRIP"          s79RIS$=  "IN1"
s79DTL$=  "!LB1 + LB3"     s79DLS$=  "79LO"          s79SKP$=  "50P2 * SH0"
s79STL$=  "TRIP"           s79BRS$=  "(51P1 + 51G1) * (79RS + 79CY)"

s79SEQ=   0                ER1$=     "51P1 + 51G1 + 51N1"

ER2=      0                SV1=      0               SV2=      0
SV3=      0                SV4=      0               SV5=      0
SV6=      0                SV7=      0               SV8=      0
SV9=      0                SV10=     0               SV11=     0
SV12=     0                SV13=     0               SV14=     0
OUT1$=    "TRIP"           OUT2=     0               OUT3=     0
OUT4=     0                DP1$=     "IN1"           DP2$=     "LB2"
DP3=      0                DP4=      0               DP5=      0
DP6=      0                DP7=      0               DP8=      0
```

Global Defines:

```
CONTACT$="4"         'OUTPUT CONTACT TO MASK
SEL_AUTO=1           '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1           'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1             'NO ERROR MESSAGE IF NO OPERATION
```

Device Test Results for: RELAY STATUS CHECK

N/A

Additional Data:
STA

52F13 Date: 01/05/24 Time: 10:52:06.485
SUB 3 WBB

FID=SEL-551-R514-Vf-Z002002-D20110408 CID=CCFD

SELF TESTS

W=Warn F=Fail

	IA	IB	IC	IN	MOF
OS	3	3	3	3	0

	+5V_PS	+5V_REG	-5V_REG	+10V_PS	-10V_PS	VBAT
PS	4.99	5.03	-4.96	9.89	-9.85	3.49

TEMP	RAM	ROM	CR_RAM	EEPROM
28.6	OK	OK	OK	OK

Relay Enabled

=>>

Device Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	215.0	-0.5	PASS
B-N	0.0	0.0	0.0	240.0	239.0	-0.4	PASS
C-N	0.0	0.0	0.0	264.0	262.0	-0.8	PASS

Device Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	16.665	16.500	1.00	PASS
B-N	16.500	16.500	-0.00	PASS
C-N	16.500	16.500	-0.00	PASS

Device Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	3.700	3.700	-0.00	PASS
B-N	3.700	3.700	-0.00	PASS
C-N	3.700	3.700	-0.00	PASS

Device Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.454	5.400	1.00	PASS

Device Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		1.212	1.200	1.00	PASS
B-N		1.212	1.200	1.00	PASS
C-N		1.188	1.200	-1.00	PASS

Device Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

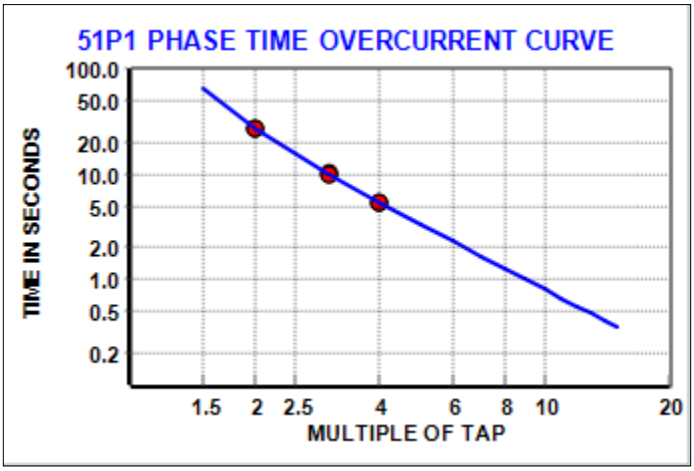
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.400	1621.60	27.027	26.667	1.35	PASS
3.00	3.600	606.68	10.111	10.000	1.11	PASS
4.00	4.800	323.29	5.388	5.333	1.03	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.400	1628.30	27.138	26.667	1.77	PASS
3.00	3.600	602.54	10.042	10.000	0.42	PASS
4.00	4.800	322.08	5.368	5.333	0.65	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.400	1609.48	26.825	26.667	0.59	PASS
3.00	3.600	602.21	10.037	10.000	0.37	PASS
4.00	4.800	321.30	5.355	5.333	0.41	PASS



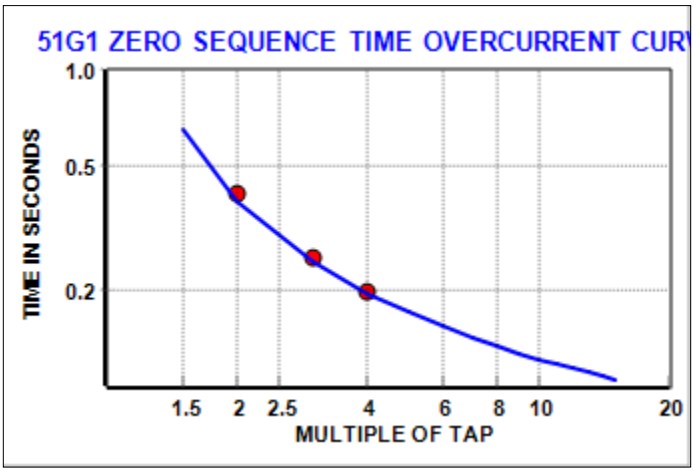
DEVICE TEST RESULTS

Device Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.510	0.500	2.00	PASS

Device Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE			OK?
2.00	1.000	24.32	0.405	0.340	TO	0.428	PASS
3.00	1.500	15.28	0.255	0.208	TO	0.283	PASS
4.00	2.000	11.96	0.199	0.161	TO	0.231	PASS



VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 1/4/2024 AMBIENT TEMPERATURE 22 °C HUMIDITY 19 % EQPT. LOCATION CENTRAL ELECTRICAL BUILDING

SUBSTATION PRIMARY SWITCHGEAR POSITION SUB 3 - WBB 52F23

MANUFACTURER SQUARE D TYPE VR SERIAL NUMBER 17 77457

MAXIMUM VOLTAGE 15 KV OPERATING VOLTAGE 13 KV MODEL NO. V5DB133Y000 DATE MANUFACTURED 10/2013

AMPACITY 1200 A INTERRUPTING CAPACITY 25 KA BIL 95 KV CONTROL VOLTAGE 132 VDC WEIGHT 380

TRIP COIL OPERATING VOLTAGE 70 - 140 VDC CLOSE COIL OPERATING VOLTAGE 100 - 140 VDC ELECTRICALLY OPERATED YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	NEW	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	22 °C	1.1

INSULATION RESISTANCE	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	7,500,000	8,250,000	7,500,000	8,250,000	7,500,000	8,250,000
POLE TO FRAME	7,500,000	8,250,000	7,500,000	8,250,000	7,500,000	8,250,000
LINE TO LOAD	7,500,000	8,250,000	7,500,000	8,250,000	7,500,000	8,250,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.20	0.20	0.20
POLE RESISTANCE (½Ω)	29.9	29.9	29.9

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 27 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	0.0	0.0	0.0

COUNTER READING:
BEG 499
END 501

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY, K. ICKES

VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 1/5/2024 AMBIENT TEMPERATURE 21 °C HUMIDITY 19 % EQPT. LOCATION CENTRAL ELECTRICAL BUILDING

SUBSTATION PRIMARY SWITCHGEAR POSITION SUB 4 - TF 52F14

MANUFACTURER SQUARE D TYPE VR SERIAL NUMBER 17 77447

MAXIMUM VOLTAGE 15 KV OPERATING VOLTAGE 13 KV MODEL NO. V5DB133Y000 DATE MANUFACTURED 10/2013

AMPACITY 1200 A INTERRUPTING CAPACITY 25 KA BIL 95 KV CONTROL VOLTAGE 132 VDC WEIGHT 380

TRIP COIL OPERATING VOLTAGE 70 - 140 VDC CLOSE COIL OPERATING VOLTAGE 100 - 140 VDC ELECTRICALLY OPERATED YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	NEW	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	21 °C	1.05

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	5,340,000	5,607,000	4,900,000	5,145,000	7,390,000	7,759,500
POLE TO FRAME	7,500,000	7,875,000	5,220,000	5,481,000	6,050,000	6,352,500
LINE TO LOAD	7,500,000	7,875,000	7,500,000	7,875,000	7,500,000	7,875,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.18	0.19	0.19
POLE RESISTANCE (½©)	31.6	29.2	30.0

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 27 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	0.0	0.0	0.0

COUNTER READING:
BEG 537
END 539

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY, K. ICKES

DEVICE TEST RESULTS

Routine : SEL-551.FST_LIB **AF/AL :** AL **Test Date :** 1/5/2024
Version : 8.2 **Pass/Fail :** PASS

Device Data:

Customer:	City of Ann Arbor	Job_Number:	230858
SUBSTATION:	CEB	Relay_ID:	SUB 4-TF 52F14
PHASE_ZONE:	3 Phase	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	NA
SERIAL_NUMBER:	1121500410		
FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408		
NERC_AUDITABLE:	0	MAINT_INTERVAL:	0
PREVIOUS_TESTDATE:	2/20/2020	CURRENT_TESTDATE:	1/5/2024
NEXT_TESTDATE:	1/5/2024	TESTSET_CALDATE:	2/15/2023
Tested_BY:	COLBY KROUT		

Routine Notes:

Device Settings Used for Testing:

```
RID$=     "52F14"          TID$=     "SUB 4 TF"      CTR=      120
CTRN=     120              TDURD=    9.000           s50P1P=   13.0
s50P2P=   1.8              s50P3P$=  "OFF"           s50P4P$=  "OFF"
s50P5P$=  "OFF"            s50P6P$=  "OFF"           s50ABCP$= "OFF"
s51P1P=   0.7              s51P1C$=  "C3"            s51P1TD=  1.00
s51P1RS$= "N"              s51P2P$=  "OFF"           s51P2C$=  "U3"
s51P2TD=  15.00            s51P2RS$= "N"             s50N1P$=  "OFF"
s50N2P$=  "OFF"            s51N1P$=  "OFF"           s51N1C$=  "U4"
s51N1TD=  3.00             s51N1RS$= "N"             s50G1P=   5.4
s50G2P$=  "OFF"            s51G1P=   0.5             s51G1C$=  "U1"
s51G1TD=  0.50             s51G1RS$= "N"             s50Q1P$=  "OFF"
s50Q2P$=  "OFF"            s51Q1P$=  "OFF"           s51Q1C$=  "U3"
s51Q1TD=  15.00            s51Q1RS$= "N"             s51Q2P$=  "OFF"
s51Q2C$=  "U3"             s51Q2TD=  15.00           s51Q2RS$= "N"
s79OI1=   0.000            s79OI2=   600.000         s79OI3=   0.000
s79OI4=   0.000            s79RSD=   1800.000        s79RSLD=  300.000
CFD=      60.000           DMTC=     5               PDEMP=    5.00
NDEMP=    1.50             GDEMP=    1.50            QDEMP=    1.50
SV5PU=    0.000            SV5DO=    0.000           SV6PU=    0.000
SV6DO=    0.000            SV7PU=    0.000           SV7DO=    0.000
SV8PU=    0.000            SV8DO=    0.000           SV9PU=    0.000
SV9DO=    0.000            SV10PU=   0.000           SV10DO=   0.000
SV11PU=   0.000            SV11DO=   0.000           SV12PU=   0.000
SV12DO=   0.000            SV13PU=   0.000           SV13DO=   0.000
SV14PU=   0.000            SV14DO=   0.000           NFREQ=    60
PHROT$=   "ABC"            DATE_F$=  "MDY"
TR$=      "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "

ULTR$=    "!(51P1 + 51G1)"s51P1TC=  1               s51P2TC=  1
s51N1TC=  1                s51G1TC=  1               s51Q1TC=  1
s51Q2TC=  1                s52A$=    "IN1"           CL$=      "LB4"
ULCL$=    "TRIP"           s79RI$=   "TRIP"          s79RIS$=  "IN1"
s79DTL$=  "!LB1 + LB3"     s79DLS$=  "79LO"          s79SKP$=  "50P2 * SH0"
s79STL$=  "TRIP"           s79BRS$=  "(51P1 + 51G1) * (79RS + 79CY)"

s79SEQ=   0                ER1$=     "51P1 + 51G1 + 51N1"

ER2=      0                SV1=      0               SV2=      0
SV3=      0                SV4=      0               SV5=      0
SV6=      0                SV7=      0               SV8=      0
SV9=      0                SV10=     0               SV11=     0
SV12=     0                SV13=     0               SV14=     0
OUT1$=    "TRIP"           OUT2=     0               OUT3=     0
OUT4=     0                DP1$=     "IN1"           DP2$=     "LB2"
DP3=      0                DP4=      0               DP5=      0
DP6=      0                DP7=      0               DP8=      0
```

Global Defines:

```
CONTACT$="4"         'OUTPUT CONTACT TO MASK
SEL_AUTO=1           '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1           'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1             'NO ERROR MESSAGE IF NO OPERATION
```

Device Test Results for: RELAY STATUS CHECK

N/A

Additional Data:
STA

52F14 Date: 01/05/24 Time: 12:07:37.673
SUB 4 TF

FID=SEL-551-R514-Vf-Z002002-D20110408 CID=CCFD

SELF TESTS

W=Warn F=Fail

	IA	IB	IC	IN	MOF
OS	3	2	3	3	0

	+5V_PS	+5V_REG	-5V_REG	+10V_PS	-10V_PS	VBAT
PS	4.98	4.99	-4.98	9.94	-10.00	3.46

TEMP	RAM	ROM	CR_RAM	EEPROM
31.7	OK	OK	OK	OK

Relay Enabled

=>>

Device Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	214.0	-0.9	PASS
B-N	0.0	0.0	0.0	240.0	239.0	-0.4	PASS
C-N	0.0	0.0	0.0	264.0	266.0	0.8	PASS

Device Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	13.130	13.000	1.00	PASS
B-N	13.000	13.000	0.00	PASS
C-N	13.000	13.000	0.00	PASS

Device Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	1.800	1.800	0.00	PASS
B-N	1.818	1.800	1.00	PASS
C-N	1.800	1.800	0.00	PASS

Device Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.400	5.400	0.00	PASS

Device Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		0.714	0.700	2.00	PASS
B-N		0.700	0.700	0.00	PASS
C-N		0.672	0.700	-4.00	PASS

Device Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

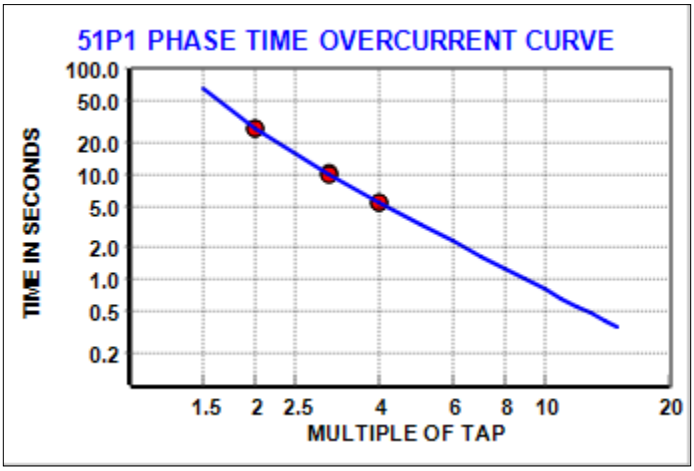
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.400	1620.07	27.001	26.667	1.25	PASS
3.00	2.100	607.10	10.118	10.000	1.18	PASS
4.00	2.800	320.86	5.348	5.333	0.27	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.400	1599.34	26.656	26.667	-0.04	PASS
3.00	2.100	604.03	10.067	10.000	0.67	PASS
4.00	2.800	320.00	5.333	5.333	0.00	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.400	1594.45	26.574	26.667	-0.35	PASS
3.00	2.100	599.35	9.989	10.000	-0.11	PASS
4.00	2.800	324.19	5.403	5.333	1.31	PASS

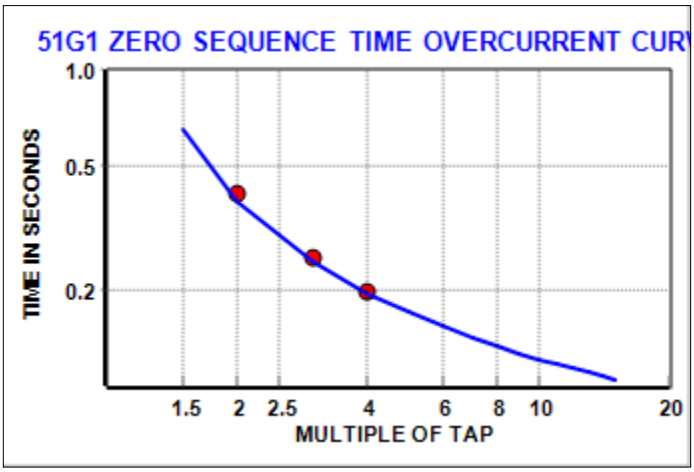


Device Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.475	0.500	-5.00	PASS

Device Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE			OK?
2.00	1.000	24.21	0.404	0.340	TO	0.428	PASS
3.00	1.500	15.16	0.253	0.208	TO	0.283	PASS
4.00	2.000	11.95	0.199	0.161	TO	0.231	PASS



VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 1/4/2024 | AMBIENT TEMPERATURE: 22 °C | HUMIDITY: 19 % | EQPT. LOCATION: CENTRAL ELECTRICAL BUILDING
SUBSTATION: PRIMARY SWITCHGEAR | POSITION: SUB 4 - TF 52F24

MANUFACTURER: SQUARE D | TYPE: VR | SERIAL NUMBER: 17 77446
MAXIMUM VOLTAGE: 15 KV | OPERATING VOLTAGE: 13 KV | MODEL NO.: V5DB133Y000 | DATE MANUFACTURED: 10/2013
AMPACITY: 1200 A | INTERRUPTING CAPACITY: 25 KA | BIL: 95 KV | CONTROL VOLTAGE: 132 VDC | WEIGHT: 380
TRIP COIL OPERATING VOLTAGE: 70 - 140 VDC | CLOSE COIL OPERATING VOLTAGE: 100 - 140 VDC | ELECTRICALLY OPERATED: YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	NEW	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	22 °C	1.1

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	5,120,000	5,632,000	4,260,000	4,686,000	6,640,000	7,304,000
POLE TO FRAME	3,480,000	3,828,000	3,320,000	3,652,000	1,804,000	1,984,400
LINE TO LOAD	3,330,000	3,663,000	4,320,000	4,752,000	6,010,000	6,611,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.20	0.20	0.20
POLE RESISTANCE (½©)	29.4	30.5	28.9

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 27 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	0.0	0.0	0.0

COUNTER READING:
BEG: 459
END: 461

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY, K. ICKES

VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 1/5/2024 | AMBIENT TEMPERATURE: 21 °C | HUMIDITY: 19 % | EQPT. LOCATION: CENTRAL ELECTRICAL BUILDING
SUBSTATION: PRIMARY SWITCHGEAR | POSITION: SUB 5 - SH 52F15

MANUFACTURER: SQUARE D | TYPE: VR | SERIAL NUMBER: 17 77442
MAXIMUM VOLTAGE: 15 KV | OPERATING VOLTAGE: 13 KV | MODEL NO.: V5DB133Y000 | DATE MANUFACTURED: 10/2013
AMPACITY: 1200 A | INTERRUPTING CAPACITY: 25 KA | BIL: 95 KV | CONTROL VOLTAGE: 132 VDC | WEIGHT: 380
TRIP COIL OPERATING VOLTAGE: 70 - 140 VDC | CLOSE COIL OPERATING VOLTAGE: 100 - 140 VDC | ELECTRICALLY OPERATED: YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	NEW	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	21 °C	1.05

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,040,000	3,192,000	3,470,000	3,643,500	3,720,000	3,906,000
POLE TO FRAME	3,820,000	4,011,000	3,370,000	3,538,500	7,500,000	7,875,000
LINE TO LOAD	7,500,000	7,875,000	7,500,000	7,875,000	7,500,000	7,875,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.18	0.16	0.16
POLE RESISTANCE (½©)	30.3	31.0	30.0

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 27 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	0.0	0.0	0.0

COUNTER READING:
BEG: 613
END: 615

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY, K. ICKES

DEVICE TEST RESULTS

Routine : SEL-551.FST_LIB **AF/AL :** AL **Test Date :** 1/5/2024
Version : 8.2 **Pass/Fail :** PASS

Device Data:

Customer:	City of Ann Arbor	Job_Number:	230858
SUBSTATION:	CEB	Relay_ID:	SUB 5-SH-52F15
PHASE_ZONE:	3 Phase	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	NA
SERIAL_NUMBER:	1132620127		
FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408		
NERC_AUDITABLE:	0	MAINT_INTERVAL:	0
PREVIOUS_TESTDATE:	2/28/2020	CURRENT_TESTDATE:	1/5/2024
NEXT_TESTDATE:	1/5/2024	TESTSET_CALDATE:	2/15/2023
Tested_BY:	COLBY KROUT		

Routine Notes:

Device Settings Used for Testing:

```
RID$=     "52F15"          TID$=     "SUB 5 SH"       CTR=      120
CTRN=     120              TDURD=    9.000            s50P1P=   16.5
s50P2P=   3.5              s50P3P$=  "OFF"            s50P4P$=  "OFF"
s50P5P$=  "OFF"            s50P6P$=  "OFF"            s50ABCP$= "OFF"
s51P1P=   1.2              s51P1C$=  "C3"             s51P1TD=  1.00
s51P1RS$= "N"              s51P2P$=  "OFF"            s51P2C$=  "U3"
s51P2TD=  15.00            s51P2RS$= "N"              s50N1P$=  "OFF"
s50N2P$=  "OFF"            s51N1P$=  "OFF"            s51N1C$=  "U4"
s51N1TD=  3.00             s51N1RS$= "N"              s50G1P=   5.4
s50G2P$=  "OFF"            s51G1P=   0.5              s51G1C$=  "U1"
s51G1TD=  0.50             s51G1RS$= "N"              s50Q1P$=  "OFF"
s50Q2P$=  "OFF"            s51Q1P$=  "OFF"            s51Q1C$=  "U3"
s51Q1TD=  15.00            s51Q1RS$= "N"              s51Q2P$=  "OFF"
s51Q2C$=  "U3"             s51Q2TD=  15.00            s51Q2RS$= "N"
s79OI1=   0.000            s79OI2=   600.000          s79OI3=   0.000
s79OI4=   0.000            s79RSD=   1800.000         s79RSLD=  300.000
CFD=      60.000           DMTC=     5                PDEMP=    5.00
NDEMP=    1.50             GDEMP=    1.50             QDEMP=    1.50
SV5PU=    0.000            SV5DO=    0.000            SV6PU=    0.000
SV6DO=    0.000            SV7PU=    0.000            SV7DO=    0.000
SV8PU=    0.000            SV8DO=    0.000            SV9PU=    0.000
SV9DO=    0.000            SV10PU=   0.000            SV10DO=   0.000
SV11PU=   0.000            SV11DO=   0.000            SV12PU=   0.000
SV12DO=   0.000            SV13PU=   0.000            SV13DO=   0.000
SV14PU=   0.000            SV14DO=   0.000            NFREQ=    60
PHROT$=   "ABC"            DATE_F$=  "MDY"
TR$=      "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "

ULTR$=    "!(51P1 + 51G1)"s51P1TC=  1                s51P2TC=  1
s51N1TC=  1                s51G1TC=  1                s51Q1TC=  1
s51Q2TC=  1                s52A$=    "IN1"            CL$=      "LB4"
ULCL$=    "TRIP"           s79RI$=   "TRIP"           s79RIS$=  "IN1"
s79DTL$=  "!LB1 + LB3"     s79DLS$=  "79LO"           s79SKP$=  "50P2 * SH0"
s79STL$=  "TRIP"           s79BRS$=  "(51P1 + 51G1) * (79RS + 79CY)"

s79SEQ=   0                ER1$=     "51P1 + 51G1 + 51N1"

ER2=      0                SV1=      0                SV2=      0
SV3=      0                SV4=      0                SV5=      0
SV6=      0                SV7=      0                SV8=      0
SV9=      0                SV10=     0                SV11=     0
SV12=     0                SV13=     0                SV14=     0
OUT1$=    "TRIP"           OUT2=     0                OUT3=     0
OUT4=     0                DP1$=     "IN1"            DP2$=     "LB2"
DP3=      0                DP4=      0                DP5=      0
DP6=      0                DP7=      0                DP8=      0
```

Global Defines:

```
CONTACT$="4"         'OUTPUT CONTACT TO MASK
SEL_AUTO=1           '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1           'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1             'NO ERROR MESSAGE IF NO OPERATION
```

Device Test Results for: RELAY STATUS CHECK

N/A

Additional Data:
STA

52F15 Date: 01/05/24 Time: 12:00:54.750
SUB 5 SH

FID=SEL-551-R514-Vf-Z002002-D20110408 CID=CCFD

SELF TESTS

W=Warn F=Fail

	IA	IB	IC	IN	MOF
OS	3	3	3	3	0

	+5V_PS	+5V_REG	-5V_REG	+10V_PS	-10V_PS	VBAT
PS	4.98	5.03	-4.96	9.89	-9.95	3.50

TEMP	RAM	ROM	CR_RAM	EEPROM
27.6	OK	OK	OK	OK

Relay Enabled

=>>

Device Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	216.0	0.0	PASS
B-N	0.0	0.0	0.0	240.0	240.0	0.0	PASS
C-N	0.0	0.0	0.0	264.0	265.0	0.4	PASS

Device Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	16.500	16.500	-0.00	PASS
B-N	16.500	16.500	-0.00	PASS
C-N	16.500	16.500	-0.00	PASS

Device Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	3.500	3.500	0.00	PASS
B-N	3.500	3.500	0.00	PASS
C-N	3.500	3.500	0.00	PASS

Device Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.400	5.400	0.00	PASS

Device Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		1.212	1.200	1.00	PASS
B-N		1.188	1.200	-1.00	PASS
C-N		1.212	1.200	1.00	PASS

Device Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

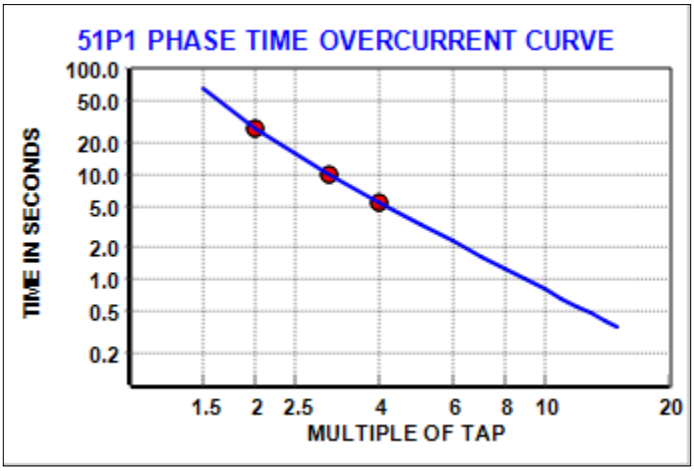
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.400	1619.96	26.999	26.667	1.25	PASS
3.00	3.600	601.82	10.030	10.000	0.30	PASS
4.00	4.800	320.30	5.338	5.333	0.09	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.400	1606.48	26.775	26.667	0.40	PASS
3.00	3.600	600.55	10.009	10.000	0.09	PASS
4.00	4.800	320.38	5.340	5.333	0.12	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.400	1598.92	26.649	26.667	-0.07	PASS
3.00	3.600	598.22	9.970	10.000	-0.30	PASS
4.00	4.800	319.46	5.324	5.333	-0.17	PASS

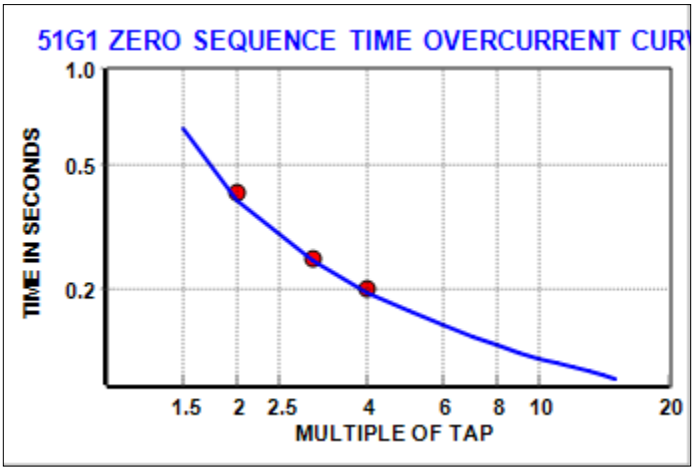


Device Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.485	0.500	-3.00	PASS

Device Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE			OK?
2.00	1.000	24.29	0.405	0.340	TO	0.428	PASS
3.00	1.500	15.07	0.251	0.208	TO	0.283	PASS
4.00	2.000	12.16	0.203	0.161	TO	0.231	PASS



VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 1/4/2024 | AMBIENT TEMPERATURE: 22 °C | HUMIDITY: 19 % | EQPT. LOCATION: CENTRAL ELECTRICAL BUILDING
SUBSTATION: PRIMARY SWITCHGEAR | POSITION: SUB 5-SH 52F25

MANUFACTURER: SQUARE D | TYPE: VR | SERIAL NUMBER: 1777445
MAXIMUM VOLTAGE: 15 KV | OPERATING VOLTAGE: 13 KV | MODEL NO.: V5DB133Y000 | DATE MANUFACTURED: 10/2013
AMPACITY: 1200 A | INTERRUPTING CAPACITY: 25 KA | BIL: 95 KV | CONTROL VOLTAGE: 132 VDC | WEIGHT: 380
TRIP COIL OPERATING VOLTAGE: 70 - 140 VDC | CLOSE COIL OPERATING VOLTAGE: 100 - 140 VDC | ELECTRICALLY OPERATED: YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	22 °C	1.1

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1,455,000	1,600,500	1,676,000	1,843,600	1,880,000	2,068,000
POLE TO FRAME	1,863,000	2,049,300	1,878,000	2,065,800	2,570,000	2,827,000
LINE TO LOAD	3,050,000	3,355,000	4,250,000	4,675,000	4,250,000	4,675,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.18	0.18	0.19
POLE RESISTANCE (½©)	28.3	29.8	31.4

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 27 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	0.0	0.0	0.0

COUNTER READING:
BEG 453
END 456

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY, K. ICKES

VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 1/5/2024 | AMBIENT TEMPERATURE: 21 °C | HUMIDITY: 19 % | EQPT. LOCATION: CENTRAL ELECTRICAL BUILDING
SUBSTATION: PRIMARY SWITCHGEAR | POSITION: SUB 7 -CEB 52F17

MANUFACTURER: SQUARE D | TYPE: VR | SERIAL NUMBER: 17 77459
MAXIMUM VOLTAGE: 15 KV | OPERATING VOLTAGE: 13 KV | MODEL NO.: V5DB133Y000 | DATE MANUFACTURED: 10/2013
AMPACITY: 1200 A | INTERRUPTING CAPACITY: 25 KA | BIL: 95 KV | CONTROL VOLTAGE: 132 VDC | WEIGHT: 380
TRIP COIL OPERATING VOLTAGE: 70 - 140 VDC | CLOSE COIL OPERATING VOLTAGE: 100 - 140 VDC | ELECTRICALLY OPERATED: YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	NEW	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	21 °C	1.05

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	7,500,000	7,875,000	7,500,000	7,875,000	7,500,000	7,875,000
POLE TO FRAME	7,500,000	7,875,000	7,500,000	7,875,000	7,500,000	7,875,000
LINE TO LOAD	7,500,000	7,875,000	7,500,000	7,875,000	7,500,000	7,875,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.19	0.19	0.18
POLE RESISTANCE (½©)	28.7	28.4	27.6

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 27 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	0.0	0.0	0.0

COUNTER READING:
BEG: 537
END: 539

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY, K. ICKES

DEVICE TEST RESULTS

Routine : SEL-551.FST_LIB **AF/AL :** AL **Test Date :** 1/5/2024
Version : 8.2 **Pass/Fail :** PASS

Device Data:

Customer:	City of Ann Arbor	Job_Number:	230858
SUBSTATION:	CEB	Relay_ID:	SUB 7-CEB 52F17
PHASE_ZONE:	3 Phase	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	NA
SERIAL_NUMBER:	1132620130		
FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408		
NERC_AUDITABLE:	0	MAINT_INTERVAL:	0
PREVIOUS_TESTDATE:	2/2/2020	CURRENT_TESTDATE:	1/5/2024
NEXT_TESTDATE:	1/5/2024	TESTSET_CALDATE:	2/15/2023
Tested_BY:	COLBY KROUT		

Routine Notes:

Device Settings Used for Testing:

```
RID$=     "FDR-52F17"     TID$=     "SUB 7 CEB"     CTR=      120
CTRN=     120             TDURD=    9.000           s50P1P=   13.0
s50P2P=   3.2             s50P3P$=  "OFF"           s50P4P$=  "OFF"
s50P5P$=  "OFF"           s50P6P$=  "OFF"           s50ABCP$= "OFF"
s51P1P=   1.0             s51P1C$=  "C3"            s51P1TD=  1.00
s51P1RS$= "N"             s51P2P$=  "OFF"           s51P2C$=  "U3"
s51P2TD=  15.00           s51P2RS$= "N"             s50N1P$=  "OFF"
s50N2P$=  "OFF"           s51N1P$=  "OFF"           s51N1C$=  "U4"
s51N1TD=  3.00            s51N1RS$= "N"             s50G1P=   5.4
s50G2P$=  "OFF"           s51G1P=   0.5             s51G1C$=  "U1"
s51G1TD=  0.50            s51G1RS$= "N"             s50Q1P$=  "OFF"
s50Q2P$=  "OFF"           s51Q1P$=  "OFF"           s51Q1C$=  "U3"
s51Q1TD=  15.00           s51Q1RS$= "N"             s51Q2P$=  "OFF"
s51Q2C$=  "U3"            s51Q2TD=  15.00           s51Q2RS$= "N"
s79OI1=   0.000           s79OI2=   600.000         s79OI3=   0.000
s79OI4=   0.000           s79RSD=   1800.000        s79RSLD=  300.000
CFD=      60.000          DMTC=     5               PDEMP=    5.00
NDEMP=    1.50            GDEMP=    1.50            QDEMP=    1.50
SV5PU=    0.000           SV5DO=    0.000           SV6PU=    0.000
SV6DO=    0.000           SV7PU=    0.000           SV7DO=    0.000
SV8PU=    0.000           SV8DO=    0.000           SV9PU=    0.000
SV9DO=    0.000           SV10PU=   0.000           SV10DO=   0.000
SV11PU=   0.000           SV11DO=   0.000           SV12PU=   0.000
SV12DO=   0.000           SV13PU=   0.000           SV13DO=   0.000
SV14PU=   0.000           SV14DO=   0.000           NFREQ=    60
PHROT$=   "ABC"           DATE_F$=  "MDY"
TR$=      "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "

ULTR$=    "!(51P1 + 51G1)"s51P1TC=  1               s51P2TC=  1
s51N1TC=  1               s51G1TC=  1               s51Q1TC=  1
s51Q2TC=  1               s52A$=    "IN1"           CL$=      "LB4"
ULCL$=    "TRIP"          s79RI$=   "TRIP"          s79RIS$=  "IN1"
s79DTL$=  "!LB1 + LB3"    s79DLS$=  "79LO"          s79SKP$=  "50P2 * SH0"
s79STL$=  "TRIP"          s79BRS$=  "(51P1 + 51G1) * (79RS + 79CY)"

s79SEQ=   0               ER1$=     "51P1 + 51G1 + 51N1"

ER2=      0               SV1=      0               SV2=      0
SV3=      0               SV4=      0               SV5=      0
SV6=      0               SV7=      0               SV8=      0
SV9=      0               SV10=     0               SV11=     0
SV12=     0               SV13=     0               SV14=     0
OUT1$=    "TRIP"          OUT2=     0               OUT3=     0
OUT4=     0               DP1$=     "IN1"           DP2$=     "LB2"
DP3=      0               DP4=      0               DP5=      0
DP6=      0               DP7=      0               DP8=      0
```

Global Defines:

```
CONTACT$="4"        'OUTPUT CONTACT TO MASK
SEL_AUTO=1          '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1          'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1            'NO ERROR MESSAGE IF NO OPERATION
```

Device Test Results for: RELAY STATUS CHECK

N/A

Additional Data:
STA

FDR-52F17 Date: 01/05/24 Time: 12:16:00.477
SUB 7 CEB

FID=SEL-551-R514-Vf-Z002002-D20110408 CID=CCFD

SELF TESTS

W=Warn F=Fail

	IA	IB	IC	IN	MOF
OS	3	3	3	3	0

	+5V_PS	+5V_REG	-5V_REG	+10V_PS	-10V_PS	VBAT
PS	4.96	5.01	-4.96	9.89	-9.92	3.48

TEMP	RAM	ROM	CR_RAM	EEPROM
28.6	OK	OK	OK	OK

Relay Enabled

=>>

Device Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	215.0	-0.5	PASS
B-N	0.0	0.0	0.0	240.0	237.0	-1.2	PASS
C-N	0.0	0.0	0.0	264.0	264.0	0.0	PASS

Device Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	13.000	13.000	0.00	PASS
B-N	13.000	13.000	0.00	PASS
C-N	13.000	13.000	0.00	PASS

Device Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	3.200	3.200	0.00	PASS
B-N	3.200	3.200	0.00	PASS
C-N	3.200	3.200	0.00	PASS

Device Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.400	5.400	0.00	PASS

Device Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		1.000	1.000	0.00	PASS
B-N		1.000	1.000	0.00	PASS
C-N		1.010	1.000	1.00	PASS

Device Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

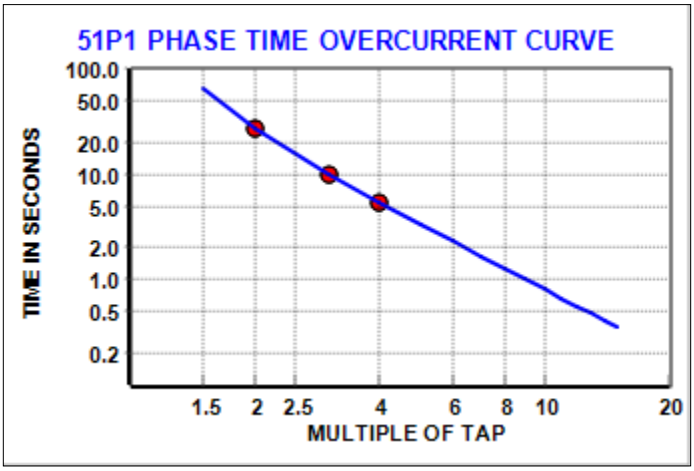
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.000	1627.72	27.129	26.667	1.73	PASS
3.00	3.000	602.31	10.038	10.000	0.38	PASS
4.00	4.000	321.59	5.360	5.333	0.50	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.000	1626.15	27.102	26.667	1.63	PASS
3.00	3.000	600.28	10.005	10.000	0.05	PASS
4.00	4.000	320.40	5.340	5.333	0.12	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.000	1616.96	26.949	26.667	1.06	PASS
3.00	3.000	602.11	10.035	10.000	0.35	PASS
4.00	4.000	321.93	5.366	5.333	0.60	PASS

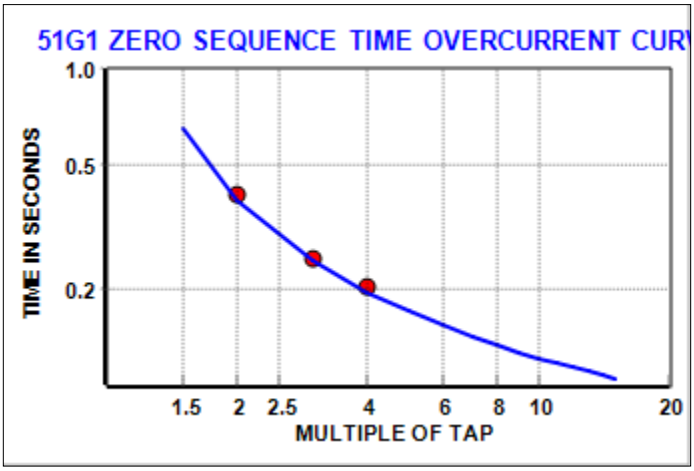


Device Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.485	0.500	-3.00	PASS

Device Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.000	23.88	0.398	0.384	3.70	PASS
3.00	1.500	15.04	0.251	0.245	2.13	PASS
4.00	2.000	12.31	0.205	0.196	4.55	PASS



VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 1/4/2024 | AMBIENT TEMPERATURE: 21.6 °C | HUMIDITY: 22 % | EQPT. LOCATION: CENTRAL ELECTRICAL BUILDING
SUBSTATION: PRIMARY SWITCHGEAR | POSITION: SUB 7-CEB 52F27

MANUFACTURER: SQUARE D | TYPE: VR | SERIAL NUMBER: 17 77452
MAXIMUM VOLTAGE: 15 KV | OPERATING VOLTAGE: 13 KV | MODEL NO.: V5DB133Y000 | DATE MANUFACTURED: 10/2013
AMPACITY: 1200 A | INTERRUPTING CAPACITY: 25 KA | BIL: 95 KV | CONTROL VOLTAGE: 132 VDC | WEIGHT: 380
TRIP COIL OPERATING VOLTAGE: 70 - 140 VDC | CLOSE COIL OPERATING VOLTAGE: 100 - 140 VDC | ELECTRICALLY OPERATED: YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	NEW	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	21.6 °C	1.08

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	7,500,000	8,100,000	7,500,000	8,100,000	7,500,000	8,100,000
POLE TO FRAME	7,500,000	8,100,000	7,500,000	8,100,000	7,500,000	8,100,000
LINE TO LOAD	7,500,000	8,100,000	7,500,000	8,100,000	7,500,000	8,100,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION inch	0.20	0.20	0.20
POLE RESISTANCE (½©)	27.0	28.1	27.9

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 27 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	0.0	0.0	0.0

COUNTER READING:
BEG: 472
END: 475

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY, K. ICKES

VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 1/5/2024 AMBIENT TEMPERATURE 21 °C HUMIDITY 19 % EQPT. LOCATION CENTRAL ELECTRICAL BUILDING

SUBSTATION PRIMARY SWITCHGEAR POSITION SUB 8 - EBB 52F18

MANUFACTURER SQUARE D TYPE VR SERIAL NUMBER 17 77463

MAXIMUM VOLTAGE 15 KV OPERATING VOLTAGE 13 KV MODEL NO. V5DB133Y000 DATE MANUFACTURED 10/2013

AMPACITY 1200 A INTERRUPTING CAPACITY 25 KA BIL 95 KV CONTROL VOLTAGE 132 VDC WEIGHT 380

TRIP COIL OPERATING VOLTAGE 70 - 140 VDC CLOSE COIL OPERATING VOLTAGE 100 - 140 VDC ELECTRICALLY OPERATED YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	NEW	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	21 °C	1.05

INSULATION RESISTANCE	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,630,000	3,811,500	5,750,000	6,037,500	7,500,000	7,875,000
POLE TO FRAME	4,380,000	4,599,000	5,040,000	5,292,000	4,940,000	5,187,000
LINE TO LOAD	7,150,000	7,507,500	5,250,000	5,512,500	7,500,000	7,875,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.19	0.19	0.19
POLE RESISTANCE (½Ω)	29.1	28.6	27.7

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 27 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	0.0	0.0	0.0

COUNTER READING:
BEG 564
END 566

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY, K. ICKES

DEVICE TEST RESULTS

Routine : SEL-551.FST_LIB **AF/AL :** AL **Test Date :** 1/5/2024
Version : 8.2 **Pass/Fail :** PASS

Device Data:

Customer:	City of Ann Arbor	Job_Number:	230858
SUBSTATION:	CEB	Relay_ID:	SUB 8-EBB 52F18
PHASE_ZONE:	3 Phase	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0501003X5613XB
IEEE_DEVICE:	MF	IL_IB:	NA
SERIAL_NUMBER:	1132620121		
FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408		
NERC_AUDITABLE:	0	MAINT_INTERVAL:	0
PREVIOUS_TESTDATE:	3/11/2024	CURRENT_TESTDATE:	1/5/2024
NEXT_TESTDATE:	1/5/2024	TESTSET_CALDATE:	2/15/2023
Tested_BY:	COLBY KROUT		

Routine Notes:

Device Settings Used for Testing:

```
RID$=     "FDR-52F18"     TID$=     "SUB 8 EBB"     CTR=      120
CTRN=     120             TDURD=    9.000           s50P1P=   12.4
s50P2P=   3.0             s50P3P$=  "OFF"           s50P4P$=  "OFF"
s50P5P$=  "OFF"           s50P6P$=  "OFF"           s50ABCP$= "OFF"
s51P1P=   1.1             s51P1C$=  "C3"            s51P1TD=  0.37
s51P1RS$= "N"             s51P2P$=  "OFF"           s51P2C$=  "U3"
s51P2TD=  15.00           s51P2RS$= "N"             s50N1P$=  "OFF"
s50N2P$=  "OFF"           s51N1P$=  "OFF"           s51N1C$=  "U4"
s51N1TD=  3.00            s51N1RS$= "N"             s50G1P=   5.4
s50G2P$=  "OFF"           s51G1P=   0.5             s51G1C$=  "U1"
s51G1TD=  0.50            s51G1RS$= "N"             s50Q1P$=  "OFF"
s50Q2P$=  "OFF"           s51Q1P$=  "OFF"           s51Q1C$=  "U3"
s51Q1TD=  15.00           s51Q1RS$= "N"             s51Q2P$=  "OFF"
s51Q2C$=  "U3"            s51Q2TD=  15.00           s51Q2RS$= "N"
s79OI1=   0.000           s79OI2=   600.000         s79OI3=   0.000
s79OI4=   0.000           s79RSD=   1800.000        s79RSLD=  300.000
CFD=      60.000          DMTC=     5               PDEMP=    5.00
NDEMP=    1.50            GDEMP=    1.50            QDEMP=    1.50
SV5PU=    0.000           SV5DO=    0.000           SV6PU=    0.000
SV6DO=    0.000           SV7PU=    0.000           SV7DO=    0.000
SV8PU=    0.000           SV8DO=    0.000           SV9PU=    0.000
SV9DO=    0.000           SV10PU=   0.000           SV10DO=   0.000
SV11PU=   0.000           SV11DO=   0.000           SV12PU=   0.000
SV12DO=   0.000           SV13PU=   0.000           SV13DO=   0.000
SV14PU=   0.000           SV14DO=   0.000           NFREQ=    60
PHROT$=   "ABC"           DATE_F$=  "MDY"
TR$=      "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "

ULTR$=    "!(51P1 + 51G1)"s51P1TC=  1               s51P2TC=  1
s51N1TC=  1               s51G1TC=  1               s51Q1TC=  1
s51Q2TC=  1               s52A$=    "IN1"           CL$=      "LB4"
ULCL$=    "TRIP"          s79RI$=   "TRIP"          s79RIS$=  "IN1"
s79DTL$=  "!LB1 + LB3"    s79DLS$=  "79LO"          s79SKP$=  "50P2 * SH0"
s79STL$=  "TRIP"          s79BRS$=  "(51P1 + 51G1) * (79RS + 79CY)"

s79SEQ=   0               ER1$=     "51P1 + 51G1 + 51N1"

ER2=      0               SV1=      0               SV2=      0
SV3=      0               SV4=      0               SV5=      0
SV6=      0               SV7=      0               SV8=      0
SV9=      0               SV10=     0               SV11=     0
SV12=     0               SV13=     0               SV14=     0
OUT1$=    "TRIP"          OUT2=     0               OUT3=     0
OUT4=     0               DP1$=     "IN1"           DP2$=     "LB2"
DP3=      0               DP4=      0               DP5=      0
DP6=      0               DP7=      0               DP8=      0
```

Global Defines:

```
CONTACT$="4"        'OUTPUT CONTACT TO MASK
SEL_AUTO=1          '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1          'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1            'NO ERROR MESSAGE IF NO OPERATION
```

Device Test Results for: RELAY STATUS CHECK

N/A

Additional Data:
STA

FDR-52F18 Date: 01/05/24 Time: 12:35:31.210
SUB 8 EBB

FID=SEL-551-R514-Vf-Z002002-D20110408 CID=CCFD

SELF TESTS

W=Warn F=Fail

	IA	IB	IC	IN	MOF
OS	3	3	3	3	0

	+5V_PS	+5V_REG	-5V_REG	+10V_PS	-10V_PS	VBAT
PS	4.98	5.03	-4.99	9.87	-9.89	3.49

TEMP	RAM	ROM	CR_RAM	EEPROM
27.6	OK	OK	OK	OK

Relay Enabled

=>>

Device Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	216.0	0.0	PASS
B-N	0.0	0.0	0.0	240.0	242.0	0.8	PASS
C-N	0.0	0.0	0.0	264.0	265.0	0.4	PASS

Device Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	12.400	12.400	0.00	PASS
B-N	12.400	12.400	0.00	PASS
C-N	12.400	12.400	0.00	PASS

Device Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	3.000	3.000	-0.00	PASS
B-N	2.970	3.000	-1.00	PASS
C-N	3.000	3.000	-0.00	PASS

Device Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.400	5.400	0.00	PASS

Device Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		1.122	1.100	2.00	PASS
B-N		1.111	1.100	1.00	PASS
C-N		1.100	1.100	-0.00	PASS

Device Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

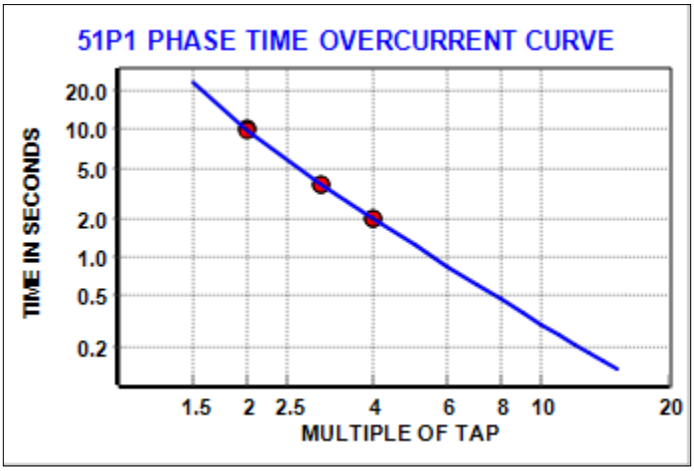
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.200	615.80	10.263	9.867	4.02	PASS
3.00	3.300	224.63	3.744	3.700	1.19	PASS
4.00	4.400	118.56	1.976	1.973	0.14	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.200	604.64	10.077	9.867	2.14	PASS
3.00	3.300	220.87	3.681	3.700	-0.51	PASS
4.00	4.400	118.24	1.971	1.973	-0.14	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.200	585.77	9.763	9.867	-1.05	PASS
3.00	3.300	221.38	3.690	3.700	-0.28	PASS
4.00	4.400	118.17	1.970	1.973	-0.19	PASS

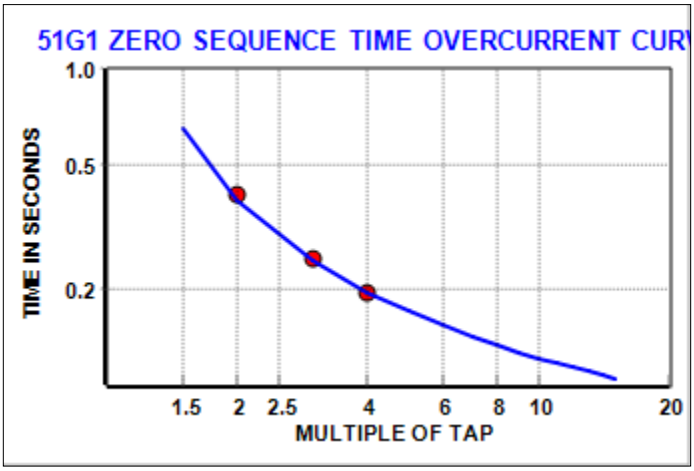


Device Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.500	0.500	0.00	PASS

Device Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.000	23.81	0.397	0.384	3.41	PASS
3.00	1.500	14.96	0.249	0.245	1.60	PASS
4.00	2.000	11.75	0.196	0.196	-0.18	PASS



VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 1/4/2024 | AMBIENT TEMPERATURE: 21.8 °C | HUMIDITY: 21 % | EQPT. LOCATION: CENTRAL ELECTRICAL BUILDING
SUBSTATION: PRIMARY SWITCHGEAR | POSITION: SUB 8-EBB 52F28

MANUFACTURER: SQUARE D | TYPE: VR | SERIAL NUMBER: 17 77450
MAXIMUM VOLTAGE: 15 KV | OPERATING VOLTAGE: 13 KV | MODEL NO.: V5DB133Y000 | DATE MANUFACTURED: 10/2013
AMPACITY: 1200 A | INTERRUPTING CAPACITY: 25 KA | BIL: 95 KV | CONTROL VOLTAGE: 132 VDC | WEIGHT: 380
TRIP COIL OPERATING VOLTAGE: 70 - 140 VDC | CLOSE COIL OPERATING VOLTAGE: 100 - 140 VDC | ELECTRICALLY OPERATED: YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	NEW	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	21.8 °C	1.09

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	7,500,000	8,175,000	7,500,000	8,175,000	7,500,000	8,175,000
POLE TO FRAME	7,500,000	8,175,000	7,500,000	8,175,000	7,500,000	8,175,000
LINE TO LOAD	7,500,000	8,175,000	7,500,000	8,175,000	7,500,000	8,175,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION inch	0.20	0.20	0.20
POLE RESISTANCE (½©)	29.7	29.9	30.1

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 27 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	0.0	0.0	0.0

COUNTER READING:
BEG: 417
END: 421

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY, K. ICKES

SWITCHGEAR INSPECTION AND TEST REPORT

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 2/12/2024 AMBIENT TEMPERATURE 23 °C HUMIDITY 14 % EQPT. LOCATION RSLS ELECTRICAL BUILDING

SUBSTATION SUBSTATION 1 POSITION 480V SWITCHGEAR BUS A

SWITCHGEAR NAMEPLATE

MANUFACTURER SQUARE D TYPE ARC RESISTANT SN / SO NO. E-409906 G-727930 MFG DATE 2014

STYLE / CAT # / BUILD NUMBER 30951271-004 SYSTEM VOLTAGE 480 RATED VOLTAGE 600 SERVICE 3 WIRE

BUS AMPACITIES 2000 OVERCURRENT DEVICE TYPE/CAT. MICROLOGIC 6.0A INTERRUPT RATINGS 100KA

NEUTRAL YES Other N/A

INSPECTION CHECKLIST / REMARKS

☐ REASON FOR INSPECTION	UNABLE TO INSPECT DUE TO BUS BEING ENERGIZED
☐ CLEAN SWITCHGEAR, CUBICLES, BUS, AND INSULATORS	NA
☐ OVERHEATING (CHECK FOR HOT SURFACES, DISCOLORATION)	NA
☐ CHECK FOR UNUSED OPENINGS	NA
☐ CHECK ELECTRICAL CONNECTIONS	NA
☐ VENTS AND FILTER	NA
☐ PROPER CLEARANCE	NA
☐ PANEL ID AND ARC FLASH WARNING (PANEL LABEL)	NA
☐ INDICATING LIGHTS	NA
☐ INTERLOCKS	NA
☐ HEATERS	NA
☐ PANEL SCREWS (MISSING, STRIPPED, ETC)	NA
☐ BARRIER BOARDS AND SHUTTER OPERATION	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
500 V	°C	

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE						
POLE TO FRAME						
LINE TO LOAD						

DIELECTRIC WITHSTAND (mA)			
TEST VOLTAGE _____KV			
Phase #1	Phase #2	Phase #3	Neutral
N/A	N/A	N/A	N/A

BUS BAR RESISTANCE (µ-OHM)				
Ground	NEUTRAL	Phase #1	Phase #2	Phase #3
N/A	N/A	N/A	N/A	N/A

COMMENTS: UNABLE TO INSPECT DUE TO BUS BEING ENERGIZED. CUSTOMER WAS UNABLE TO DEENERGIZE LOAD ON MCC-C.

DEFICIENCIES:

TESTED BY: C. KROUT

SWITCHGEAR INSPECTION AND TEST REPORT

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 2/12/2024 AMBIENT TEMPERATURE 21 °C HUMIDITY 21 % EQPT. LOCATION RSLS ELECTRICAL BUILDING

SUBSTATION SUBSTATION 1 POSITION 480V SWITCHGEAR BUS B

SWITCHGEAR NAMEPLATE

MANUFACTURER SQUARE D TYPE ARC RESISTANT SN / SO NO. G-727981 E-409907 MFG DATE 2014

STYLE / CAT # / BUILD NUMBER 30951271-004 SYSTEM VOLTAGE 480 RATED VOLTAGE 600 SERVICE 3 WIRE

BUS AMPACITIES 2000 OVERCURRENT DEVICE TYPE/CAT. MICROLOGIC 6.0A INTERRUPT RATINGS 100KA

NEUTRAL YES Other N/A

INSPECTION CHECKLIST / REMARKS

☑ REASON FOR INSPECTION	ROUTINE MAINTENANCE AND TESTING
☑ CLEAN SWITCHGEAR, CUBICLES, BUS, AND INSULATORS	YES
☑ OVERHEATING (CHECK FOR HOT SURFACES, DISCOLORATION)	NO SIGNS OF OVERHEATING
☑ CHECK FOR UNUSED OPENINGS	1 UNUSED CUBICLES
☑ CHECK ELECTRICAL CONNECTIONS	GOOD
☑ VENTS AND FILTER	VENTS ARE GOOD, NO FILTERS
☑ PROPER CLEARANCE	GOOD
☑ PANEL ID AND ARC FLASH WARNING (PANEL LABEL)	NO ARC FLASH LABELS
☑ INDICATING LIGHTS	GOOD
☑ INTERLOCKS	GOOD
☑ HEATERS	N/A
☑ PANEL SCREWS (MISSING, STRIPPED, ETC)	NO MISSING SCREWS
☑ BARRIER BOARDS AND SHUTTER OPERATION	BARRIER BOARDS IN GOOD SHAPE. NO SHUTTERS INSTALLED

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
500 V	22 °C	1.1

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1,265,000	1,391,500	1,294,000	1,423,400	1,595,000	1,754,500
POLE TO FRAME	724,000	796,400	631,000	694,100	921,000	1,013,100
LINE TO LOAD						

DIELECTRIC WITHSTAND (mA)			
TEST VOLTAGE _____KV			
Phase #1	Phase #2	Phase #3	Neutral
N/A	N/A	N/A	N/A

POTENTIAL XFMRS	INSULATION RESISTANCE (M-OMH)			TURNS RATIO
	HIGH TO LOW	HIGH TO GND	LOW TO GND	
	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) 0.5	CALCULATED RATIO
LEFT	286,000	388,000	423,000	3.994
CENTER	286,000	373,000	520,000	3.994
RIGHT	286,000	305,000	451,000	3.994

BUS BAR RESISTANCE (µ-OHM)				
Ground	NEUTRAL	Phase #1	Phase #2	Phase #3
N/A	N/A	45.5	50.7	48.8

CONTROL POWER XFMR	INSULATION RESISTANCE (M-OMH)			TURNS RATIO	
	HIGH TO LOW	HIGH TO GND	LOW TO GND		
	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) 0.5	CALCULATED RATIO	
	583,000	546,000	1,500,000	PHASE A	3.880
				PHASE B	
				PHASE C	

COMMENTS: SURGE LOGIC FUNCTIONING NORMALLY

DEFICIENCIES:

TESTED BY: C. KROUT

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 2/12/2024 | AMBIENT TEMPERATURE: 23 °C | HUMIDITY: 14 % | ASSET #: MAIN A 480V BREAKER
SUBSTATION: SUBSTATION 1 | POSITION: MAIN A 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085249508102	FRAME SIZE 1,600 AMPS 635 V	
BREAKER TYPE	WA6ECR44A9CFFFWSEA	SENSOR TAPS	1200	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	1B	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	MICROLOGIC 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING	N/A

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	NA
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	C

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	1,200	LONG	☑	1	X	1,200	A =	1,200	A		8	NA	
SENSOR TAP	1,200	SHORT	☑	4	X	1,200	A =	4,800	A		0.4	OFF	
		INST.	☐		X		=		A				
		GRD. FLT.	☑	0.3	X	1,200	A =	360	A		0.2	0FF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	1,200	LONG	☑	1	X	1,200	A =	1,200	A		8	NA	
SENSOR TAP	1,200	SHORT	☑	4	-	4,800	A						
		INST.	☐										
		GRD. FLT.	☑	0.3	-	360	A				0.2	0FF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	8	3600	NA	NA	30.756 / 30.756	30.756 / 30.756	30.756 / 30.756	NA
Short Time PU	4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.4	6000	NA	NA	0.42 / 0.42	0.42 / 0.42	0.42 / 0.42	NA
GRD Fault PU	0.3	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	720	NA	NA	0.159 / 0.159	0.159 / 0.159	0.159 / 0.159	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	23 °C	1.15

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,450,000	2,770,000	3,185,500	2,920,000	3,358,000
POLE TO FRAME	2,380,000	2,737,000	2,880,000	3,312,000	3,000,000	3,450,000
LINE TO LOAD	2,830,000	3,254,500	3,000,000	3,450,000	3,000,000	3,450,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
11.9	12.1	12.0

COUNTER END: N/A

COMMENTS: ALL BREAKERS TESTED WITH AS FOUND SETTINGS. PASSED SECONDARY INJECTION.
DEFICIENCIES:

TESTED BY: Colby Krout

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 2/12/2024 | AMBIENT TEMPERATURE: 23 °C | HUMIDITY: 14 % | ASSET #: MAIN B 480V BREAKER
SUBSTATION: SUBSTATION 1 | POSITION: MAIN B 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085249508	FRAME SIZE 1,600 AMPS 635 V	
BREAKER TYPE	WA6ECR44A9CFFFWSEA	SENSOR TAPS	1200	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	4A	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	MICROLOGIC 6.0	TRIP UNIT CAT #	MICROLOGIC 6.0	COUNTER BEGINNING	N/A

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	C

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	1,200	LONG	☑	1	X	1,200	A =	1,200	A		8	NA	
SENSOR TAP	1,200	SHORT	☑	4	X	1,200	A =	4,800	A		0.4	OFF	
		INST.	☐		X		=		A				
		GRD. FLT.	☑	0.3	X	1,200	A =	360	A		0.2	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	1,200	LONG	☑	1	X	1,200	A =	1,200	A		8	NA	
SENSOR TAP	1,200	SHORT	☑	4	-	4,800	A						
		INST.	☐										
		GRD. FLT.	☑	0.3	-	360	A				0.2	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	8	3600	NA	NA	31.121 / 31.121	31.121 / 31.121	31.121 / 31.121	NA
Short Time PU	4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.4	6000	NA	NA	0.42 / 0.42	0.42 / 0.42	0.42 / 0.42	NA
GRD Fault PU	0.3	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	720	NA	NA	0.154 / 0.154	0.154 / 0.154	0.154 / 0.154	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	22 °C	1.1

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000
POLE TO FRAME	1,687,000	1,855,700	2,090,000	2,299,000	205,000	225,500
LINE TO LOAD	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
12.4	12.0	12.0

COUNTER END: N/A

COMMENTS: ALL BREAKERS TESTED WITH AS FOUND SETTINGS. PASSED SECONDARY INJECTION.
DEFICIENCIES:

TESTED BY: C. KROUT

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 2/12/2024 | AMBIENT TEMPERATURE: 23 °C | HUMIDITY: 14 % | ASSET #: MCC-C 480V BREAKER
SUBSTATION: SUBSTATION 1 | POSITION: MCC-C 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085249508201	FRAME SIZE 800 AMPS 635 V	
BREAKER TYPE	WA6AAR44A9CXFXWXAA	SENSOR TAPS	800	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	2C	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	MICROLOGIC 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING	N/A

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☐	NA	NA
CONTACT FINGERS	☐	NA	NA
LOADING AND ARCING CONTACTS	☐	NA	NA
OVERCURRENT DEV. BATTERY	☐	NA	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☐	NA	NA
AUXILIARY DEVICES	☐	NA	NA
GROUND CONNECTION	☐	NA	NA
TRIP UNIT	☐	NA	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	0.5	X	800	A =	400	A		20	NA	
SENSOR TAP	800	SHORT	☑	4	X	800	A =	3,200	A		0.2	ON	
		INST.	☐		X		=		A				
		GRD. FLT.	☑		X	800	=		A		0	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	0.5	X	800	A =	400	A		20	NA	
SENSOR TAP	800	SHORT	☑	4	-	3,200	A						
		INST.	☐										
		GRD. FLT.	☑		-		A					OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.5	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	20	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time PU	4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault PU		NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	°C	

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE						
POLE TO FRAME						
LINE TO LOAD						

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3

COUNTER END: N/A

COMMENTS: CUSTOMER WAS UNABLE TO LOSE LOAD ON MCC-C SO BREAKER COULD NOT BE DEENERGIZED AND TESTED
DEFICIENCIES:

TESTED BY: C. KROUT

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 2/12/2024 | AMBIENT TEMPERATURE: 22 °C | HUMIDITY: 21 % | ASSET #: MCC-D 480V BREAKER
SUBSTATION: SUBSTATION 1 | POSITION: MCC-D 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085249512301	FRAME SIZE 800 AMPS 635 V	
BREAKER TYPE	WA6PPR44A9CXFXWXAA	SENSOR TAPS	250	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	3C	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	MICROLOGIC 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING	N/A

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	C

SETTINGS AS FOUND	FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	LONG	☑	0.9	X	250	A =	225	A		24	NA	
SENSOR TAP	SHORT	☑	10	X	250	A =	2,500	A		0.2	OFF	
	INST.	☐		X		=		A				
	GRD. FLT.	☑	0.4	X	250	A =	100	A		0	0FF	

SETTINGS AS LEFT	FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	LONG	☑	0.9	X	250	A =	225	A		24	NA	
SENSOR TAP	SHORT	☑	10	-	2,500	A						
	INST.	☐										
	GRD. FLT.	☑	0.4	-	100	A					0FF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.9	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	24	1575	NA	NA	15.22 / 15.22	15.22 / 15.22	15.22 / 15.22	NA
Short Time PU	10	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	2812	NA	NA	0.17 / 0.17	0.17 / 0.17	0.17 / 0.17	NA
GRD Fault PU	0.4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0	200	NA	NA	0.03 / 0.03	0.03 / 0.03	0.03 / 0.03	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	22 °C	1.1

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000
POLE TO FRAME	3,000,000	3,300,000	2,090,000	2,299,000	3,000,000	3,300,000
LINE TO LOAD	1,730,000	1,903,000	2,290,000	2,519,000	2,390,000	2,629,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
12.1	13.2	13.0

COUNTER END: N/A

COMMENTS: ALL BREAKERS TESTED WITH AS FOUND SETTINGS. PASSED SECONDARY INJECTION.
DEFICIENCIES:

TESTED BY: C. KROUT, K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/22/2023 | AMBIENT TEMPERATURE: 18 °C | HUMIDITY: 40 % | ASSET #:
SUBSTATION: SUBSTATION 1 | POSITION: MCC-RLS-A

MANUFACTURER	SQUARE D	SN / SO NO.	064160555501	FRAME SIZE 800 AMPS 600	V
BREAKER TYPE	PLP34080U44ALVJK	SENSOR TAPS	600	MOUNTING	○ D.O. ◉ B.I.
FUSE CAT. NO.	NA	CUBICLE CODE	MAIN	ELECTRICALLY OPERATED	○ YES ◉ NO
TRIP UNIT TYPE	MICROLOGIC 6.0 A	TRIP UNIT CAT #	MIRCOLOGIC 6.0 A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☐	NA	NA
CONTACT FINGERS	☐	NA	NA
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☐	NA	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA
GROUND CONNECTION	☐	NA	NA
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	600	LONG	☑	1	X	600	A =	600	A		12	NA	
SENSOR TAP	600	SHORT	☑	4	X	600	A =	2,400	A		0		
		INST.	☑	15	X	600	A =	9,000	A		N/A	NA	
		GRD. FLT.	☑	0.2	X	600	A =	120	A		0		

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	600	LONG	☑	1	X	600	A =	600	A		12	NA	
SENSOR TAP	600	SHORT	☑	4	-	2,400	A						
		INST.	☑	15	-	9,000	A					NA	
		GRD. FLT.	☑	0.2	-	120	A						

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	12	1800	NA	NA	44.67 / 44.67	44.67 / 44.67	44.67 / 44.67	NA
Short Time PU	4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0	5700	NA	NA	0.036 / 0.036	0.036 / 0.036	0.036 / 0.036	NA
Instant PU	15	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay		11250	NA	NA	0.033 / 0.033	0.033 / 0.033	0.033 / 0.033	NA
GRD Fault PU	0.2	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0	240	NA	NA	0.037 / 0.037	0.037 / 0.037	0.037 / 0.037	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	18 °C	0.924

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	59,000	54,516	42,400	39,177.6	53,300	49,249.2
POLE TO FRAME	24,800	22,915.2	21,500	19,866	19,950	18,433.8
LINE TO LOAD	27,100	25,040.4	28,900	26,703.6	25,800	23,839.2

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
35.4	37.7	33.7

COUNTER END: NA

COMMENTS: BREAKER PASSED ALL SECONDARY INJECTION TESTS.
INSULATION RESISTANCE PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO MCC-1 CONNECTED.

DEFICIENCIES:

TESTED BY: E. PENLAND, K. ICKES, S. FRY

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/22/2023 | AMBIENT TEMPERATURE: 18 °C | HUMIDITY: 40 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 1 | POSITION: MCC-RLS-A

NAMEPLATE DATA

MANUFACTURER: SQUARE D | SERIAL NO.: U-519655 | TYPE: 12
CATALOG NO.: 30951271-137 | DRAWING NO.: 80459-641-01 | VOLTAGE CLASS: 600
MAIN BUS RATING: 600 A | MAIN BUS NEUTRAL RATING: NA A | CONDUCTOR: ○ CU ◉ AL
CURRENT WITHSTAND RATING: NA | NUMBER OF SECTIONS: 5 | LISTING: ☑ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER: 1 | MLO: 0 | TYPE: SQUARE D | AMPACITY: 800 | MAIN DISCONNECT: 0 | FUSE TYPE: NA | SIZE: NA
TOTAL POSITIONS EQUIPPED: 15 | NO. OF SPARE SPACES: 3 | TOTAL POSITIONS USED: 12

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	NA
AUXILIARY DEVICES	☑	Acceptable	NA

TEST VOLTAGE: 1 KVDC | EQUIPMENT TEMPERATURE: 18 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 0.9

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
BUS	RDG.	24,800	21,500	19,950		59,000	53,300	42,400			
	20°C	22,320	19,350	17,955		53,100	47,970	38,160			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:
DEFICIENCIES:

TESTED BY: E. PENLAND, K. ICKES

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 11/22/2023 AMBIENT TEMPERATURE 18 °C HUMIDITY 40 % EQPT. LOCATION

SUBSTATION SUBSTATION 1 POSITION MCC-RLS-A

NAMEPLATE DATA

MANUFACTURER SQUARE D SERIAL NO. U-519655 TYPE 12

CATALOG NO. 30951271-137 DRAWING NO. 80459-641-01 VOLTAGE CLASS 600

PHASE AMPACITY 600 A WITHSTAND RATING NA KA CONDUCTOR ○ CU ◉ AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
MAIN	SPARE 30A	469	506	476									
MAIN	SURGE PROT	594	619	533									
MAIN	SRP-1	254	262	205									
MAIN	10 HP SPARE	825	873	745									
MAIN	SRP-3	339	309	282									
MAIN	RLS-P-1	938	1120	940									
MAIN	SRP-5	349	342	315									
MAIN	RLS-P-2	1214	1278	921									
MAIN	SPARE 30A	634	638	639									
MAIN	ATS RLS	441	420	442									
MAIN	78" GATE	730	657	655									
MAIN	RLS-ACU-1	708	674	688									
MAIN	RLS-ACCU-1	677	703	684									

COMMENTS:

DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY, K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 2/12/2024 | AMBIENT TEMPERATURE: 23 °C | HUMIDITY: 14 % | ASSET #: MCC-RLS-A 480V BREAKER
SUBSTATION: SUBSTATION 1 | POSITION: MCC-RLS-A 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085249507701	FRAME SIZE 800 AMPS 635 V	
BREAKER TYPE	WA6PPR44A9CXFXWXAA	SENSOR TAPS	600	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	2D	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	MICROLOGIC 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING	N/A

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	NA
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	C

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	600	LONG	☑	1	X	600	A =	600	A		12	NA	
SENSOR TAP	600	SHORT	☑	4	X	600	A =	2,400	A		0.2	OFF	
		INST.	☐		X		=		A				
		GRD. FLT.	☑	0.3	X	600	A =	180	A		0	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	600	LONG	☑	1	X	600	A =	600	A		12	NA	
SENSOR TAP	600	SHORT	☑	4	-	2,400	A						
		INST.	☐										
		GRD. FLT.	☑	0.3	-	180	A					OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	12	1800	NA	NA	44.912 / 44.912	44.912 / 44.912	44.912 / 44.912	NA
Short Time PU	4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	3000	NA	NA	0.17 / 0.17	0.17 / 0.17	0.17 / 0.17	NA
GRD Fault PU	0.3	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0	360	NA	NA	0.032 / 0.032	0.032 / 0.032	0.032 / 0.032	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	23 °C	1.15

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,450,000	3,000,000	3,450,000	3,000,000	3,450,000
POLE TO FRAME	3,000,000	3,450,000	3,000,000	3,450,000	3,000,000	3,450,000
LINE TO LOAD	1,935,000	2,225,250	3,000,000	3,450,000	3,000,000	3,450,000

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
13.2	13.0	15.5

COUNTER END: N/A

COMMENTS: ALL BREAKERS TESTED WITH AS FOUND SETTINGS. PASSED SECONDARY INJECTION.
DEFICIENCIES:

TESTED BY: Colby Krout

MOLDED CASE CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 11/22/2023 AMBIENT TEMPERATURE 18 °C HUMIDITY 40 % EQPT. LOCATION

SUBSTATION SUBSTATION 1 POSITION MCC-RLS-B

BREAKER IDENTIFICATION	MANUFACTURER	SERIAL NUMBER	TYPE	FRAME RATING (Amps)	FRAME RATING (Volts)	TRIP RATING	INSTANTANEOUS TRIP	ELEMENT TYPE
MCC-RLS-B MAIN	SQUARE D	04-307260	LJ600	600	600	400	6600	MAGNETIC ADJUSTABLE

INSULATION RESISTANCE (M©) @ 1000 VDC									POLE RESISTANCE (µ©)		
A - B	B - C	C - A	A - GND	B - GND	C - GND	A	B	C			
POLE TO POLE			POLE TO FRAME			LINE TO LOAD			A	B	C
66,300	113,300	114,400	42,900	41,700	46,300	229,000	324,000	724,000	176.00	172.50	189.60

	RANGE	MIN TIME	MAX TIME	TRIP TESTS	A	B	C
Manual Trip Function ☑	AMPS			INSTANTANEOUS TRIP AMPS			
Exercise Breaker ☑	SECONDS			TRIP TIME IN SECONDS @ 300% RATED CURRENT			

COMMENTS: UNABLE TO SECONDARY INJECT.
INSULATION RESISTANCE PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO MCC-1 CONNECTED.

DEFICIENCIES:

TESTED BY: S. FRY, K. ICKES

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 11/22/2023 AMBIENT TEMPERATURE 18 °C HUMIDITY 40 % EQPT. LOCATION

SUBSTATION SUBSTATION 1 POSITION MCC-RLS-B

NAMEPLATE DATA

MANUFACTURER SQUARE D SERIAL NO. U-519663 TYPE 12

CATALOG NO. 30951271-138 DRAWING NO. 80459-641-01 VOLTAGE CLASS 600

MAIN BUS RATING 600 A MAIN BUS NEUTRAL RATING NA A CONDUCTOR ○ CU ◉ AL

CURRENT WITHSTAND RATING NA NUMBER OF SECTIONS 4 LISTING ☑ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER 1 MLO 0 TYPE BREAKER AMPACITY 800 MAIN DISCONNECT 0 FUSE TYPE NA SIZE NA

TOTAL POSITIONS EQUIPPED 14 NO. OF SPARE SPACES 2 TOTAL POSITIONS USED 12

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	NA
AUXILIARY DEVICES	☑	Acceptable	NA

TEST VOLTAGE 1 KVDC EQUIPMENT TEMPERATURE 18 °C TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.9

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
BUS	RDG.	42,900	41,700	46,300		66,300	114,400	113,300			
	20°C	38,610	37,530	41,670		59,670	102,960	101,970			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES:

TESTED BY: E. PENLAND, K. ICKES

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 11/22/2023 AMBIENT TEMPERATURE 18 °C HUMIDITY 40 % EQPT. LOCATION

SUBSTATION SUBSTATION 1 POSITION MCC-RLS-B

NAMEPLATE DATA

MANUFACTURER SQUARE D SERIAL NO. U-519663 TYPE 12

CATALOG NO. 30951271-138 DRAWING NO. 80459-641-01 VOLTAGE CLASS 600

PHASE AMPACITY 600 A WITHSTAND RATING NA KA CONDUCTOR ○ CU ◉ AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
MAIN	10 HP SPARE	732	1028	770									
MAIN	SURGE PROT	808	593	681									
MAIN	SRP-2	381	317	330									
MAIN	SPARE	823	800	766									
MAIN	RLS-PPU-1	821	819	775									
MAIN	WELDEROUT	867	839	819									
MAIN	SRP-4	459	494	403									
MAIN	ATS RLS	658	615	617									
MAIN	48" GATE	857	874	832									
MAIN	SPARE	881	850	871									
MAIN	RLS-EF-2	986	819	890									
MAIN	RLS-EF-1	1015	817	873									
MAIN	RLS-SF-1	936	822	821									

COMMENTS:

DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY, K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 2/12/2024 | AMBIENT TEMPERATURE: 21 °C | HUMIDITY: 22 % | ASSET #: MCC-RLS-B 480V BREAKER
SUBSTATION: SUBSTATION 1 | POSITION: MCC-RLS-B 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085249507801	FRAME SIZE 800 AMPS 635 V	
BREAKER TYPE	WA6PPR44A9CXFXWXAA	SENSOR TAPS	400	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	3D	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	MICROLOGIC 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING	N/A

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	C

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	400	LONG	☑	0.9	X	400	A =	360	A		20	NA	
SENSOR TAP	400	SHORT	☑	5	X	400	A =	2,000	A		0.2	OFF	
		INST.	☐		X		=		A				
		GRD. FLT.	☑	0.4	X	400	A =	160	A		0	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	400	LONG	☑	0.8	X	400	A =	320	A		20	NA	
SENSOR TAP	400	SHORT	☑	5	-	2,000	A						
		INST.	☐										
		GRD. FLT.	☑	0.4	-	160	A					OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.9	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	20	1320	NA	NA	46.987 / 46.987	46.987 / 46.987	46.987 / 46.987	NA
Short Time PU	5	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	2250	NA	NA	0.17 / 0.17	0.17 / 0.17	0.17 / 0.17	NA
GRD Fault PU	0.4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0	320	NA	NA	0.039 / 0.039	0.039 / 0.039	0.039 / 0.039	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	21 °C	1.05

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1,399,000	1,468,950	3,000,000	3,150,000	3,000,000	3,150,000
POLE TO FRAME	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000
LINE TO LOAD	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
14.2	17.1	16.6

COUNTER END: N/A

COMMENTS: ALL BREAKERS TESTED WITH AS FOUND SETTINGS. PASSED SECONDARY INJECTION.
DEFICIENCIES:

TESTED BY: C. KROUT

LOADBREAK DISCONNECT TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 2/12/2024 | AMBIENT TEMPERATURE: 19 °C | HUMIDITY: 55 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 1 | POSITION: PRIMARY SWITCH A

NAMEPLATE DATA

MANUFACTURER: SQUARE D | TYPE: HVL | SERIAL NO.: 17-30951271-002 | MFG DATE: 1/2014
RATED VOLTAGE: 15,000 | SYSTEM VOLTAGE: 13200 | AMPERES: 600 | INTERRUPTING RATING: 25 KA | B.I.L. RATING: 95 KV
TYPE OPERATING MECHANISM: MANUAL | MOMENTARY FAULT INTERUPTING: 40 KA | MOMENTARY FAULT CLOSING AMPS: 40 KA

FUSE DATA

MANUFACTURER: N/A | TYPE: N/A | HOLDER: N/A | MAX. AMPS: N/A
REFILL ELEMENT TYPE: N/A | SIZE: N/A | CAT. NO.: N/A | TCC NO.: N/A | VOLTAGE: N/A KV

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTION	☑	GOOD	NA
STRUCTURAL MEMBERS	☑	GOOD	NA
CUBICLE	☑	GOOD	C
INTERLOCKS	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
Contacts	☑	GOOD	C
HEATERS	☐	NA	NA
OPERATING MECHANISM	☑	GOOD	C/L
HAZARD WARNING LABELS	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	19 °C	0.962

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1,963,000	1,888,406	1,863,000	1,792,206	2,140,000	2,058,680
POLE TO FRAME	931,000	895,622	880,000	846,560	920,000	885,040
LINE TO LOAD	1,636,000	1,573,832	1,710,000	1,645,020	1,610,000	1,548,820

POLE RESISTANCE (µ©)	POLE 1	POLE 2	POLE 3
AS FOUND	33.7	31.5	31.8
AS LEFT	33.7	31.5	31.8

ARRESTERS TESTING (M©)			
TEST VOLTAGE KV / 1 MIN	PHASE A	PHASE B	PHASE C
2.5	106,600	91,600	101,400

DIELECTRIC WITHSTAND (mA)			
TEST VOLTAGE 27 KVAC	POLE 1	POLE 2	POLE 3
SWITCH CLOSED - POLE TO GND OTHER POLES GROUNDED	1	1	1

COMMENTS: ARRESTER INFO: 12.7 kV MCOV, 15 kV RATED.
PRIMARY CABLE INSULATION RESISTANCES: A-G - 34,200 MEGAOHMS; B-G - 31,900 MEGAOHMS;
C-G - 33,900 MEGAOHMS; A-B - 59,800 MEGAOHMS; B-C - 58,400 MEGAOHMS; C-A - 61,400 MEGAOHMS.

DEFICIENCIES:

TESTED BY: B. BURGESS, K. ICKES

LOADBREAK DISCONNECT TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 2/12/2024 | AMBIENT TEMPERATURE: 19 °C | HUMIDITY: 55 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 1 | POSITION: PRIMARY SWITCH B

NAMEPLATE DATA

MANUFACTURER: SQUARE D | TYPE: HVL | SERIAL NO.: 17-30951271-005 | MFG DATE: 1/2014
RATED VOLTAGE: 15,000 | SYSTEM VOLTAGE: 13200 | AMPERES: 600 | INTERRUPTING RATING: 25 KA | B.I.L. RATING: 95 KV
TYPE OPERATING MECHANISM: MANUAL | MOMENTARY FAULT INTERUPTING: 40 KA | MOMENTARY FAULT CLOSING AMPS: 40 KA

FUSE DATA

MANUFACTURER: N/A | TYPE: N/A | HOLDER: N/A | MAX. AMPS: N/A
REFILL ELEMENT TYPE: N/A | SIZE: N/A | CAT. NO.: N/A | TCC NO.: N/A | VOLTAGE: N/A KV

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTION	☑	GOOD	NA
STRUCTURAL MEMBERS	☑	GOOD	NA
CUBICLE	☑	GOOD	C
INTERLOCKS	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
Contacts	☑	GOOD	C
HEATERS	☐	NA	NA
OPERATING MECHANISM	☑	GOOD	C/L
HAZARD WARNING LABELS	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	19 °C	0.962

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,460,000	2,366,520	2,930,000	2,818,660	3,120,000	3,001,440
POLE TO FRAME	1,131,000	1,088,022	810,000	779,220	760,000	731,120
LINE TO LOAD	1,703,000	1,638,286	3,890,000	3,742,180	3,960,000	3,809,520

POLE RESISTANCE (µ©)			
	POLE 1	POLE 2	POLE 3
AS FOUND	34.7	31.5	32.5
AS LEFT	34.7	31.5	32.5

ARRESTERS TESTING (M©)			
TEST VOLTAGE KV / 1 MIN	PHASE A	PHASE B	PHASE C
2.5	556,000	635,000	545,000

DIELECTRIC WITHSTAND (mA)			
TEST VOLTAGE 27 KVAC	POLE 1	POLE 2	POLE 3
SWITCH CLOSED - POLE TO GND OTHER POLES GROUNDED	1	1	1

COMMENTS: ARRESTER INFO: 12.7 kV MCOV, 15 kV RATED.
PRIMARY CABLE INSULATION RESISTANCES: A-G - 33,900 MEGAOHMS; B-G - 32,600 MEGAOHMS;
C-G - 30,100 MEGAOHMS; A-B - 64,600 MEGAOHMS; B-C - 58,700 MEGAOHMS; C-A - 70,500 MEGAOHMS.

DEFICIENCIES:

TESTED BY: B. BURGESS, K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 2/12/2024 | AMBIENT TEMPERATURE: 22 °C | HUMIDITY: 15 % | ASSET #: SPARE A 480V BREAKER
SUBSTATION: SUBSTATION 1 | POSITION: SPARE A 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085249507902	FRAME SIZE 800 AMPS 636 V	
BREAKER TYPE	WA6PPR44A9CXFXWXAA	SENSOR TAPS	250	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	1D	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	MICROLOGIC 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING	N/A

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	C

SETTINGS AS FOUND	FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	LONG	☑	1	X	250	A =	250	A		24	NA	
SENSOR TAP	SHORT	☑	10	X	250	A =	2,500	A		0.1	OFF	
	INST.	☑	15	X	250	A =	3,750	A		N/A	NA	
	GRD. FLT.	☑	0.3	X	250	A =	75	A		0	OFF	

SETTINGS AS LEFT	FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	LONG	☑	1	X	250	A =	250	A		24	NA	
SENSOR TAP	SHORT	☑	10	-	2,500	A						
	INST.	☑	15	-	3,750	A					NA	
	GRD. FLT.	☑	0.3	-	75	A					OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	24	1750	NA	NA	14.959 / 14.959	14.959 / 14.959	14.959 / 14.959	NA
Short Time PU	10	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.1	3125	NA	NA	0.111 / 0.111	0.111 / 0.111	0.111 / 0.111	NA
Instant PU	15	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay		4648	NA	NA	0.037 / 0.037	0.037 / 0.037	0.037 / 0.037	NA
GRD Fault PU	0.3	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0	150	NA	NA	0.029 / 0.029	0.029 / 0.029	0.029 / 0.029	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	22 °C	1.1

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000
POLE TO FRAME	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000
LINE TO LOAD	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
39.3	42.7	33.4

COUNTER END: N/A

COMMENTS: ALL BREAKERS TESTED WITH AS FOUND SETTINGS. PASSED SECONDARY INJECTION.
DEFICIENCIES:

TESTED BY: C. KROUT, K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 2/12/2024 | AMBIENT TEMPERATURE: 22 °C | HUMIDITY: 21 % | ASSET #: SPARE B 480V BREAKER
SUBSTATION: SUBSTATION 1 | POSITION: SPARE B 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085249512302	FRAME SIZE 800 AMPS 635 V	
BREAKER TYPE	WA6PPR44A9CXFXWXAA	SENSOR TAPS	250	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	4D	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	MICROLOGIC 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING	N/A

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	C

SETTINGS AS FOUND	FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	LONG	☑	0.9	X	250	A =	225	A		24	NA	
SENSOR TAP	SHORT	☑	10	X	250	A =	2,500	A		0.2	OFF	
	INST.	☐		X		=		A				
	GRD. FLT.	☑	0.4	X	250	A =	100	A		0	OFF	

SETTINGS AS LEFT	FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	LONG	☑	0.9	X	250	A =	225	A		24	NA	
SENSOR TAP	SHORT	☑	10	-	2,500	A						
	INST.	☐										
	GRD. FLT.	☑	0.4	-	100	A					OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.9	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	24	1575	NA	NA	15.496 / 15.496	15.496 / 15.496	15.496 / 15.496	NA
Short Time PU	10	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	2812	NA	NA	0.171 / 0.171	0.171 / 0.171	0.171 / 0.171	NA
GRD Fault PU	0.4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0	200	NA	NA	0.036 / 0.036	0.036 / 0.036	0.036 / 0.036	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	21 °C	1.05

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1,878,000	1,971,900	2,160,000	2,268,000	1,972,000	2,070,600
POLE TO FRAME	2,250,000	2,362,500	2,140,000	2,247,000	2,370,000	2,488,500
LINE TO LOAD	3,000,000	3,150,000	1,936,000	2,032,800	1,877,000	1,970,850

POLE RESISTANCE (μ©)		
POLE 1	POLE 2	POLE 3
12.6	12.2	12.8

COUNTER END: N/A

COMMENTS: ALL BREAKERS TESTED WITH AS FOUND SETTINGS. PASSED SECONDARY INJECTION.
DEFICIENCIES:

TESTED BY: C. KROUT

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 2/12/2024 | AMBIENT TEMPERATURE: 22 °C | HUMIDITY: 15 % | ASSET #: TIE 480V BREAKER
SUBSTATION: SUBSTATION 1 | POSITION: TIE 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085249508103	FRAME SIZE 1,600 AMPS 635 V	
BREAKER TYPE	WA6ECR44A9CFFFWSEA	SENSOR TAPS	1200	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	2B	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	MICROLOGIC 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING	N/A

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	NA
TRIP UNIT	☑	GOOD	C

SETTINGS AS FOUND	FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	LONG	☑	0.8	X	1,200	A =	960	A		8	NA	
SENSOR TAP	SHORT	☑	4	X	1,200	A =	4,800	A		0.3	OFF	
	INST.	☐		X		=		A				
	GRD. FLT.	☑	0.2	X	1,200	A =	240	A		0.1	OFF	

SETTINGS AS LEFT	FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	LONG	☑	0.8	X	1,200	A =	960	A		8	NA	
SENSOR TAP	SHORT	☑	4	-	4,800	A						
	INST.	☐										
	GRD. FLT.	☑	0.2	-	240	A				0.1	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.8	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	8	2880	NA	NA	31.271 / 31.271	31.271 / 31.271	31.271 / 31.271	NA
Short Time PU	4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.3	4800	NA	NA	0.278 / 0.278	0.278 / 0.278	0.278 / 0.278	NA
GRD Fault PU	0.2	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.1	480	NA	NA	0.092 / 0.092	0.092 / 0.092	0.092 / 0.092	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	22 °C	1.1

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000
POLE TO FRAME	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000
LINE TO LOAD	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
12.6	12.8	15.3

COUNTER END: N/A

COMMENTS: ALL BREAKERS TESTED WITH AS FOUND SETTINGS. PASSED SECONDARY INJECTION.
DEFICIENCIES:

TESTED BY: C. KROUT, K. ICKES

TRANSFORMER MAINTENANCE AND INSPECTION

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 2/13/2024 | AMBIENT TEMPERATURE: 23 °C | HUMIDITY: 14 % | EQPT. LOCATION: SUBSTATION 1
SUBSTATION: SUBSTATION 1 | POSITION: XFMR 1

NAMEPLATE DATA

MANUFACTURER: SQUARE D | YR MFR: 2014 | SERIAL NO.: 30951271-003-01-1
IMPEDANCE: 5.83 % | NUMBER OF FANS: 0 | WEIGHT: 7000 LBS | TYPE: DRY | CLASS: AA / /
KVA: 750 / / | WINDING MATERIAL: COPPER | TEMPERATURE RISE: 115 °C | B.I.L. RATING: 95 / 10
PRIMARY V: 13,200 | DELTA | MFR LOCATION: VIRGINIA
SECONDARY V: 480 / 277.12 | WYE | ☑ EXPOSED NEUTRAL - X0 | TANK TYPE: VENTED
TAP VOLTAGES: 13,860 | 13,530 | 13,200 | 12,870 | 12,540 | INSULATING MATERIAL: EPOXY MICA
TAP POSITION: E - F | D - F | E - G | D - G | C - G | WINDING INSUATING SYSTEM: OPEN-WOUND
TAP SETTING: E - G 13,200 V | ☑ HIGH SIDE TAP | ☐ LOW SIDE TAP

VISUAL AND MECHANICAL INSPECTION

	Description	NOTES
☑	REASON FOR INSPECTION	ROUTINE
☑	CHECK FOR SIGNS OF OVERHEATING, DISCOLORATION	GOOD
☑	ENCLOSURE (OPENINGS, COVERS, PAINT, ETC)	GOOD
☑	CHECK ALL CONNECTIONS TIGHT	GOOD
☐	IMPROPER TERMINATIONS	
☑	EQUIPMENT GROUND/GROUND BAR	GOOD
☐	CORE GROUND	NA
☑	NEUTRAL BAR	GOOD
☑	PRIMARY SIDE (CABLE OR BUSS)	GOOD

	Description	NOTES
☑	SECONDARY SIDE (CABLE OR BUSS)	GOOD
☑	CLEAN AND INSPECT INSULATORS, SUPPORTS, AND BARRIERS	GOOD
☑	CLEAN CORE, COIL, AND ENCLOSURE (INTERIOR/EXTERIOR)	GOOD
☑	CORE AND COIL BRACING	GOOD
☑	VIBRATION ISOLATATION PADS	GOOD
☑	PROPER CLEARANCE (36 INCHES UNOBSTRUCTED)	GOOD
☑	CONTROL WIRING	GOOD
☐	COOLING FANS	NA
☐	ALARMS AND INDICATORS	NA

ELECTRICAL TESTS

INSULATION RESISTANCE (Mohm)

MINUTES	PRIMARY TO GROUND	SECONDARY TO GROUND	PRIMARY TO SECONDARY
Test kV	5	1	5
0.50	149,700	15,500	183,000
1.00	248,000	24,300	236,000
10.00	442,000	133,400	510,000
P. I. (10min/1min)	1.78	5.49	2.16

WINDING RESISTANCE TEST (mohm)

APPARATUS TEMP. (°C)	19	TEST AMPS	1

H3-H1		H1-H2		H2-H3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
1,935.00	1,980.80	1,955.00	2,001.27	1,958.00	2,004.34
X0-X1		X0-X2		X0-X3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
0.912	0.934	0.886	0.907	0.846	0.866

TRANSFORMER TURN RATIO TEST

TAP	CALC	PHASE A	PHASE B	PHASE C
E - G	47.633	47.645	47.635	47.637
% ERROR		0.026%	0.005%	0.009%

EXTERNAL DOCUMENTS ATTACHED TO REPORT

COMMENTS: EXCITATION CURRENT A - 2.0 MILLIAMPS; B- 1.0 MILLIAMPS; C - 1.0 MILLAMPS.
DEFICIENCIES:

TESTED BY: B. BURGESS, K. ICKES

TRANSFORMER MAINTENANCE AND INSPECTION

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 2/12/2024 | AMBIENT TEMPERATURE: 19 °C | HUMIDITY: 55 % | EQPT. LOCATION: SUBSTATION 1
SUBSTATION: SUBSTATION 1 | POSITION: XFMR 2

NAMEPLATE DATA

MANUFACTURER: SQUARE D | YR MFR: 2014 | SERIAL NO.: 30951271-006-01-1
IMPEDANCE: 5.8 % | NUMBER OF FANS: 0 | WEIGHT: 7000 LBS | TYPE: DRY | CLASS: AA / / /
KVA: 750 / / | WINDING MATERIAL: COPPER | TEMPERATURE RISE: 115 °C | B.I.L. RATING: 95 / 10
PRIMARY V: 13,200 | DELTA | MFR LOCATION: VIRGINIA
SECONDARY V: 480 / 277.12 | WYE | ☑ EXPOSED NEUTRAL - X0 | TANK TYPE: VENTED
TAP VOLTAGES: 13,860 | 13,530 | 13,200 | 12,870 | 12,540 | INSULATING MATERIAL: PAPER
TAP POSITION: E - F | D - F | E - G | D - G | C - G | WINDING INSUATING SYSTEM: OPEN-WOUND
TAP SETTING: E - G 13,200 V | ☑ HIGH SIDE TAP | ☐ LOW SIDE TAP

VISUAL AND MECHANICAL INSPECTION

	Description	NOTES
☑	REASON FOR INSPECTION	ROUTINE
☑	CHECK FOR SIGNS OF OVERHEATING, DISCOLORATION	GOOD
☑	ENCLOSURE (OPENINGS, COVERS, PAINT, ETC)	GOOD
☑	CHECK ALL CONNECTIONS TIGHT	GOOD
☐	IMPROPER TERMINATIONS	
☑	EQUIPMENT GROUND/GROUND BAR	GOOD
☐	CORE GROUND	NA
☑	NEUTRAL BAR	GOOD
☑	PRIMARY SIDE (CABLE OR BUSS)	GOOD

	Description	NOTES
☑	SECONDARY SIDE (CABLE OR BUSS)	GOOD
☑	CLEAN AND INSPECT INSULATORS, SUPPORTS, AND BARRIERS	GOOD
☑	CLEAN CORE, COIL, AND ENCLOSURE (INTERIOR/EXTERIOR)	GOOD
☑	CORE AND COIL BRACING	GOOD
☑	VIBRATION ISOLATATION PADS	GOOD
☑	PROPER CLEARANCE (36 INCHES UNOBSTRUCTED)	GOOD
☑	CONTROL WIRING	GOOD
☐	COOLING FANS	NA
☐	ALARMS AND INDICATORS	NA

ELECTRICAL TESTS

INSULATION RESISTANCE (Mohm)

MINUTES	PRIMARY TO GROUND	SECONDARY TO GROUND	PRIMARY TO SECONDARY
Test kV	5	1	5
0.50	68,000	133,700	65,100
1.00	78,400	197,500	75,000
10.00	87,400	912,000	95,600
P. I. (10min/1min)	1.12	4.62	1.27

WINDING RESISTANCE TEST (mohm)

APPARATUS TEMP. (°C)	19	TEST AMPS	10.848

H3-H1		H1-H2		H2-H3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
1,951.00	1,997.18	1,948.00	1,994.11	1,949.00	1,995.13
X0-X1		X0-X2		X0-X3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
0.848	0.868	0.884	0.905	0.912	0.934

TRANSFORMER TURN RATIO TEST

TAP	CALC	PHASE A	PHASE B	PHASE C
E - G	47.633	47.655	47.652	47.662
% ERROR		0.047%	0.040%	0.061%

EXTERNAL DOCUMENTS ATTACHED TO REPORT

COMMENTS: EXCITATION CURRENT A - 1.0 MILLIAMPS; B- 0.9 MILLIAMPS; C - 1.0 MILLAMPS.
DEFICIENCIES:

TESTED BY: B. BURGESS, K. ICKES

SWITCHGEAR INSPECTION AND TEST REPORT

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 11/21/2023 AMBIENT TEMPERATURE 18 °C HUMIDITY 41 % EQPT. LOCATION SUB 2

SUBSTATION SUBSTATION 2 POSITION 480V SWITCHGEAR BUS A

SWITCHGEAR NAMEPLATE

MANUFACTURER SQUARE D TYPE ARC RESISTANT SN / SO NO. G-801126 E-409951 MFG DATE 2014

STYLE / CAT # / BUILD NUMBER 30951271-010 SYSTEM VOLTAGE 480 RATED VOLTAGE 600 SERVICE 3 WIRE

BUS AMPACITIES 1600 OVERCURRENT DEVICE TYPE/CAT. MICROLOGIC 6.0A INTERRUPT RATINGS 100KA

NEUTRAL YES Other NA

INSPECTION CHECKLIST / REMARKS

☑ REASON FOR INSPECTION	ROUTINE MAINTENANCE AND TESTING
☑ CLEAN SWITCHGEAR, CUBICLES, BUS, AND INSULATORS	YES
☑ OVERHEATING (CHECK FOR HOT SURFACES, DISCOLORATION)	NO SIGNS OF OVERHEATING
☑ CHECK FOR UNUSED OPENINGS	5 UNUSED CUBICLES
☑ CHECK ELECTRICAL CONNECTIONS	GOOD
☑ VENTS AND FILTER	VENTS ARE GOOD, NO FILTERS
☑ PROPER CLEARANCE	GOOD
☑ PANEL ID AND ARC FLASH WARNING (PANEL LABEL)	NO ARC FLASH LABELS
☑ INDICATING LIGHTS	GOOD
☑ INTERLOCKS	GOOD
☐ HEATERS	N/A
☑ PANEL SCREWS (MISSING, STRIPPED, ETC)	NO MISSING SCREWS
☑ BARRIER BOARDS AND SHUTTER OPERATION	BARRIER BOARDS IN GOOD SHAPE. NO SHUTTERS INSTALLED

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
500 V	18 °C	0.924

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	78,600	72,626.4	167,900	155,139.6	3,000,000	2,772,000
POLE TO FRAME	46,700	43,150.8	137,900	127,419.6	293,000	270,732
LINE TO LOAD						

DIELECTRIC WITHSTAND (mA)			
TEST VOLTAGE _____KV			
Phase #1	Phase #2	Phase #3	Neutral
N/A	N/A	N/A	N/A

POTENTIAL XFMRS	INSULATION RESISTANCE (M-OMH)			TURNS RATIO
	HIGH TO LOW	HIGH TO GND	LOW TO GND	
	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) .5	CALCULATED RATIO 4
LEFT	162,200	285,000	297,000	3.995
CENTER	162,200	285,000	297,000	3.995
RIGHT	162,200	285,000	297,000	4.006

BUS BAR RESISTANCE (µ-OHM)				
Ground	NEUTRAL	Phase #1	Phase #2	Phase #3
N/A	N/A	46.2	51.8	49.3

CONTROL POWER XFMR	INSULATION RESISTANCE (M-OMH)			TURNS RATIO	
	HIGH TO LOW	HIGH TO GND	LOW TO GND		
	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) .5	CALCULATED RATIO 4	
	1,281,000	1,150,000	1,500,000	PHASE A	3.886
				PHASE B	3.886
				PHASE C	3.886

COMMENTS: SURGE LOGIC FUNCTIONING NORMALLY

DEFICIENCIES:

TESTED BY: E. PENLAND, B. BURGESS

SWITCHGEAR INSPECTION AND TEST REPORT

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 11/20/2023 AMBIENT TEMPERATURE 19 °C HUMIDITY 29 % EQPT. LOCATION SUB 2

SUBSTATION SUBSTATION 2 POSITION 480V SWITCHGEAR BUS B

SWITCHGEAR NAMEPLATE

MANUFACTURER SQUARE D TYPE ARC RESISTANT SN / SO NO. G-801126 E-409951 MFG DATE 2014

STYLE / CAT # / BUILD NUMBER 30951271-010 SYSTEM VOLTAGE 480 RATED VOLTAGE 600 SERVICE 3 WIRE

BUS AMPACITIES 1600 OVERCURRENT DEVICE TYPE/CAT. MICROLOGIC 6.0A INTERRUPT RATINGS 100KA

NEUTRAL YES Other NA

INSPECTION CHECKLIST / REMARKS

☑ REASON FOR INSPECTION	ROUTINE MAINTENANCE AND TESTING
☑ CLEAN SWITCHGEAR, CUBICLES, BUS, AND INSULATORS	YES
☑ OVERHEATING (CHECK FOR HOT SURFACES, DISCOLORATION)	NO SIGNS OF OVERHEATING
☑ CHECK FOR UNUSED OPENINGS	5 UNUSED CUBICLES
☑ CHECK ELECTRICAL CONNECTIONS	GOOD
☑ VENTS AND FILTER	VENTS ARE GOOD, NO FILTERS
☑ PROPER CLEARANCE	GOOD
☑ PANEL ID AND ARC FLASH WARNING (PANEL LABEL)	NO ARC FLASH LABELS
☑ INDICATING LIGHTS	GOOD
☑ INTERLOCKS	GOOD
☐ HEATERS	N/A
☑ PANEL SCREWS (MISSING, STRIPPED, ETC)	NO MISSING SCREWS
☑ BARRIER BOARDS AND SHUTTER OPERATION	BARRIER BOARDS IN GOOD SHAPE. NO SHUTTERS INSTALLED

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
500 V	19 °C	0.962

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	589,000	566,618	579,000	556,998	819,000	787,878
POLE TO FRAME	315,000	303,030	398,000	382,876	575,000	553,150
LINE TO LOAD						

DIELECTRIC WITHSTAND (mA)

TEST VOLTAGE _____KV

Phase #1	Phase #2	Phase #3	Neutral
N/A	N/A	N/A	N/A

POTENTIAL XFMRS	INSULATION RESISTANCE (M-OMH)			TURNS RATIO
	HIGH TO LOW (TEST VOLTAGE (KV) 1)	HIGH TO GND (TEST VOLTAGE (KV) 1)	LOW TO GND (TEST VOLTAGE (KV) .5)	(CALCULATED RATIO 4)
LEFT	295,000	395,000	529,000	3.998
CENTER	295,000	395,000	529,000	3.998
RIGHT	295,000	395,000	529,000	3.998

BUS BAR RESISTANCE (µ-OHM)

Ground	NEUTRAL	Phase #1	Phase #2	Phase #3
N/A	N/A	38.1	52.2	56.1

CONTROL POWER XFMR	INSULATION RESISTANCE (M-OMH)			TURNS RATIO	
	HIGH TO LOW (TEST VOLTAGE (KV) 1)	HIGH TO GND (TEST VOLTAGE (KV) 1)	LOW TO GND (TEST VOLTAGE (KV) .5)	(CALCULATED RATIO 4)	
	2,150,000	2,050,000	1,500,000	PHASE A	3.885
				PHASE B	3.885
				PHASE C	3.885

COMMENTS: SURGE LOGIC FUNCTIONING NORMALLY

DEFICIENCIES:

TESTED BY: C. KROUT, K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/21/2023 | AMBIENT TEMPERATURE: 18 °C | HUMIDITY: 42 % | ASSET #:
SUBSTATION: SUBSTATION 2 | POSITION: MAIN A 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085249512101	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	WA6AAR44A9CFFFWSEA	SENSOR TAPS	800	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	1B	ELECTRICALLY OPERATED	(●) YES ( ) NO
TRIP UNIT TYPE	MICROLOGIC 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING	N/A

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	C
GROUND CONNECTION	☑	GOOD	NA
TRIP UNIT	☑	GOOD	C

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A		12	NA	
SENSOR TAP	800	SHORT	☑	6	X	800	A =	4,800	A		0.3	OFF	
		INST.	☐		X		=		A				
		GRD. FLT.	☑	0.3	X	800	A =	240	A		0.2	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A		12	NA	
SENSOR TAP	800	SHORT	☑	6	-	4,800	A				0.3	OFF	
		INST.	☐										
		GRD. FLT.	☑	0.3	-	240	A				0.2	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	12	3467	NA	NA	20.921 / 20.921	20.921 / 20.921	20.921 / 20.921	NA
Short Time PU	6	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.3	6000	NA	NA	0.277 / 0.277	0.277 / 0.277	0.277 / 0.277	NA
GRD Fault PU	0.3	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	480	NA	NA	0.152 / 0.152	0.152 / 0.152	0.152 / 0.152	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	18 °C	0.924

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,760,000	2,550,240	3,000,000	2,772,000	3,000,000	2,772,000
POLE TO FRAME	2,710,000	2,504,040	2,510,000	2,319,240	2,690,000	2,485,560
LINE TO LOAD	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
11.5	10.5	11.2

COUNTER END: N/A

COMMENTS: ALL BREAKERS TESTED WITH AS FOUND SETTINGS. PASSED SECONDARY INJECTION.
DEFICIENCIES:

TESTED BY: E. PENLAND

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/20/2023 | AMBIENT TEMPERATURE: 19 °C | HUMIDITY: 29 % | ASSET #:
SUBSTATION: SUBSTATION 2 | POSITION: MAIN B 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085249512103	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	WA6AAR44A9CFFFWSEA	SENSOR TAPS	800	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	4B1	ELECTRICALLY OPERATED	(●) YES ( ) NO
TRIP UNIT TYPE	MICROLOGIC 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING	N/A

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	C
GROUND CONNECTION	☑	GOOD	NA
TRIP UNIT	☑	GOOD	C

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A		12	NA	
SENSOR TAP	800	SHORT	☑	6	X	800	A =	4,800	A		0.3	OFF	
		INST.	☐		X		=		A				
		GRD. FLT.	☑	0.3	X	800	A =	240	A		0.2	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A		12	NA	
SENSOR TAP	800	SHORT	☑	6	-	4,800	A				0.3	OFF	
		INST.	☐										
		GRD. FLT.	☑	0.3	-	240	A				0.2	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	12	3467	NA	NA	19.946 / 19.946	19.946 / 19.946	19.946 / 19.946	NA
Short Time PU	6	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.3	6000	NA	NA	0.278 / 0.278	0.278 / 0.278	0.278 / 0.278	NA
GRD Fault PU	0.3	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	480	NA	NA	0.159 / 0.159	0.159 / 0.159	0.159 / 0.159	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	19 °C	0.962

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	2,886,000	3,000,000	2,886,000	3,000,000	2,886,000
POLE TO FRAME	2,900,000	2,789,800	2,770,000	2,664,740	3,000,000	2,886,000
LINE TO LOAD	3,000,000	2,886,000	3,000,000	2,886,000	3,000,000	2,886,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
10.6	12.1	14.9

COUNTER END: N/A

COMMENTS: ALL BREAKERS TESTED WITH AS FOUND SETTINGS. PASSED SECONDARY INJECTION.
DEFICIENCIES: RATING PLUG IS STRIPPED WHERE THE BOLT GOES IN. RECOMMEND REPLACE.

TESTED BY: C. KROUT, K. ICKES

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/21/2023 | AMBIENT TEMPERATURE: 19 °C | HUMIDITY: 29 % | EQPT. LOCATION: SUB 2
SUBSTATION: SUBSTATION 2 | POSITION: MCC-E

NAMEPLATE DATA

MANUFACTURER: GENERAL ELECTRIC | SERIAL NO.: 507862 | TYPE: LINE CONTROL CENTER
CATALOG NO.: NP245A1230A | DRAWING NO.: 213B9202 SH.8 | VOLTAGE CLASS: 460V
MAIN BUS RATING: 600 A | MAIN BUS NEUTRAL RATING: NA A | CONDUCTOR: (●) CU ( ) AL
CURRENT WITHSTAND RATING: NA | NUMBER OF SECTIONS: 9 | LISTING: ☑ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER: 0 | MLO: 1 | TYPE: | AMPACITY: 600 | MAIN DISCONNECT: 0 | FUSE TYPE: NA | SIZE: NA
TOTAL POSITIONS EQUIPPED: 47 | NO. OF SPARE SPACES: 7 | TOTAL POSITIONS USED: 40

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

TEST VOLTAGE: 1 KVDC | EQUIPMENT TEMPERATURE: 18 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 0.9

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
MCC-E MAIN BUS	RDG.	0.898	51.4	0.881		65.6	4.89	65.3			
	20°C	0.8082	46.26	0.7929		59.04	4.401	58.77			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:
DEFICIENCIES: BUS DOES NOT MEET NETA STANDARDS FOR INSULATION RESISTANCE. DUE TO PROXIMITY AND LIMITED ACCESS TO THE BUS COMPARTMENTS AS WELL AS CONSTRUCTION OF BUS. PREMIER POWER MAINTENANCE IS RECOMMENDING REPLACEMENT OF MCC CENTER.

TESTED BY: C. KROUT

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR
PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105
JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI
TELEPHONE:

DATE: 11/21/2023 AMBIENT TEMPERATURE: 19 °C HUMIDITY: 29 % EQPT. LOCATION: SUB 2
SUBSTATION: SUBSTATION 2 POSITION: MCC-E

NAMEPLATE DATA

MANUFACTURER: GENERAL ELECTRIC SERIAL NO.: 507862 TYPE: LINE CONTROL CENTER
CATALOG NO.: NP245A1230A DRAWING NO.: 213B902 SH.8 VOLTAGE CLASS: 460V
PHASE AMPACITY: 600 A WITHSTAND RATING: NA KA CONDUCTOR: (•) CU ( ) AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
ML	SUMP P 1	703	862.4	952.9			ML	FEED MCCEE	786	771	644		
ML	TEMP CTM	610	757	883			ML	EQ RET V 2	959	938	1148		
ML	SLUGE COL3	854	952	1090			ML	EQ RET V 1	967	970	1158		
ML	SLUGE COL1	944	1047	1175			ML	BAS OUT 3	1008	995	1177		
ML	SLUGE P1	1023	1163	1289			ML	BAS OUT 1	1030	1018	1214		
ML	UNNAMED	1083	1156	1329			ML	EQR-EUH-1	1543	1403	1830		
ML	SCREW P7	920	911	969			ML	EQR-EUH-2	1785	1482	1614		
ML	SCREW P8	965	950	996									
ML	WELD OUTLE	846	817	989									
ML	CROSS COL3	949	1050	1178									
ML	HP PEW P 1	1077	1086	1010									
ML	RET BAS RCV	824	784	1025									
ML	CC1	961	1087	1217									
ML	MP PEW P	1077	1083	991									
ML	EQ INF G.11	685	796	975									
ML	EQ INF. G. 9	835	811	1042									
ML	EQ INF G.3	841	834	1045									
ML	EQ INF G.1	865	851	1048									
ML	LPE	778	797	878									
ML	UNNAMED	1665	1382	1440									
ML	RB DRAIN P2	1535	1307	1288									
ML	BAS INF G 3	859	835	1024									
ML	BAS INF G 1	863	850	1043									
ML	EQ INF G.12	863	863	1066									
ML	EQ INF G.10	895	894	1080									
ML	EQ INF G.4	926	914	1147									
ML	EQ INF G.2	950	935	1119									
ML	SECUR G	841	852	975									
ML	RB DRAIN P4	1467	1418	1408									

COMMENTS: RB DRAIN PUMP # 4 FUSE FAILED. FUSES WERE REPLACED
DEFICIENCIES:

TESTED BY: C. KROUT

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/21/2023 | AMBIENT TEMPERATURE: 18 °C | HUMIDITY: 42 % | ASSET #:
SUBSTATION: SUBSTATION 2 | POSITION: MCC-E 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085249508001	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	WA6AAR44A9CXFXWXAA	SENSOR TAPS	400	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	2C	ELECTRICALLY OPERATED	(●) YES ( ) NO
TRIP UNIT TYPE	MICROLOGIC 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING	N/A

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	C
GROUND CONNECTION	☑	GOOD	NA
TRIP UNIT	☑	GOOD	C

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	400	LONG	☑	1	X	400	A =	400	A		12	NA	
SENSOR TAP	400	SHORT	☑	6	X	400	A =	2,400	A		0.1	OFF	
		INST.	☑	10	X	400	A =	4,000	A		N/A	NA	
		GRD. FLT.	☑	0.3	X	400	A =	120	A		0	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	400	LONG	☑	1	X	400	A =	400	A		12	NA	
SENSOR TAP	400	SHORT	☑	6	-	2,400	A				0.1	OFF	
		INST.	☑	10	-	4,000	A					NA	
		GRD. FLT.	☑	0.3	-	120	A					OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	12	1733	NA	NA	19.947 / 19.947	19.947 / 19.947	19.947 / 19.947	NA
Short Time PU	6	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.1	3200	NA	NA	0.105 / 0.105	0.105 / 0.105	0.105 / 0.105	NA
Instant PU	10	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay		5000	NA	NA	0.036 / 0.036	0.036 / 0.036	0.036 / 0.036	NA
GRD Fault PU	0.3	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0	240	NA	NA	0.031 / 0.031	0.031 / 0.031	0.031 / 0.031	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	18 °C	0.924

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,270,000	2,097,480	2,280,000	2,106,720	2,300,000	2,125,200
POLE TO FRAME	2,410,000	2,226,840	2,290,000	2,115,960	2,470,000	2,282,280
LINE TO LOAD	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
12.6	13.2	10.9

COUNTER END: N/A

COMMENTS: ALL BREAKERS TESTING WITH AS FOUND SETTINGS. PASS SECONDARY INJECTION.
DEFICIENCIES:

TESTED BY: E. PENLAND

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/20/2023 | AMBIENT TEMPERATURE: 19 °C | HUMIDITY: 29 % | EQPT. LOCATION: SUB 2
SUBSTATION: SUBSTATION 2 | POSITION: MCC-F

NAMEPLATE DATA

MANUFACTURER: GENERAL ELECTRIC | SERIAL NO.: 507871 | TYPE: LINE CONTROL CENTER
CATALOG NO.: 435X719M11 | DRAWING NO.: 213B9202 | VOLTAGE CLASS: 460V
MAIN BUS RATING: 600 A | MAIN BUS NEUTRAL RATING: NA A | CONDUCTOR: (●) CU ( ) AL
CURRENT WITHSTAND RATING: NA | NUMBER OF SECTIONS: 3 | LISTING: [x] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER: 0 | MLO: 1 | TYPE: | AMPACITY: 600 | MAIN DISCONNECT: 0 | FUSE TYPE: NA | SIZE: NA
TOTAL POSITIONS EQUIPPED: 41 | NO. OF SPARE SPACES: 5 | TOTAL POSITIONS USED: 36

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

TEST VOLTAGE: 1 KVDC | EQUIPMENT TEMPERATURE: 19 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 0.95

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
MCC-F MAIN BUS	RDG.	239	926	145		1,300	585	1,193			
	20°C	227.05	879.7	137.75		1,235	555.75	1,133.35			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 11/20/2023 AMBIENT TEMPERATURE 19 °C HUMIDITY 29 % EQPT. LOCATION SUB 2

SUBSTATION SUBSTATION 2 POSITION MCC-F

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC SERIAL NO. 507871 TYPE LINE CONTROL CENTER

CATALOG NO. 435X719M11 DRAWING NO. 213B9202 VOLTAGE CLASS 460V

PHASE AMPACITY 600 A WITHSTAND RATING NA KA CONDUCTOR (•) CU ( ) AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
ML	SUMP PUMP 2	687	792	883			ML	CP15	1011	2849	1152		
ML	PR HOIST	676	674	853			ML	EQ RET CV	964	985	1175		
ML	ER HOIST	736	741	871			ML	BAS IMFL K2	1057	1008	1179		
ML	SCREW PUM	1057	908	877			ML	BAS OUT K2	1078	1067	1320		
ML	AC ALT	832.2	943	1063			ML	EF-1	1444	1619	1817		
ML	EIG5	767	783	951			ML	EN. REC HR2	966	976	1029		
ML	HP PEW 2	1010	990	987									
ML	S.E. PUMP	999	1142	1126									
ML	LIGHT PAN. F	690	747	743.2									
ML	EQ. INF. GA7	837	833	1026									
ML	MP PEW	1053	1028	1016									
ML	C.T.LIFT.STAT	630	665	752									
ML	EQ. INF. GA8	810	766	977									
ML	RF-5	1097	1213	1307									
ML	RB DRA P 1	1295	1266	1230									
ML	BY-PASS G.2	815	824	999									
ML	BY-PASS G.1	833	822	1230									
ML	SLUICE G.2	870	853	1073									
ML	SLUICE G.1	902	869	1106									
ML	RF-6	1112	1116	1353									
ML	RB DRA P 3	1331	1287	1252									
ML	TEMP AF	864	852	888									
ML	MCCFF	784	772	761									
ML	AIRCOMP 2	1099	1224	1331									
ML	UNNAMED	1287	1317	1445									
ML	SLUDGE P3	1279	1332	1452									
ML	TEMP AFF	1027	1378	1960									
ML	WELD OUTLE	1120	958	1135									
ML	EQ RTN VALV	1651	1868	1164									

COMMENTS:

BASIN HOIST WAS LOCKED OUT.
AIR COMPRESSOR NUMBER 2 HAS A BAD FUSE ON C PHASE. FUSE WAS REPLACED.
BYPASS GATE NUMBER 1- B AND C FUSES WERE BAD. FUSES WERE REPLACED

DEFICIENCIES:

TESTED BY: K. HORST

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/20/2023 | AMBIENT TEMPERATURE: 19 °C | HUMIDITY: 29 % | ASSET #:
SUBSTATION: SUBSTATION 2 | POSITION: MCC-F 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085249508202	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	WA6AAR44A9CXFXWXAA	SENSOR TAPS	400	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	3C	ELECTRICALLY OPERATED	(●) YES ( ) NO
TRIP UNIT TYPE	MICROLOGIC 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING	N/A

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	C
GROUND CONNECTION	☑	GOOD	NA
TRIP UNIT	☑	GOOD	C

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	400	LONG	☑	1	X	400	A =	400	A		12	NA	
SENSOR TAP	400	SHORT	☑	6	X	400	A =	2,400	A		0.1	OFF	
		INST.	☑	10	X	400	A =	4,000	A		N/A	NA	
		GRD. FLT.	☑	0.3	X	400	A =	120	A		0	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	400	LONG	☑	1	X	400	A =	400	A		12	NA	
SENSOR TAP	400	SHORT	☑	6	-	2,400	A				0.1	OFF	
		INST.	☑	10	-	4,000	A					NA	
		GRD. FLT.	☑	0.3	-	120	A					OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	12	1733	NA	NA	28.222 / 28.222	28.222 / 28.222	28.222 / 28.222	NA
Short Time PU	6	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.1	3200	NA	NA	0.105 / 0.105	0.105 / 0.105	0.105 / 0.105	NA
Instant PU	10	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay		5000	NA	NA	0.036 / 0.036	0.036 / 0.036	0.036 / 0.036	NA
GRD Fault PU	0.3	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0	240	NA	NA	0.037 / 0.037	0.037 / 0.037	0.037 / 0.037	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	19 °C	0.962

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	2,886,000	3,000,000	2,886,000	3,000,000	2,886,000
POLE TO FRAME	3,000,000	2,886,000	3,000,000	2,886,000	3,000,000	2,886,000
LINE TO LOAD	3,000,000	2,886,000	3,000,000	2,886,000	3,000,000	2,886,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
14.4	13.6	15.6

COUNTER END: N/A

COMMENTS: ALL BREAKERS TESTING WITH AS FOUND SETTINGS. PASS SECONDARY INJECTION
DEFICIENCIES:

TESTED BY: C. KROUT, K. ICKES

LOADBREAK DISCONNECT TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/21/2023 | AMBIENT TEMPERATURE: 18 °C | HUMIDITY: 37 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 2 | POSITION: PRIMARY SWITCH MAIN A

NAMEPLATE DATA

MANUFACTURER: HVL | TYPE: LOAD CURRENT INT. | SERIAL NO.: 44056-325-51-2A | MFG DATE: 1/2014
RATED VOLTAGE: 15,000 | SYSTEM VOLTAGE: 13200 | AMPERES: 600 | INTERRUPTING RATING: 40 KA | B.I.L. RATING: 95 KV
TYPE OPERATING MECHANISM: MANUAL | MOMENTARY FAULT INTERUPTING: 40 KA | MOMENTARY FAULT CLOSING AMPS: 40 KA

FUSE DATA

MANUFACTURER: NA | TYPE: NA | HOLDER: NA | MAX. AMPS: NA
REFILL ELEMENT TYPE: NA | SIZE: NA | CAT. NO.: NA | TCC NO.: NA | VOLTAGE: NA KV

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTION	☑	GOOD	C
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
INTERLOCKS	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
Contacts	☑	GOOD	C/L
HEATERS	☐	NA	NA
OPERATING MECHANISM	☑	GOOD	C/L
HAZARD WARNING LABELS	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	18 °C	0.924

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,500,000	2,310,000	1,977,000	1,826,748	2,300,000	2,125,200
POLE TO FRAME	499,000	461,076	492,000	454,608	689,000	636,636
LINE TO LOAD	1,876,000	1,733,424	3,430,000	3,169,320	1,778,000	1,642,872

POLE RESISTANCE (µ©)			
	POLE 1	POLE 2	POLE 3
AS FOUND	50.9	54.9	51.8
AS LEFT	50.9	54.9	51.8

ARRESTERS TESTING (M©)			
TEST VOLTAGE KV / 1 MIN	PHASE A	PHASE B	PHASE C
5	88,200	167,400	79,100

DIELECTRIC WITHSTAND (mA)			
TEST VOLTAGE 27 KVAC	POLE 1	POLE 2	POLE 3
SWITCH CLOSED - POLE TO GND OTHER POLES GROUNDED	0.1	0.1	0.1

COMMENTS: ARRESTER INFO: 12.7 kV MCOV, 15 kV RATED.
PRIMARY CABLE INSULATION RESISTANCES: A-G - 35,100 MEGAOHMS; B-G - 27,100 MEGAOHMS;
C-G - 34,500 MEGAOHMS; A-B - 59,900 MEGAOHMS; B-C - 53,300 MEGAOHMS; C-A - 58,500 MEGAOHMS.

DEFICIENCIES:

TESTED BY: E. PENLAND, S. FRY

LOADBREAK DISCONNECT TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/20/2023 | AMBIENT TEMPERATURE: 20 °C | HUMIDITY: 25 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 2 | POSITION: PRIMARY SWITCH MAIN B

NAMEPLATE DATA

MANUFACTURER: HVL | TYPE: LOAD CURRENT INT. | SERIAL NO.: 44056-325-51-2B | MFG DATE: 1/2014
RATED VOLTAGE: 15,000 | SYSTEM VOLTAGE: 13200 | AMPERES: 600 | INTERRUPTING RATING: 40 KA | B.I.L. RATING: 95 KV
TYPE OPERATING MECHANISM: MANUAL | MOMENTARY FAULT INTERUPTING: 40 KA | MOMENTARY FAULT CLOSING AMPS: 40 KA

FUSE DATA

MANUFACTURER: NA | TYPE: NA | HOLDER: NA | MAX. AMPS: NA
REFILL ELEMENT TYPE: NA | SIZE: NA | CAT. NO.: NA | TCC NO.: NA | VOLTAGE: NA KV

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTION	☑	GOOD	C
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
INTERLOCKS	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
Contacts	☑	GOOD	C/L
HEATERS	☐	NA	NA
OPERATING MECHANISM	☑	GOOD	C/L
HAZARD WARNING LABELS	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	20 °C	1

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	10,270,000	10,270,000	8,490,000	8,490,000	8,240,000	8,240,000
POLE TO FRAME	1,967,000	1,967,000	1,701,000	1,701,000	2,490,000	2,490,000
LINE TO LOAD	9,610,000	9,610,000	2,810,000	2,810,000	6,850,000	6,850,000

POLE RESISTANCE (µ©)	POLE 1	POLE 2	POLE 3
AS FOUND	59.0	66.0	59.0
AS LEFT	59.0	66.0	59.0

ARRESTERS TESTING (M©)			
TEST VOLTAGE KV / 1 MIN	PHASE A	PHASE B	PHASE C
5	26,500	204,000	76,900

DIELECTRIC WITHSTAND (mA)			
TEST VOLTAGE 27 KVAC	POLE 1	POLE 2	POLE 3
SWITCH CLOSED - POLE TO GND OTHER POLES GROUNDED	0.1	0.1	0.1

COMMENTS: ARRESTER INFO: 12.7 kV MCOV, 15 kV RATED. A AND B ARRESTERS FOUND LOOSE, CORRECTED.
PRIMARY CABLE INSULATION RESISTANCES: A-G - 28,000 MEGAOHMS; B-G - 33,000 MEGAOHMS;
C-G - 29,100 MEGAOHMS; A-B - 64,000 MEGAOHMS; B-C - 56,900 MEGAOHMS; C-A - 52,900 MEGAOHMS.

DEFICIENCIES: A PHASE ARRESTER READING LOWER THAN OTHER PHASES. MAY NEED REPLACEMENT.

TESTED BY: E. PENLAND, S. FRY, B. BURGESS

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/21/2023 | AMBIENT TEMPERATURE: 18 °C | HUMIDITY: 42 % | ASSET #:
SUBSTATION: SUBSTATION 2 | POSITION: SPARE 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085249508001	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	WA6PPR44A9CXFXWXAA	SENSOR TAPS	250	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	2D	ELECTRICALLY OPERATED	(●) YES ( ) NO
TRIP UNIT TYPE	MICROLOGIC 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING	N/A

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	C
GROUND CONNECTION	☑	GOOD	NA
TRIP UNIT	☑	GOOD	C

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	250	LONG	☑	1	X	250	A =	250	A		24	NA	
SENSOR TAP	250	SHORT	☑	10	X	250	A =	2,500	A		0.1	OFF	
		INST.	☑	15	X	250	A =	3,750	A		N/A	NA	
		GRD. FLT.	☑	0.3	X	250	A =	75	A		0	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	250	LONG	☑	1	X	250	A =	250	A		24	NA	
SENSOR TAP	250	SHORT	☑	10	-	2,500	A				0.1	OFF	
		INST.	☑	15	-	3,750	A					NA	
		GRD. FLT.	☑	0.3	-	75	A					OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	24	1750	NA	NA	15.504 / 15.504	15.504 / 15.504	15.504 / 15.504	NA
Short Time PU	10	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.1	3125	NA	NA	0.111 / 0.111	0.111 / 0.111	0.111 / 0.111	NA
Instant PU	15	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay		4688	NA	NA	0.037 / 0.037	0.037 / 0.037	0.037 / 0.037	NA
GRD Fault PU	0.3	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0	150	NA	NA	0.034 / 0.034	0.034 / 0.034	0.034 / 0.034	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	18 °C	0.924

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,660,000	2,457,840	2,290,000	2,115,960	2,480,000	2,291,520
POLE TO FRAME	2,640,000	2,439,360	2,480,000	2,291,520	2,410,000	2,226,840
LINE TO LOAD	2,710,000	2,504,040	2,270,000	2,097,480	2,850,000	2,633,400

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
14.6	15.4	12.1

COUNTER END: N/A

COMMENTS: ALL BREAKER TESTING WITH AS FOUND SETTINGS. PASS SECONDARY INJECTION
DEFICIENCIES:

TESTED BY: E. PENLAND

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/20/2023 | AMBIENT TEMPERATURE: 19 °C | HUMIDITY: 29 % | ASSET #:
SUBSTATION: SUBSTATION 2 | POSITION: TIE 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085249512102	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	NW 08 H3	SENSOR TAPS	800	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	2B2	ELECTRICALLY OPERATED	(●) YES ( ) NO
TRIP UNIT TYPE	MICROLOGIC 6.0	TRIP UNIT CAT #	WA6AAR44A9CFFFWSEA	COUNTER BEGINNING	N/A

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	DIRTY	C
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA
GROUND CONNECTION	☑	GOOD	NA
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	0.9	X	800	A =	720	A		8	NA	
SENSOR TAP	800	SHORT	☑	5	X	800	A =	4,000	A		0.2	OFF	
		INST.	☐		X		=		A				
		GRD. FLT.	☑	0.2	X	800	A =	160	A		0.2	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	0.9	X	800	A =	720	A		8	NA	
SENSOR TAP	800	SHORT	☑	5	-	4,000	A				0.2	OFF	
		INST.	☐										
		GRD. FLT.	☑	0.2	-	160	A				0.2	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.9	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	8	2640	300	NA	18.593 / 18.593	18.593 / 18.593	18.593 / 18.593	NA
Short Time PU	5	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	4500	110	NA	0.169 / 0.169	0.169 / 0.169	0.169 / 0.169	NA
GRD Fault PU	0.2	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	320	200	NA	0.095 / 0.095	0.095 / 0.095	0.095 / 0.095	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	19 °C	0.962

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	2,886,000	3,000,000	2,886,000	3,000,000	2,886,000
POLE TO FRAME	3,000,000	2,886,000	3,000,000	2,886,000	3,000,000	2,886,000
LINE TO LOAD	3,000,000	2,886,000	3,000,000	2,886,000	3,000,000	2,886,000

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
30.0	30.4	35.1

COUNTER END: N/A

COMMENTS:
DEFICIENCIES:

TESTED BY: C. KROUT, K. ICKES

TRANSFORMER MAINTENANCE AND INSPECTION

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/20/2023 | AMBIENT TEMPERATURE: 20 °C | HUMIDITY: 25 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 2 | POSITION: XFMR 1

NAMEPLATE DATA

MANUFACTURER: SQUARE D | YR MFR: 2014 | SERIAL NO.: 30951271-009-01-1
IMPEDANCE: 5.59 % | NUMBER OF FANS: 0 | WEIGHT: 6900 LBS | TYPE: DRY | CLASS: AA / /
KVA: 500 / / | WINDING MATERIAL: COPPER | TEMPERATURE RISE: 40 °C | B.I.L. RATING: 95 / 10
PRIMARY V: 13,200 | DELTA | MFR LOCATION: BLAND,VA
SECONDARY V: 480 / 277.12 | WYE | ☑ EXPOSED NEUTRAL - X0 | TANK TYPE: VENTED
TAP VOLTAGES: 13,860 | 13,530 | 13,200 | 12,870 | 12,540 | INSULATING MATERIAL: PAPER
TAP POSITION: E-F | D-F | E-G | D-G | C-G | WINDING INSUATING SYSTEM: OPEN-WOUND
TAP SETTING: E-G 13,200 V | ☑ HIGH SIDE TAP | ☐ LOW SIDE TAP

VISUAL AND MECHANICAL INSPECTION

	Description	NOTES
☑	REASON FOR INSPECTION	ROUTINE
☑	CHECK FOR SIGNS OF OVERHEATING, DISCOLORATION	GOOD
☑	ENCLOSURE (OPENINGS, COVERS, PAINT, ETC)	GOOD
☑	CHECK ALL CONNECTIONS TIGHT	GOOD
☑	IMPROPER TERMINATIONS	GOOD
☑	EQUIPMENT GROUND/GROUND BAR	GOOD
☑	CORE GROUND	GOOD
☑	NEUTRAL BAR	GOOD
☑	PRIMARY SIDE (CABLE OR BUSS)	GOOD

	Description	NOTES
☑	SECONDARY SIDE (CABLE OR BUSS)	GOOD
☑	CLEAN AND INSPECT INSULATORS, SUPPORTS, AND BARRIERS	GOOD
☑	CLEAN CORE, COIL, AND ENCLOSURE (INTERIOR/EXTERIOR)	GOOD
☑	CORE AND COIL BRACING	GOOD
☑	VIBRATION ISOLATATION PADS	GOOD
☑	PROPER CLEARANCE (36 INCHES UNOBSTRUCTED)	GOOD
☐	CONTROL WIRING	NA
☐	COOLING FANS	NA
☐	ALARMS AND INDICATORS	NA

ELECTRICAL TESTS

INSULATION RESISTANCE (Mohm)

MINUTES	PRIMARY TO GROUND	SECONDARY TO GROUND	PRIMARY TO SECONDARY
Test kV	5	1	5
0.50	291,000	178,000	265,000
1.00	421,000	267,000	350,000
10.00	607,000	565,000	907,000
P. I. (10min/1min)	1.44	2.12	2.59

WINDING RESISTANCE TEST (mohm)

APPARATUS TEMP. (°C)	20	TEST AMPS	10

H3-H1		H1-H2		H2-H3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
1,850.00	1,886.35	1,850.00	1,886.35	1,840.00	1,876.15
X0-X1		X0-X2		X0-X3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
1.323	1.349	1.285	1.311	1.218	1.242

TRANSFORMER TURN RATIO TEST

TAP	CALC	PHASE A	PHASE B	PHASE C
E-G	47.633	47.659	47.659	47.659
% ERROR		0.055%	0.055%	0.055%

EXTERNAL DOCUMENTS ATTACHED TO REPORT

COMMENTS: EXCITATION CURRENT A - 2.4 MILLIAMPS; B- 1.9 MILLIAMPS; C - 2.1 MILLAMPS.
DEFICIENCIES:

TESTED BY: S. FRY, K. HORST

TRANSFORMER MAINTENANCE AND INSPECTION

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/20/2023 | AMBIENT TEMPERATURE: 20 °C | HUMIDITY: 25 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 2 | POSITION: XFMR 2

NAMEPLATE DATA

MANUFACTURER: SQUARE D | YR MFR: 2014 | SERIAL NO.: 30951271-012-01-1
IMPEDANCE: 5.6 % | NUMBER OF FANS: | WEIGHT: 6900 LBS | TYPE: DRY | CLASS: AA / /
KVA: 500 / / | WINDING MATERIAL: COPPER | TEMPERATURE RISE: 40 °C | B.I.L. RATING: 95 / 10
PRIMARY V: 13,200 | DELTA | MFR LOCATION: BLAND,VA
SECONDARY V: 480 / 277.12 | WYE | ☑ EXPOSED NEUTRAL - X0 | TANK TYPE: VENTED
TAP VOLTAGES: 13,860 | 13,530 | 13,200 | 12,870 | 12,540 | INSULATING MATERIAL: PAPER
TAP POSITION: E-F | D-F | E-G | D-G | C-G | WINDING INSUATING SYSTEM: OPEN-WOUND
TAP SETTING: E-G 13,200 V | ☑ HIGH SIDE TAP | ☐ LOW SIDE TAP

VISUAL AND MECHANICAL INSPECTION

	Description	NOTES
☑	REASON FOR INSPECTION	ROUTINE
☑	CHECK FOR SIGNS OF OVERHEATING, DISCOLORATION	GOOD
☑	ENCLOSURE (OPENINGS, COVERS, PAINT, ETC)	GOOD
☑	CHECK ALL CONNECTIONS TIGHT	GOOD
☑	IMPROPER TERMINATIONS	GOOD
☑	EQUIPMENT GROUND/GROUND BAR	GOOD
☑	CORE GROUND	GOOD
☑	NEUTRAL BAR	GOOD
☑	PRIMARY SIDE (CABLE OR BUSS)	GOOD

	Description	NOTES
☑	SECONDARY SIDE (CABLE OR BUSS)	GOOD
☑	CLEAN AND INSPECT INSULATORS, SUPPORTS, AND BARRIERS	GOOD
☑	CLEAN CORE, COIL, AND ENCLOSURE (INTERIOR/EXTERIOR)	GOOD
☑	CORE AND COIL BRACING	GOOD
☑	VIBRATION ISOLATATION PADS	GOOD
☑	PROPER CLEARANCE (36 INCHES UNOBSTRUCTED)	GOOD
☐	CONTROL WIRING	NA
☐	COOLING FANS	NA
☐	ALARMS AND INDICATORS	NA

ELECTRICAL TESTS

INSULATION RESISTANCE (Mohm)

MINUTES	PRIMARY TO GROUND	SECONDARY TO GROUND	PRIMARY TO SECONDARY
Test kV	5	1	5
0.50	178,600	1,163	147,700
1.00	200,000	1,893	195,500
10.00	661,000	2,260	343,000
P. I. (10min/1min)	3.31	1.19	1.75

WINDING RESISTANCE TEST (mohm)

APPARATUS TEMP. (°C)	20	TEST AMPS	10

H3-H1		H1-H2		H2-H3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
1,853.40	1,889.81	1,856.00	1,892.46	1,853.00	1,889.40
X0-X1		X0-X2		X0-X3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
1.219	1.243	1.265	1.289	1.305	1.331

TRANSFORMER TURN RATIO TEST

TAP	CALC	PHASE A	PHASE B	PHASE C
E-G	47.633	47.659	47.650	47.647
% ERROR		0.055%	0.036%	0.030%

EXTERNAL DOCUMENTS ATTACHED TO REPORT

COMMENTS: EXCITATION CURRENT A - 2.1 MILLIAMPS; B- 1.6 MILLIAMPS; C - 1.9 MILLAMPS.
DEFICIENCIES:

TESTED BY: E. PENLAND, S. FRY

SWITCHGEAR INSPECTION AND TEST REPORT

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 11/28/2023 AMBIENT TEMPERATURE 18 °C HUMIDITY 21 % EQPT. LOCATION SUB 2

SUBSTATION SUBSTATION 3 POSITION 480V SWITCHGEAR BUS A

SWITCHGEAR NAMEPLATE

MANUFACTURER SQUARE D TYPE ARC RESISTANT SN / SO NO. G-726036 G-801549 MFG DATE 2014

STYLE / CAT # / BUILD NUMBER 30951271-016 SYSTEM VOLTAGE 480 RATED VOLTAGE 600 SERVICE 3 WIRE

BUS AMPACITIES 3200 OVERCURRENT DEVICE TYPE/CAT. MICROLOGIC 6.0A INTERRUPT RATINGS 100KA

NEUTRAL YES Other NA

INSPECTION CHECKLIST / REMARKS

☑ REASON FOR INSPECTION	ROUTINE MAINTENANCE AND TESTING
☑ CLEAN SWITCHGEAR, CUBICLES, BUS, AND INSULATORS	YES
☑ OVERHEATING (CHECK FOR HOT SURFACES, DISCOLORATION)	NO SIGNS OF OVERHEATING
☑ CHECK FOR UNUSED OPENINGS	5 UNUSED CUBICLES
☑ CHECK ELECTRICAL CONNECTIONS	GOOD
☑ VENTS AND FILTER	VENTS ARE GOOD, NO FILTERS
☑ PROPER CLEARANCE	GOOD
☑ PANEL ID AND ARC FLASH WARNING (PANEL LABEL)	NO ARC FLASH LABELS
☑ INDICATING LIGHTS	GOOD
☑ INTERLOCKS	GOOD
☐ HEATERS	N/A
☑ PANEL SCREWS (MISSING, STRIPPED, ETC)	NO MISSING SCREWS
☑ BARRIER BOARDS AND SHUTTER OPERATION	BARRIER BOARDS IN GOOD SHAPE. NO SHUTTERS INSTALLED

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
500 V	18 °C	0.924

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1,500,000	1,386,000	1,500,000	1,386,000	1,500,000	1,386,000
POLE TO FRAME	1,500,000	1,386,000	1,500,000	1,386,000	1,500,000	1,386,000
LINE TO LOAD						

DIELECTRIC WITHSTAND (mA)			
TEST VOLTAGE _____KV			
Phase #1	Phase #2	Phase #3	Neutral
N/A	N/A	N/A	N/A

POTENTIAL XFMRS	INSULATION RESISTANCE (M-OMH)			TURNS RATIO
	HIGH TO LOW	HIGH TO GND	LOW TO GND	
	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) .5	CALCULATED RATIO 4
LEFT	416,000	121,500	322,000	3.995
CENTER	416,000	121,500	322,000	3.996
RIGHT	416,000	121,500	322,000	3.996

BUS BAR RESISTANCE (µ-OHM)				
Ground	NEUTRAL	Phase #1	Phase #2	Phase #3
N/A	N/A	29	25	26.2

CONTROL POWER XFMR	INSULATION RESISTANCE (M-OMH)			TURNS RATIO	
	HIGH TO LOW	HIGH TO GND	LOW TO GND		
	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) .5	CALCULATED RATIO 4	
	3,000,000	2,610,000	1,500,000	PHASE A	3.886
				PHASE B	3.886
				PHASE C	3.886

COMMENTS: SURGE LOGIC FUNCTIONING NORMALLY

DEFICIENCIES:

TESTED BY: E. PENLAND, K. ICKES

SWITCHGEAR INSPECTION AND TEST REPORT

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 11/27/2023 AMBIENT TEMPERATURE 18 °C HUMIDITY 21 % EQPT. LOCATION SUB 2

SUBSTATION SUBSTATION 3 POSITION 480V SWITCHGEAR BUS B

SWITCHGEAR NAMEPLATE

MANUFACTURER SQUARE D TYPE ARC RESISTANT SN / SO NO. G-726037 G-801550 MFG DATE 2014

STYLE / CAT # / BUILD NUMBER 30951271-016 SYSTEM VOLTAGE 480 RATED VOLTAGE 600 SERVICE 3 WIRE

BUS AMPACITIES 3200 OVERCURRENT DEVICE TYPE/CAT. MICROLOGIC 6.0A INTERRUPT RATINGS 100KA

NEUTRAL YES Other NA

INSPECTION CHECKLIST / REMARKS

☑ REASON FOR INSPECTION	ROUTINE MAINTENANCE AND TESTING
☑ CLEAN SWITCHGEAR, CUBICLES, BUS, AND INSULATORS	YES
☑ OVERHEATING (CHECK FOR HOT SURFACES, DISCOLORATION)	NO SIGNS OF OVERHEATING
☑ CHECK FOR UNUSED OPENINGS	5 UNUSED CUBICLES
☑ CHECK ELECTRICAL CONNECTIONS	GOOD
☑ VENTS AND FILTER	VENTS ARE GOOD, NO FILTERS
☑ PROPER CLEARANCE	GOOD
☑ PANEL ID AND ARC FLASH WARNING (PANEL LABEL)	NO ARC FLASH LABELS
☑ INDICATING LIGHTS	GOOD
☑ INTERLOCKS	GOOD
☐ HEATERS	N/A
☑ PANEL SCREWS (MISSING, STRIPPED, ETC)	NO MISSING SCREWS
☑ BARRIER BOARDS AND SHUTTER OPERATION	BARRIER BOARDS IN GOOD SHAPE. NO SHUTTERS INSTALLED

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
500 V	18 °C	0.924

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1,500,000	1,386,000	1,500,000	1,386,000	1,500,000	1,386,000
POLE TO FRAME	1,500,000	1,386,000	932,000	861,168	1,500,000	1,386,000
LINE TO LOAD						

DIELECTRIC WITHSTAND (mA)			
TEST VOLTAGE _____KV			
Phase #1	Phase #2	Phase #3	Neutral
N/A	N/A	N/A	N/A

POTENTIAL XFMRS	INSULATION RESISTANCE (M-OMH)			TURNS RATIO
	HIGH TO LOW	HIGH TO GND	LOW TO GND	
	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) .5	CALCULATED RATIO 4
LEFT	644,000	718,000	809,000	3.995
CENTER	644,000	718,000	809,000	3.996
RIGHT	644,000	718,000	809,000	3.996

BUS BAR RESISTANCE (µ-OHM)				
Ground	NEUTRAL	Phase #1	Phase #2	Phase #3
N/A	N/A	22.4	25.4	26.8

CONTROL POWER XFMR	INSULATION RESISTANCE (M-OMH)			TURNS RATIO	
	HIGH TO LOW	HIGH TO GND	LOW TO GND		
	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) .5	CALCULATED RATIO 4	
	3,000,000	3,000,000	1,500,000	PHASE A	3.885
				PHASE B	3.885
				PHASE C	3.885

COMMENTS: SURGE LOGIC FUNCTIONING NORMALLY

DEFICIENCIES:

TESTED BY: E. PENLAND, B. BURGESS

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/27/2023 | AMBIENT TEMPERATURE: 18 °C | HUMIDITY: 21 % | ASSET #:
SUBSTATION: SUBSTATION 3 | POSITION: ISOLATION 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085262996801	FRAME SIZE 3,200 AMPS 600 V	
BREAKER TYPE	WA6JHR44A9SXFXXXAA	SENSOR TAPS	3000	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	NA	CUBICLE CODE	4B	ELECTRICALLY OPERATED	(●) YES ( ) NO
TRIP UNIT TYPE	MICROLOGI 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☐	NA	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	3,000	LONG	☑	0.7	X	3,000	A =	2,100	A	4	NA	
SENSOR TAP	3,000	SHORT	☑	4	X	2,100	A =	8,400	A	0.3	OFF	
		INST.	☐		X		=		A			
		GRD. FLT.	☑	0.29	X	3,000	A =	870	A	0.3	OFF	

SETTINGS AS LEFT		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	3,000	LONG	☑	0.7	X	3,000	A =	2,100	A	4	NA	
SENSOR TAP	3,000	SHORT	☑	4	-	8,400	A			0.3	OFF	
		INST.	☐									
		GRD. FLT.	☑	0.29	-	870	A			0.3	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.7	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	4	6300	NA	NA	14.795 / 14.795	14.795 / 14.795	14.795 / 14.795	NA
Short Time PU	4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.3	10500	NA	NA	0.278 / 0.278	0.278 / 0.278	0.278 / 0.278	NA
GRD Fault PU	0.29	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.3	1760	NA	NA	0.26 / 0.26	0.26 / 0.26	0.26 / 0.26	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	18 °C	0.924

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000
POLE TO FRAME	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000
LINE TO LOAD	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
11.9	14.3	11.9

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: E. PENLAND, K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/28/2023 | AMBIENT TEMPERATURE: 18 °C | HUMIDITY: 21 % | ASSET #:
SUBSTATION: SUBSTATION 3 | POSITION: MAIN A 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085262996901	FRAME SIZE 3,200 AMPS	600 V
BREAKER TYPE	WA6JHR44A9CFFFWSAA	SENSOR TAPS	3000	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	NA	CUBICLE CODE	1B	ELECTRICALLY OPERATED	(●) YES ( ) NO
TRIP UNIT TYPE	MICROLOGI 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☐	NA	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	3,000	LONG	☑	0.9	X	3,000	A =	2,700	A		4	NA	
SENSOR TAP	3,000	SHORT	☑	4	X	2,700	A =	10,800	A		0.4	OFF	
		INST.	☐		X		=		A				
		GRD. FLT.	☑	0.4	X	3,000	A =	1,200	A		0.4	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	3,000	LONG	☑	0.9	X	3,000	A =	2,700	A		4	NA	
SENSOR TAP	3,000	SHORT	☑	4	-	10,800	A				0.4	OFF	
		INST.	☐										
		GRD. FLT.	☑	0.4	-	1,200	A				0.4	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.9	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	4	8100	NA	NA	14.686 / 14.686	14.686 / 14.686	14.686 / 14.686	NA
Short Time PU	4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.4	13500	NA	NA	0.42 / 0.42	0.42 / 0.42	0.42 / 0.42	NA
GRD Fault PU	0.4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.4	2400	NA	NA	0.402 / 0.402	0.402 / 0.402	0.402 / 0.402	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	18 °C	0.924

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000
POLE TO FRAME	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000
LINE TO LOAD	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
14.6	14.2	14.2

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: E. PENLAND, K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/27/2023 | AMBIENT TEMPERATURE: 18 °C | HUMIDITY: 21 % | ASSET #:
SUBSTATION: SUBSTATION 3 | POSITION: MAIN B 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085262996903	FRAME SIZE 3,200 AMPS 600 V	
BREAKER TYPE	WA6JHR44A9CFFFWSAA	SENSOR TAPS	3000	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	NA	CUBICLE CODE	6B	ELECTRICALLY OPERATED	(●) YES ( ) NO
TRIP UNIT TYPE	MICROLOGI 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☐	NA	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	3,000	LONG	☑	0.9	X	3,000	A =	2,700	A	4	NA	
SENSOR TAP	3,000	SHORT	☑	4	X	2,700	A =	10,800	A	0.4	OFF	
		INST.	☐		X		=		A			
		GRD. FLT.	☑	0.4	X	3,000	A =	1,200	A	0.4	OFF	

SETTINGS AS LEFT		FUNCTION		Setting				DELAY	I2T	ADDI INFO
RATING PLUG	3,000	LONG	☑	0.9	X	3,000	A = 2,700 A	4	NA	
SENSOR TAP	3,000	SHORT	☑	4	-	10,800	A	0.4	OFF	
		INST.	☐							
		GRD. FLT.	☑	0.4	-	1,200	A	0.4	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.9	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	4	8100	NA	NA	14.93 / 14.93	14.93 / 14.93	14.93 / 14.93	NA
Short Time PU	4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.4	13500	NA	NA	0.42 / 0.42	0.42 / 0.42	0.42 / 0.42	NA
GRD Fault PU	0.4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.4	2400	NA	NA	0.404 / 0.404	0.404 / 0.404	0.4043 / 0.4043	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	18 °C	0.924

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000
POLE TO FRAME	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000
LINE TO LOAD	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
13.2	15.0	14.2

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: E. PENLAND, K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/28/2023 | AMBIENT TEMPERATURE: 17.2 °C | HUMIDITY: 22 % | ASSET #:
SUBSTATION: SUBSTATION 3 | POSITION: MCC-WBB-A

MANUFACTURER	SQUARE D	SN / SO NO.	06416634070001	FRAME SIZE 1,600 AMPS 1,600 V	
BREAKER TYPE	RLF36160U33AJK	SENSOR TAPS	1600	MOUNTING	○ D.O. ◉ B.I.
FUSE CAT. NO.	NA	CUBICLE CODE	TIE BREAKER	ELECTRICALLY OPERATED	○ YES ◉ NO
TRIP UNIT TYPE	MICROLOGIC 5.0 A	TRIP UNIT CAT #	MIRCOLOGIC 5.0 A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☐	NA	NA
CONTACT FINGERS	☐	NA	NA
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☐	NA	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA
GROUND CONNECTION	☐	NA	NA
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	1,600	LONG	☑	0.8	X	1,600	A =	1,280	A	4	NA	
SENSOR TAP	1,600	SHORT	☑	3	X	1,600	A =	4,800	A	0.1	OFF	
		INST.	☐	15	X	600	A =	9,000	A			
		GRD. FLT.	☐	0.2	X	600	A =	120	A			

SETTINGS AS LEFT		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	1,600	LONG	☑	0.8	X	1,600	A =	1,280	A	4	NA	
SENSOR TAP	1,600	SHORT	☑	3	-	4,800	A			0.1	OFF	
		INST.	☐									
		GRD. FLT.	☐									

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.8	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	4	2987	NA	NA	22.236 / 22.236	22.236 / 22.236	22.236 / 22.236	NA
Short Time PU	3	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.1	4800	NA	NA	0.111 / 0.111	0.111 / 0.111	0.111 / 0.111	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	17.2 °C	0.8936

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	516,000	461,097.6	466,000	416,417.6	541,000	483,437.6
POLE TO FRAME	226,000	201,953.6	463,000	413,736.8	242,000	216,251.2
LINE TO LOAD						

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3

COUNTER END: NA

COMMENTS: BREAKER PASSED ALL SECONDARY INJECTION TESTS.
BREAKER COULD NOT BE CLOSED SO ALL TESTS WERE PERFORMED IN THE OPEN POSITION

DEFICIENCIES:

TESTED BY: C. KROUT, K. HORST

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 11/28/2023 AMBIENT TEMPERATURE 17.2 °C HUMIDITY 22 % EQPT. LOCATION SUB 3

SUBSTATION SUBSTATION 3 POSITION MCC-WBB-A

NAMEPLATE DATA

MANUFACTURER SQUARE D SERIAL NO. A0292091 TYPE 12

CATALOG NO. 30951271-145 DRAWING NO. 80459-641-01 VOLTAGE CLASS 600

MAIN BUS RATING 2000 A MAIN BUS NEUTRAL RATING NA A CONDUCTOR ○ CU ◉ AL

CURRENT WITHSTAND RATING NA NUMBER OF SECTIONS 8 LISTING ☑ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER 0 MLO 0 TYPE NA AMPACITY NA MAIN DISCONNECT 0 FUSE TYPE NA SIZE NA

TOTAL POSITIONS EQUIPPED 29 NO. OF SPARE SPACES 6 TOTAL POSITIONS USED 23

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

TEST VOLTAGE 1 KVDC EQUIPMENT TEMPERATURE 17 °C TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.85

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
MCC-WBB-A	RDG.	226,000	463,000	242,000		516,000	541,000	466,000			
	20°C	192,100	393,550	205,700		438,600	459,850	396,100			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:
DEFICIENCIES:

TESTED BY: C. KROUT, K. HORST

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 11/28/2023 AMBIENT TEMPERATURE 17.2 °C HUMIDITY 22 % EQPT. LOCATION SUB 3

SUBSTATION SUBSTATION 3 POSITION MCC-WBB-A

NAMEPLATE DATA

MANUFACTURER SQUARE D SERIAL NO. A0292091 TYPE 12

CATALOG NO. 30951271-145 DRAWING NO. 80459-641-01 VOLTAGE CLASS 600

PHASE AMPACITY 2000 A WITHSTAND RATING NA KA CONDUCTOR ○ CU ◉ AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
MAIN	SURGE PRO	524.1	657	773									
MAIN	ADP-W1	616.2	382.3	446									
MAIN	WASP-W1	646	643	587									
MAIN	RASP-W1	490	424	395									
MAIN	RASP-W3	467	426	426									
MAIN	SPARE 15A	695	735	732									
MAIN	SPARE 15A	713	730	742									
MAIN	WSE-SAP-3	699	602	566									
MAIN	SCDR-W1	1065	890	970									
MAIN	10 HP SPARE	753	756	747									
MAIN	SSCP-W1	646	554	596									
MAIN	WBB-HV-1	628	600	603									
MAIN	SPARE 15A	583	583	567									
MAIN	HOIST LCP	687	576	648									
MAIN	ATS-WBB	174	164	158									
MAIN	WBB-EF-1	722	559	545									
MAIN	WBB-EF-3	676	620	684									
MAIN	WBB-P-1	832	702	938									
MAIN	WBB-EF-7	914	960	991									
MAIN	PAB-W1	100	91	94									
MAIN	PAB-W3	114	104	108									

COMMENTS:

DEFICIENCIES:

TESTED BY: C. KROUT, K. HORST

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/28/2023 | AMBIENT TEMPERATURE: 18 °C | HUMIDITY: 21 % | ASSET #:
SUBSTATION: SUBSTATION 3 | POSITION: MCC-WBB-A 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085262996601	FRAME SIZE 1,600 AMPS 600 V	
BREAKER TYPE	WA6EER44A9SXFXXXAA	SENSOR TAPS	1600	MOUNTING	(•) D.O. ( ) B.I.
FUSE CAT. NO.	NA	CUBICLE CODE	2C	ELECTRICALLY OPERATED	( ) YES (•) NO
TRIP UNIT TYPE	MICROLOGIC 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☐	NA	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	1,600	LONG	☑	0.9	X	1,600	A =	1,440	A		4	NA	
SENSOR TAP	1,600	SHORT	☑	4	X	1,440	A =	5,760	A		0.2	OFF	
		INST.	☐		X		=		A				
		GRD. FLT.	☑	0.4	X	1,600	A =	640	A		0.2	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	1,600	LONG	☑	0.9	X	1,600	A =	1,440	A		4	NA	
SENSOR TAP	1,600	SHORT	☑	4	-	5,760	A				0.2	OFF	
		INST.	☐										
		GRD. FLT.	☑	0.4	-	640	A				0.2	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.9	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	4	4320	NA	NA	14.964 / 14.964	14.964 / 14.964	14.964 / 14.964	NA
Short Time PU	4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	7200	NA	NA	0.17 / 0.17	0.17 / 0.17	0.17 / 0.17	NA
GRD Fault PU	0.4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	1280	NA	NA	0.156 / 0.156	0.156 / 0.156	0.156 / 0.156	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	18 °C	0.924

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000
POLE TO FRAME	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000
LINE TO LOAD	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
12.0	11.0	10.1

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: E. PENLAND, K. ICKES

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 11/27/2023 AMBIENT TEMPERATURE 18 °C HUMIDITY 27 % EQPT. LOCATION SUB 3

SUBSTATION SUBSTATION 3 POSITION MCC-WBB-B

NAMEPLATE DATA

MANUFACTURER SQUARE D SERIAL NO. A0292031 TYPE 12

CATALOG NO. 30951271-146 DRAWING NO. 80459-641-01 VOLTAGE CLASS 600

MAIN BUS RATING 2000 A MAIN BUS NEUTRAL RATING NA A CONDUCTOR ○ CU ◉ AL

CURRENT WITHSTAND RATING NA NUMBER OF SECTIONS 7 LISTING ☑ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER 0 MLO 0 TYPE NA AMPACITY NA MAIN DISCONNECT NA FUSE TYPE NA SIZE NA

TOTAL POSITIONS EQUIPPED 27 NO. OF SPARE SPACES 5 TOTAL POSITIONS USED 22

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

TEST VOLTAGE 1 KVDC EQUIPMENT TEMPERATURE 18 °C TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.9

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
MCC-WBB-B	RDG.	355,000	267,000	348,000		395,000	617,000	499,000			
	20°C	319,500	240,300	313,200		355,500	555,300	449,100			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES: ONE OF THE SPARES HAS BURNT TERMINALS. LABELED APPROPRIATELY. THIS SPARE SHOULD BE FIXED OR REMOVED FROM MCC.

TESTED BY: C. KROUT, K. HORST

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 11/27/2023 AMBIENT TEMPERATURE 18 °C HUMIDITY 27 % EQPT. LOCATION SUB 3

SUBSTATION SUBSTATION 3 POSITION MCC-WBB-B

NAMEPLATE DATA

MANUFACTURER SQUARE D SERIAL NO. A0292031 TYPE 12

CATALOG NO. 30951271-146 DRAWING NO. 80459-641-01 VOLTAGE CLASS 600

PHASE AMPACITY 2000 A WITHSTAND RATING NA KA CONDUCTOR ○ CU ◉ AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
MAIN	SURGE PD	667	580.5	747.9									
MAIN	WBB-EF-6	857.9	701.6	639.2									
MAIN	10HP SPARE	851.5	748.6	747.9									
MAIN	PAB-W2	78.4	69.8	69.3									
MAIN	WBB-EF-2	608.6	665.6	539.6									
MAIN	WBB-EF-4	847.7	814	643.5									
MAIN	WBB-HV-2	370	343.4	360.9									
MAIN	SPARE	651.3	662.2	665.7									
MAIN	WASP-W2	644.8	706.1	679.8									
MAIN	SPARE	670.7	634.3	666.5									
MAIN	SSCP-W2	720.4	557	595.7									
MAIN	SCDR-W2	753.8	703.9	863.8									
MAIN	ATS-WBB	229	187.5	179.6									
MAIN	WBB-P-2	669.9	747.2	832									
MAIN	RASP-W2	359	374	327									
MAIN	RASP-W4	353	343	340									
MAIN	PP-WBB-B	321.2	289.4	315.1									
MAIN	WBB-EF-5	687.7	691.1	630.7									
MAIN	WBB-H1	705	630	672									

COMMENTS:

DEFICIENCIES:

TESTED BY: C. KROUT, K. HORST

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/27/2023 | AMBIENT TEMPERATURE: 18 °C | HUMIDITY: 21 % | ASSET #:
SUBSTATION: SUBSTATION 3 | POSITION: MCC-WBB-B 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085262996602	FRAME SIZE 1,600 AMPS 600 V	
BREAKER TYPE	WA6EER44A9SXFXXXAA	SENSOR TAPS	1600	MOUNTING	(•) D.O. ( ) B.I.
FUSE CAT. NO.	NA	CUBICLE CODE	5C	ELECTRICALLY OPERATED	( ) YES (•) NO
TRIP UNIT TYPE	MICROLOGIC 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☐	NA	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	1,600	LONG	☑	0.9	X	1,600	A =	1,440	A		4	NA	
SENSOR TAP	1,600	SHORT	☑	4	X	1,440	A =	5,760	A		0.2	OFF	
		INST.	☐		X		=		A				
		GRD. FLT.	☑	0.4	X	1,600	A =	640	A		0.2	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	1,600	LONG	☑	0.9	X	1,600	A =	1,440	A		4	NA	
SENSOR TAP	1,600	SHORT	☑	4	-	5,760	A				0.2	OFF	
		INST.	☐										
		GRD. FLT.	☑	0.4	-	640	A				0.2	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.9	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	4	4320	NA	NA	15.061 / 15.061	15.061 / 15.061	15.061 / 15.061	NA
Short Time PU	4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	7200	NA	NA	0.17 / 0.17	0.17 / 0.17	0.17 / 0.17	NA
GRD Fault PU	0.4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	1280	NA	NA	0.159 / 0.159	0.159 / 0.159	0.159 / 0.159	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	18 °C	0.924

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000
POLE TO FRAME	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000
LINE TO LOAD	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
11.7	12.0	8.3

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: E. PENLAND, K. ICKES

MOLDED CASE CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 11/28/2023 AMBIENT TEMPERATURE 13 °C HUMIDITY 25 % EQPT. LOCATION SUB 3

SUBSTATION SUBSTATION 3 POSITION MCC-WPB-A

BREAKER IDENTIFICATION	MANUFACTURER	SERIAL NUMBER	TYPE	FRAME RATING (Amps)	FRAME RATING (Volts)	TRIP RATING	INSTANTANEOUS TRIP	ELEMENT TYPE
MAIN	SQUARE D	04-274510	LJ600	600	600	300	2400	THERMAL ADJUSTABLE

INSULATION RESISTANCE (M©) @ 1000 VDC									POLE RESISTANCE (µ©)		
A - B	B - C	C - A	A - GND	B - GND	C - GND	A	B	C	A	B	C
POLE TO POLE			POLE TO FRAME			LINE TO LOAD					
59,100	43,300	79,300	33,000	28,000	32,400	268,000	186,800	239,000	217.60	250.00	268.40

Manual Trip Function ☑	RANGE	MIN TIME	MAX TIME	TRIP TESTS	A	B	C
Exercise Breaker ☑	AMPS			INSTANTANEOUS TRIP AMPS			
	SECONDS			TRIP TIME IN SECONDS @ 300% RATED CURRENT			

COMMENTS: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO MCC-1 CONNECTED.

DEFICIENCIES:

TESTED BY: C. KROUT, K. HORST

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 11/28/2023 AMBIENT TEMPERATURE 13 °C HUMIDITY 25 % EQPT. LOCATION SUB 3

SUBSTATION SUBSTATION 3 POSITION MCC-WPB-A

NAMEPLATE DATA

MANUFACTURER SQUARE D SERIAL NO. A0291311 TYPE 12

CATALOG NO. 309512671-143 DRAWING NO. 80459-641-01 VOLTAGE CLASS 600

MAIN BUS RATING 600 A MAIN BUS NEUTRAL RATING NA A CONDUCTOR ○ CU ◉ AL

CURRENT WITHSTAND RATING NA NUMBER OF SECTIONS 6 LISTING ☑ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER 1 MLO 0 TYPE SQUARE D AMPACITY 600 MAIN DISCONNECT 0 FUSE TYPE NA SIZE NA

TOTAL POSITIONS EQUIPPED 31 NO. OF SPARE SPACES 3 TOTAL POSITIONS USED 28

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

TEST VOLTAGE 1 KVDC EQUIPMENT TEMPERATURE 13 °C TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.65

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
MCC-WPB-A	RDG.	244,000	175,400	225,000		174,600	307,000	95,500			
	20°C	158,600	114,010	146,250		113,490	199,550	62,075			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:
DEFICIENCIES:

TESTED BY: C. KROUT, K. HORST

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 11/28/2023 AMBIENT TEMPERATURE 13 °C HUMIDITY 25 % EQPT. LOCATION SUB 3

SUBSTATION SUBSTATION 3 POSITION MCC-WPB-A

NAMEPLATE DATA

MANUFACTURER SQUARE D SERIAL NO. A0291311 TYPE 12

CATALOG NO. 30951271-143 DRAWING NO. 80459-641-01 VOLTAGE CLASS 600

PHASE AMPACITY 600 A WITHSTAND RATING NA KA CONDUCTOR ○ CU ◉ AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
MAIN	SURGE PRO	630	475	632									
MAIN	PDCR-W1	806	589	717									
MAIN	PSCP-W1	824	741	918									
MAIN	WPB-EF-1	842	839	952									
MAIN	SWMX-W1	653	635	631									
MAIN	AXMX-W1A	729	744	710									
MAIN	AXMX-W1B	747	752	842									
MAIN	AXMX-W1C	829	838	739									
MAIN	ANMX-W1A	731	705	667									
MAIN	ANMX-W1B	785	686	721									
MAIN	ANMX-W1C	770	841	779									
MAIN	ANMX-W1D	880	1065	787									
MAIN	WPB-P-1	842	839	681									
MAIN	SPARE	761	690	666									
MAIN	10HP SPARE	828	777	775									
MAIN	ATS-WPB	589	552	569									
MAIN	FSAB-1	593	576	554									
MAIN	PC-W1	890	891	781									
MAIN	AERAT TANK	924	851	801									
MAIN	PSLPG-W1	844	726	750									
MAIN	PSLP-W1	574	546	502									
MAIN	SPARE	790	785	767									
MAIN	PDP-W1	592	580	539									
MAIN	RS-SAP-1	981	948	903									
MAIN	TIE	409	375	346									

COMMENTS:

DEFICIENCIES:

TESTED BY: C. KROUT, K. HORST

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/28/2023 | AMBIENT TEMPERATURE: 18 °C | HUMIDITY: 21 % | ASSET #:
SUBSTATION: SUBSTATION 3 | POSITION: MCC-WPB-A 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085262996701	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	WA6ASR44A9SXFXXXAA	SENSOR TAPS	400	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	NA	CUBICLE CODE	2B	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	MICROLOGIC 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☐	NA	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	400	LONG	☑	0.9	X	400	A =	360	A		8	NA	
SENSOR TAP	400	SHORT	☑	10	X	360	A =	3,600	A		0.1	OFF	
		INST.	☐		X		=		A				
		GRD. FLT.	☑	0.4	X	400	A =	160	A		0.2	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	400	LONG	☑	0.9	X	400	A =	360	A		8	NA	
SENSOR TAP	400	SHORT	☑	10	-	3,600	A				0.1	OFF	
		INST.	☐										
		GRD. FLT.	☑	0.4	-	160	A				0.2	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.9	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	8	2520	NA	NA	4.962 / 4.962	4.962 / 4.962	4.962 / 4.962	NA
Short Time PU	10	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.1	4500	NA	NA	0.112 / 0.112	0.112 / 0.112	0.112 / 0.112	NA
GRD Fault PU	0.4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	320	NA	NA	0.151 / 0.151	0.151 / 0.151	0.151 / 0.151	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	18 °C	0.924

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000
POLE TO FRAME	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000
LINE TO LOAD	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
9.3	11.3	9.2

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: E. PENLAND, K. ICKES

MOLDED CASE CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 11/27/2023 AMBIENT TEMPERATURE 18 °C HUMIDITY 27 % EQPT. LOCATION SUB 3

SUBSTATION SUBSTATION 3 POSITION MCC-WPB-B

BREAKER IDENTIFICATION	MANUFACTURER	SERIAL NUMBER	TYPE	FRAME RATING (Amps)	FRAME RATING (Volts)	TRIP RATING	INSTANTANEOUS TRIP	ELEMENT TYPE
MCC-WPB-B MAIN	SQUARE D	04-274500	LJ600	600	600	300	2400	MAGNETIC ADJUSTABLE

INSULATION RESISTANCE (M©) @ 1000 VDC									POLE RESISTANCE (µ©)		
A - B	B - C	C - A	A - GND	B - GND	C - GND	A	B	C	A	B	C
POLE TO POLE			POLE TO FRAME			LINE TO LOAD					
23,700	26,900	26,800	6,640	10,170	11,220	1,343,000	1,240,932	1,188,000	160.00	146.00	125.00

	RANGE	MIN TIME	MAX TIME	TRIP TESTS	A	B	C
Manual Trip Function ☑	AMPS			INSTANTANEOUS TRIP AMPS			
Exercise Breaker ☑	SECONDS			TRIP TIME IN SECONDS @ 300% RATED CURRENT			

COMMENTS: UNABLE TO SECONDARY INJECT.
INSULATION RESISTANCE PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO MCC-1 CONNECTED.

DEFICIENCIES:

TESTED BY: C. KROUT, K. HORST

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 11/27/2023 AMBIENT TEMPERATURE 18 °C HUMIDITY 27 % EQPT. LOCATION SUB 3

SUBSTATION SUBSTATION 3 POSITION MCC-WPB-B

NAMEPLATE DATA

MANUFACTURER SQUARE D SERIAL NO. A0291323 TYPE 12

CATALOG NO. 30951271-144 DRAWING NO. 80459-641-01 VOLTAGE CLASS 600

MAIN BUS RATING 600 A MAIN BUS NEUTRAL RATING NA A CONDUCTOR ○ CU ◉ AL

CURRENT WITHSTAND RATING NA NUMBER OF SECTIONS 6 LISTING ☑ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER 1 MLO 0 TYPE SQUARE D AMPACITY 600 MAIN DISCONNECT NA FUSE TYPE NA SIZE NA

TOTAL POSITIONS EQUIPPED 32 NO. OF SPARE SPACES 4 TOTAL POSITIONS USED 28

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

TEST VOLTAGE 1 KVDC EQUIPMENT TEMPERATURE 18 °C TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.9

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
MCC-WPB-B	RDG.	95,900	107,600	126,700		222,000	186,900	148,000			
	20°C	86,310	96,840	114,030		199,800	168,210	133,200			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:
DEFICIENCIES:

TESTED BY: C. KROUT, K. HORST

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 11/27/2023 AMBIENT TEMPERATURE 18 °C HUMIDITY 27 % EQPT. LOCATION SUB 3

SUBSTATION SUBSTATION 3 POSITION MCC-WPB-B

NAMEPLATE DATA

MANUFACTURER SQUARE D SERIAL NO. A0291323 TYPE 12

CATALOG NO. 30951271-144 DRAWING NO. 80459-641-01 VOLTAGE CLASS 600

PHASE AMPACITY 600 A WITHSTAND RATING NA KA CONDUCTOR ○ CU ◉ AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
MAIN	PSLP-W2	321	323	310									
MAIN	SURGE PRO	693	703	702									
MAIN	PCDR-W2	850	720	785									
MAIN	ATS-WPB	785	816	746									
MAIN	PC-W2....ETC	704	718	684									
MAIN	AERAT TANK	732	738	705									
MAIN	PSCP-W2	997	847	815									
MAIN	PSLPG-W2	803	780	778									
MAIN	WPB-HV-1	825	847	795									
MAIN	AXMX-W2A	724	721	668									
MAIN	AXMX-W2B	874	833	769									
MAIN	AXMX-W2C	1155	840	821									
MAIN	WPE-SAP-2	1378	971	1306									
MAIN	ANMX-W2A	837	927	894									
MAIN	ANMX-W2B	848	810	783									
MAIN	ANMX-W2C	1180	992	859									
MAIN	ANMX-W2D	998	1023	1000									
MAIN	WPB-P-2	1220	943	1290									
MAIN	WPB-H1	865	813	983									
MAIN	SPARE	871	851	842									
MAIN	SPARE	834	847	827									
MAIN	WPB-EF-2	1134	1014	1356									
MAIN	SWMX-W2	1006	1163	980									
MAIN	10HP SPARE	918	954	803									

COMMENTS:

DEFICIENCIES:

TESTED BY: C. KROUT, K. HORST

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/27/2023 | AMBIENT TEMPERATURE: 18 °C | HUMIDITY: 21 % | ASSET #:
SUBSTATION: SUBSTATION 3 | POSITION: MCC-WPB-B 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085262996702	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	WA6ASR44A9SXFXXXAA	SENSOR TAPS	400	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	NA	CUBICLE CODE	5B	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	MICROLOGIC 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☐	NA	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	400	LONG	☑	0.9	X	400	A =	360	A		8	NA	
SENSOR TAP	400	SHORT	☑	10	X	360	A =	3,600	A		0.1	OFF	
		INST.	☐		X		=		A				
		GRD. FLT.	☑	0.4	X	400	A =	160	A		0.2	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	400	LONG	☑	0.9	X	400	A =	360	A		8	NA	
SENSOR TAP	400	SHORT	☑	10	-	3,600	A				0.1	OFF	
		INST.	☐										
		GRD. FLT.	☑	0.4	-	160	A				0.2	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.9	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	8	2520	NA	NA	4.915 / 4.915	4.915 / 4.915	4.915 / 4.915	NA
Short Time PU	10	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.1	4500	NA	NA	0.111 / 0.111	0.111 / 0.111	0.111 / 0.111	NA
GRD Fault PU	0.4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	320	NA	NA	0.156 / 0.156	0.156 / 0.156	0.156 / 0.156	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	18 °C	0.924

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000
POLE TO FRAME	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000
LINE TO LOAD	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
10.2	12.7	11.3

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: E. PENLAND, K. ICKES

LOADBREAK DISCONNECT TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 11/28/2023 AMBIENT TEMPERATURE 18 °C HUMIDITY 21 % EQPT. LOCATION

SUBSTATION SUBSTATION 3 POSITION PRIMARY SWITCH MAIN A

NAMEPLATE DATA

MANUFACTURER SQUARE D TYPE LOAD CURRENT INT. SERIAL NO. 44036-325-51-3A MFG DATE 2014

RATED VOLTAGE 15,000 SYSTEM VOLTAGE 13200 AMPERES 600 INTERRUPTING RATING 40 KA B.I.L. RATING 95 KV

TYPE OPERATING MECHANISM MANUAL MOMENTARY FAULT INTERUPTING 40 KA MOMENTARY FAULT CLOSING AMPS 40 KA

FUSE DATA

MANUFACTURER NA TYPE NA HOLDER NA MAX. AMPS NA

REFILL ELEMENT TYPE NA SIZE NA CAT. NO. NA TCC NO. NA VOLTAGE NA KV

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTION	☑	GOOD	C
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
INTERLOCKS	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
Contacts	☑	GOOD	C/L
HEATERS	☐	NA	NA
OPERATING MECHANISM	☑	GOOD	C/L
HAZARD WARNING LABELS	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	18 °C	0.924

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	7,500,000	6,930,000.01	7,500,000	6,930,000.01	7,500,000	6,930,000.01
POLE TO FRAME	5,290,000	4,887,960.01	5,750,000	5,313,000.01	6,030,000	5,571,720.01
LINE TO LOAD	7,500,000	6,930,000.01	7,500,000	6,930,000.01	7,500,000	6,930,000.01

POLE RESISTANCE (µ©)			
	POLE 1	POLE 2	POLE 3
AS FOUND	33.2	42.7	38.8
AS LEFT	33.2	42.7	38.8

ARRESTERS TESTING (M©)			
TEST VOLTAGE KV / 1 MIN	PHASE A	PHASE B	PHASE C
5	10,850	261,000	193,000

DIELECTRIC WITHSTAND (mA)			
TEST VOLTAGE 27 KVAC	POLE 1	POLE 2	POLE 3
SWITCH CLOSED - POLE TO GND OTHER POLES GROUNDED	0.1	0.1	0.1

COMMENTS: ARRESTER INFO: 12.7 kV MCOV, 15 kV RATED.
PRIMARY CABLE INSULATION RESISTANCES: A-G - 153,500 MEGAOHMS; B-G - 149,700 MEGAOHMS;
C-G - 147,500 MEGAOHMS; A-B - 305,000 MEGAOHMS; B-C - 305,000 MEGAOHMS; C-A - 327,000 MEGAOHMS.

DEFICIENCIES: A PHASE ARRESTER READING IS LOWER THAN OTHER PHASES. MAY NEED A REPLACEMENT.

TESTED BY: E. PENLAND, K. ICKES

LOADBREAK DISCONNECT TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/27/2023 | AMBIENT TEMPERATURE: 18 °C | HUMIDITY: 21 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 3 | POSITION: PRIMARY SWITCH MAIN B

NAMEPLATE DATA

MANUFACTURER: SQUARE D | TYPE: LOAD CURRENT INT. | SERIAL NO.: 44036-525-51-3B | MFG DATE: 2014
RATED VOLTAGE: 15,000 | SYSTEM VOLTAGE: 13200 | AMPERES: 600 | INTERRUPTING RATING: 40 KA | B.I.L. RATING: 95 KV
TYPE OPERATING MECHANISM: MANUAL | MOMENTARY FAULT INTERUPTING: 40 KA | MOMENTARY FAULT CLOSING AMPS: 40 KA

FUSE DATA

MANUFACTURER: NA | TYPE: NA | HOLDER: NA | MAX. AMPS: NA
REFILL ELEMENT TYPE: NA | SIZE: NA | CAT. NO.: NA | TCC NO.: NA | VOLTAGE: NA KV

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTION	☑	GOOD	C
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
INTERLOCKS	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
Contacts	☑	GOOD	C/L
HEATERS	☐	NA	NA
OPERATING MECHANISM	☑	GOOD	C/L
HAZARD WARNING LABELS	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	18 °C	0.924

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	7,500,000	6,930,000.01	7,500,000	6,930,000.01	7,500,000	6,930,000.01
POLE TO FRAME	2,050,000	1,894,200	2,530,000	2,337,720	3,220,000	2,975,280
LINE TO LOAD	5,000,000	4,620,000	5,100,000	4,712,400	6,200,000	5,728,800.01

POLE RESISTANCE (µ©)			
	POLE 1	POLE 2	POLE 3
AS FOUND	38.0	33.7	40.0
AS LEFT	38.0	33.7	40.0

ARRESTERS TESTING (M©)			
TEST VOLTAGE KV / 1 MIN	PHASE A	PHASE B	PHASE C
5	10,200	204,000	45,000

DIELECTRIC WITHSTAND (mA)			
TEST VOLTAGE 27 KVAC	POLE 1	POLE 2	POLE 3
SWITCH CLOSED - POLE TO GND OTHER POLES GROUNDED	0.1	0.1	0.1

COMMENTS: ARRESTER INFO: 12.7 kV MCOV, 15 kV RATED.
PRIMARY CABLE INSULATION RESISTANCES: A-G - 136,500 MEGAOHMS; B-G - 91,700 MEGAOHMS;
C-G - 132,000 MEGAOHMS; A-B - 270,000 MEGAOHMS; B-C - 73,500 MEGAOHMS; C-A - 189,200 MEGAOHMS.

DEFICIENCIES: A PHASE ARRESTER READING IS LOWER THAN OTHER PHASES. MAY NEED A REPLACEMENT.

TESTED BY: E. PENLAND, K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/28/2023 | AMBIENT TEMPERATURE: 18 °C | HUMIDITY: 21 % | ASSET #:
SUBSTATION: SUBSTATION 3 | POSITION: SPARE-A 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085262997001	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	WA6AAR44A9SXFXXXAA	SENSOR TAPS	800	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	NA	CUBICLE CODE	2D	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	MICROLOGIC 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☐	NA	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A		0.5	NA	
SENSOR TAP	800	SHORT	☑	1.5	X	800	A =	1,200	A		0.1	ON	
		INST.	☑	2	X	800	A =	1,600	A		N/A	NA	
		GRD. FLT.	☑	0.2	X	800	A =	160	A		0.1	ON	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A		0.5	NA	
SENSOR TAP	800	SHORT	☑	1.5	-	1,200	A				0.1	ON	
		INST.	☑	2	-	1,600	A					NA	
		GRD. FLT.	☑	0.2	-	160	A				0.1	ON	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	0.5	1067	NA	NA	14.163 / 14.163	14.163 / 14.163	14.163 / 14.163	NA
Short Time PU	1.5	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.1	1400	NA	NA	4.955 / 4.955	4.955 / 4.955	4.955 / 4.955	NA
Instant PU	2	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	2000	NA	NA	0.036 / 0.036	0.036 / 0.036	0.036 / 0.036	NA
GRD Fault PU	0.2	NA	NA	NA.	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.1	320	NA	NA	0.72 / 0.72	0.72 / 0.72	0.72 / 0.72	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	18 °C	0.924

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000
POLE TO FRAME	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000
LINE TO LOAD	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
36.0	26.0	25.5

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: E. PENLAND, K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/27/2023 | AMBIENT TEMPERATURE: 18 °C | HUMIDITY: 21 % | ASSET #:
SUBSTATION: SUBSTATION 3 | POSITION: SPARE-B 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085262997002	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	WA6AAR44A9SXFXXXAA	SENSOR TAPS	800	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	NA	CUBICLE CODE	5D	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	MICROLOGIC 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☐	NA	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A		0.5	NA	
SENSOR TAP	800	SHORT	☑	1.5	X	800	A =	1,200	A		0.1	ON	
		INST.	☑	2	X	800	A =	1,600	A		N/A	NA	
		GRD. FLT.	☑	0.2	X	800	A =	160	A		0.1	ON	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A		0.5	NA	
SENSOR TAP	800	SHORT	☑	1.5	-	1,200	A				0.1	ON	
		INST.	☑	2	-	1,600	A					NA	
		GRD. FLT.	☑	0.2	-	160	A				0.1	ON	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	0.5	1067	NA	NA	14.488 / 14.488	14.488 / 14.488	14.488 / 14.488	NA
Short Time PU	1.5	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.1	1400	NA	NA	5.072 / 5.072	5.072 / 5.072	5.072 / 5.072	NA
Instant PU	2	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	2000	NA	NA	0.036 / 0.036	0.036 / 0.036	0.036 / 0.036	NA
GRD Fault PU	0.2	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.1	320	NA	NA	0.614 / 0.614	0.614 / 0.614	0.614 / 0.614	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	18 °C	0.924

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000
POLE TO FRAME	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000
LINE TO LOAD	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
44.0	44.4	31.5

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: E. PENLAND, K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/28/2023 | AMBIENT TEMPERATURE: 18 °C | HUMIDITY: 21 % | ASSET #:
SUBSTATION: SUBSTATION 3 | POSITION: TIE 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085262996902	FRAME SIZE 3,200 AMPS	600 V
BREAKER TYPE	WA6JHR44A9CFFFWSAA	SENSOR TAPS	3000	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	NA	CUBICLE CODE	3B	ELECTRICALLY OPERATED	(●) YES ( ) NO
TRIP UNIT TYPE	MICROLOGI 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☐	NA	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	3,000	LONG	☑	0.7	X	3,000	A =	2,100	A	4	NA	
SENSOR TAP	3,000	SHORT	☑	4	X	2,100	A =	8,400	A	0.3	OFF	
		INST.	☐		X		=		A			
		GRD. FLT.	☑	0.29	X	3,000	A =	870	A	0.3	OFF	

SETTINGS AS LEFT		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	3,000	LONG	☑	0.7	X	3,000	A =	2,100	A	4	NA	
SENSOR TAP	3,000	SHORT	☑	4	-	8,400	A			0.3	OFF	
		INST.	☐									
		GRD. FLT.	☑	0.29	-	870	A			0.3	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.7	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	4	6300	NA	NA	15.113 / 15.113	15.113 / 15.113	15.113 / 15.113	NA
Short Time PU	4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.3	10500	NA	NA	0.277 / 0.277	0.277 / 0.277	0.277 / 0.277	NA
GRD Fault PU	0.29	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.3	1760	NA	NA	0.262 / 0.262	0.262 / 0.262	0.262 / 0.262	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	18 °C	0.924

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000
POLE TO FRAME	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000
LINE TO LOAD	3,000,000	2,772,000	3,000,000	2,772,000	3,000,000	2,772,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
23.0	26.0	30.0

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: E. PENLAND, K. ICKES

TRANSFORMER MAINTENANCE AND INSPECTION

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/28/2023 | AMBIENT TEMPERATURE: 18 °C | HUMIDITY: 21 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 3 | POSITION: XFMR 1

NAMEPLATE DATA

MANUFACTURER: SQUARE D | YR MFR: 2014 | SERIAL NO.: 30951271-015-01
IMPEDANCE: 5.87 % | NUMBER OF FANS: 0 | WEIGHT: 12400 LBS | TYPE: VPI | CLASS: AA / / /
KVA: 2,000 / / | WINDING MATERIAL: COPPER | TEMPERATURE RISE: 115 °C | B.I.L. RATING: 10 / 95
PRIMARY V: 13,200 | DELTA | MFR LOCATION: BLAND, VA
SECONDARY V: 480 / 277.12 | WYE | ☑ EXPOSED NEUTRAL - X0 | TANK TYPE: NON-VENTED
TAP VOLTAGES: 13,860 | 13,530 | 13,200 | 12,870 | 12,540 | INSULATING MATERIAL: PAPER
TAP POSITION: E-F | D-F | E-G | D-G | C-G | WINDING INSUATING SYSTEM: OPEN-WOUND
TAP SETTING: E-G 13,200 V | ☑ HIGH SIDE TAP | ☐ LOW SIDE TAP

VISUAL AND MECHANICAL INSPECTION

	Description	NOTES
☑	REASON FOR INSPECTION	ROUTINE
☑	CHECK FOR SIGNS OF OVERHEATING, DISCOLORATION	GOOD
☑	ENCLOSURE (OPENINGS, COVERS, PAINT, ETC)	GOOD
☑	CHECK ALL CONNECTIONS TIGHT	GOOD
☑	IMPROPER TERMINATIONS	GOOD
☑	EQUIPMENT GROUND/GROUND BAR	GOOD
☑	CORE GROUND	GOOD
☑	NEUTRAL BAR	GOOD
☑	PRIMARY SIDE (CABLE OR BUSS)	GOOD

	Description	NOTES
☑	SECONDARY SIDE (CABLE OR BUSS)	GOOD
☑	CLEAN AND INSPECT INSULATORS, SUPPORTS, AND BARRIERS	GOOD
☐	CLEAN CORE, COIL, AND ENCLOSURE (INTERIOR/EXTERIOR)	NA
☑	CORE AND COIL BRACING	GOOD
☑	VIBRATION ISOLATATION PADS	GOOD
☑	PROPER CLEARANCE (36 INCHES UNOBSTRUCTED)	GOOD
☐	CONTROL WIRING	NA
☐	COOLING FANS	NA
☐	ALARMS AND INDICATORS	NA

ELECTRICAL TESTS

INSULATION RESISTANCE (Mohm)

MINUTES	PRIMARY TO GROUND	SECONDARY TO GROUND	PRIMARY TO SECONDARY
Test kV	5	1	5
0.50	148,100	128,700	199,200
1.00	151,900	223,000	200,000
10.00	176,300	765,000	497,000
P. I. (10min/1min)	1.16	3.43	2.48

WINDING RESISTANCE TEST (mohm)

APPARATUS TEMP. (°C)	18	TEST AMPS	5

H3-H1		H1-H2		H2-H3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
538.70	553.63	541.35	556.36	540.60	555.59
X0-X1		X0-X2		X0-X3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
0.289	0.298	0.294	0.302	0.291	0.299

TRANSFORMER TURN RATIO TEST

TAP	CALC	PHASE A	PHASE B	PHASE C
E-G	47.633	47.682	47.671	47.659
% ERROR		0.103%	0.080%	0.055%

EXTERNAL DOCUMENTS ATTACHED TO REPORT

COMMENTS: EXCITATION CURRENT A - 5.3 MILLIAMPS; B- 4.3 MILLIAMPS; C - 5.1 MILLAMPS.
DEFICIENCIES:

TESTED BY: E. PENLAND, K. ICKES

TRANSFORMER MAINTENANCE AND INSPECTION

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/27/2023 | AMBIENT TEMPERATURE: 18 °C | HUMIDITY: 21 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 3 | POSITION: XFMR 3

NAMEPLATE DATA

MANUFACTURER: SQUARE D | YR MFR: 2014 | SERIAL NO.: 30951271-018-01
IMPEDANCE: 5.89 % | NUMBER OF FANS: 0 | WEIGHT: 12400 LBS | TYPE: VPI | CLASS: AA / / /
KVA: 2,000 / / | WINDING MATERIAL: COPPER | TEMPERATURE RISE: 115 °C | B.I.L. RATING: 10 / 95
PRIMARY V: 13,200 | DELTA | MFR LOCATION: BLAND, VA
SECONDARY V: 480 / 277.12 | WYE | ☑ EXPOSED NEUTRAL - X0 | TANK TYPE: NON-VENTED
TAP VOLTAGES: 13,860 | 13,530 | 13,200 | 12,870 | 12,540 | INSULATING MATERIAL: PAPER
TAP POSITION: E-F | D-F | E-G | D-G | C-G | WINDING INSUATING SYSTEM: OPEN-WOUND
TAP SETTING: E-G 13,200 V | ☑ HIGH SIDE TAP | ☐ LOW SIDE TAP

VISUAL AND MECHANICAL INSPECTION

	Description	NOTES
☑	REASON FOR INSPECTION	ROUTINE
☑	CHECK FOR SIGNS OF OVERHEATING, DISCOLORATION	GOOD
☑	ENCLOSURE (OPENINGS, COVERS, PAINT, ETC)	GOOD
☑	CHECK ALL CONNECTIONS TIGHT	GOOD
☑	IMPROPER TERMINATIONS	GOOD
☑	EQUIPMENT GROUND/GROUND BAR	GOOD
☑	CORE GROUND	GOOD
☑	NEUTRAL BAR	GOOD
☑	PRIMARY SIDE (CABLE OR BUSS)	GOOD

	Description	NOTES
☑	SECONDARY SIDE (CABLE OR BUSS)	GOOD
☑	CLEAN AND INSPECT INSULATORS, SUPPORTS, AND BARRIERS	GOOD
☐	CLEAN CORE, COIL, AND ENCLOSURE (INTERIOR/EXTERIOR)	NA
☑	CORE AND COIL BRACING	GOOD
☑	VIBRATION ISOLATATION PADS	GOOD
☑	PROPER CLEARANCE (36 INCHES UNOBSTRUCTED)	GOOD
☐	CONTROL WIRING	NA
☐	COOLING FANS	NA
☐	ALARMS AND INDICATORS	NA

ELECTRICAL TESTS

INSULATION RESISTANCE (Mohm)

MINUTES	PRIMARY TO GROUND	SECONDARY TO GROUND	PRIMARY TO SECONDARY
Test kV	5	1	5
0.50	387,000	334,000	388,000
1.00	535,000	577,000	544,000
10.00	1,594,000	2,250,000	1,718,000
P. I. (10min/1min)	2.98	3.90	3.16

WINDING RESISTANCE TEST (mohm)

APPARATUS TEMP. (°C)	18	TEST AMPS	5

H3-H1		H1-H2		H2-H3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
547.10	562.27	547.50	562.68	546.25	561.39
X0-X1		X0-X2		X0-X3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
0.292	0.301	0.295	0.304	0.293	0.301

TRANSFORMER TURN RATIO TEST

TAP	CALC	PHASE A	PHASE B	PHASE C
E-G	47.633	47.666	47.659	47.672
% ERROR		0.070%	0.055%	0.082%

EXTERNAL DOCUMENTS ATTACHED TO REPORT

COMMENTS: EXCITATION CURRENT A - 5.1 MILLIAMPS; B - 3.7 MILLIAMPS; C - 4.6 MILLAMPS.
DEFICIENCIES:

TESTED BY: E. PENLAND, K. ICKES

SWITCHGEAR INSPECTION AND TEST REPORT

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/19/2023 AMBIENT TEMPERATURE 20 °C HUMIDITY 25 % EQPT. LOCATION SUB 2

SUBSTATION SUBSTATION 4 POSITION 480V SWITCHGEAR BUS A

SWITCHGEAR NAMEPLATE

MANUFACTURER GOULD TYPE SN / SO NO. 53325-E3 MFG DATE 1979

STYLE / CAT # / BUILD NUMBER NA SYSTEM VOLTAGE 480 RATED VOLTAGE 480 SERVICE 3 WIRE

BUS AMPACITIES NA OVERCURRENT DEVICE TYPE/CAT. NA INTERRUPT RATINGS NA

NEUTRAL YES Other NA

INSPECTION CHECKLIST / REMARKS

☑ REASON FOR INSPECTION	ROUTINE MAINTENANCE AND TESTING
☑ CLEAN SWITCHGEAR, CUBICLES, BUS, AND INSULATORS	NA
☑ OVERHEATING (CHECK FOR HOT SURFACES, DISCOLORATION)	NA
☑ CHECK FOR UNUSED OPENINGS	NA
☑ CHECK ELECTRICAL CONNECTIONS	NA
☑ VENTS AND FILTER	NA
☑ PROPER CLEARANCE	NA
☑ PANEL ID AND ARC FLASH WARNING (PANEL LABEL)	NA
☑ INDICATING LIGHTS	NA
☑ INTERLOCKS	NA
☐ HEATERS	N/A
☑ PANEL SCREWS (MISSING, STRIPPED, ETC)	NA
☑ BARRIER BOARDS AND SHUTTER OPERATION	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
500 V	20 °C	1

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	290,000	290,000	226,000	226,000	470,000	470,000
POLE TO FRAME	321,000	321,000	89,600	89,600	209,000	209,000
LINE TO LOAD						

DIELECTRIC WITHSTAND (mA)			
TEST VOLTAGE _____KV			
Phase #1	Phase #2	Phase #3	Neutral
N/A	N/A	N/A	N/A

POTENTIAL XFMRS	INSULATION RESISTANCE (M-OMH)			TURNS RATIO
	HIGH TO LOW	HIGH TO GND	LOW TO GND	
	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) .5	CALCULATED RATIO 4
LEFT	63,000	78,300	48,000	4.040
RIGHT	63,000	78,300	48,000	4.003

BUS BAR RESISTANCE (µ-OHM)				
Ground	NEUTRAL	Phase #1	Phase #2	Phase #3
N/A	N/A	107	87	114

CONTROL POWER XFMR	INSULATION RESISTANCE (M-OMH)			TURNS RATIO	
	HIGH TO LOW	HIGH TO GND	LOW TO GND		
	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) .5	CALCULATED RATIO 4	
	161,000	191,000	125,000	PHASE A	3.921
				PHASE B	1.960
				PHASE C	3.921

COMMENTS:

DEFICIENCIES:

TESTED BY: E. PENLAND,S. FRY, K. ICKES

SWITCHGEAR INSPECTION AND TEST REPORT

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/20/2023 AMBIENT TEMPERATURE 20 °C HUMIDITY 25 % EQPT. LOCATION SUB 2

SUBSTATION SUBSTATION 4 POSITION 480V SWITCHGEAR BUS B

SWITCHGEAR NAMEPLATE

MANUFACTURER GOULD TYPE SN / SO NO. NA MFG DATE NA

STYLE / CAT # / BUILD NUMBER NA SYSTEM VOLTAGE 480 RATED VOLTAGE SERVICE 3 WIRE

BUS AMPACITIES NA OVERCURRENT DEVICE TYPE/CAT. NA INTERRUPT RATINGS NA

NEUTRAL YES Other NA

INSPECTION CHECKLIST / REMARKS

☑	REASON FOR INSPECTION	ROUTINE MAINTENANCE AND TESTING
☑	CLEAN SWITCHGEAR, CUBICLES, BUS, AND INSULATORS	NA
☑	OVERHEATING (CHECK FOR HOT SURFACES, DISCOLORATION)	NA
☑	CHECK FOR UNUSED OPENINGS	NA
☑	CHECK ELECTRICAL CONNECTIONS	NA
☑	VENTS AND FILTER	NA
☑	PROPER CLEARANCE	NA
☑	PANEL ID AND ARC FLASH WARNING (PANEL LABEL)	NA
☑	INDICATING LIGHTS	NA
☑	INTERLOCKS	NA
☐	HEATERS	NA
☑	PANEL SCREWS (MISSING, STRIPPED, ETC)	NA
☑	BARRIER BOARDS AND SHUTTER OPERATION	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
500 V	20 °C	1

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	327,000	327,000	388,000	388,000	244,000	244,000
POLE TO FRAME	181,200	181,200	252,000	252,000	144,900	144,900
LINE TO LOAD						

DIELECTRIC WITHSTAND (mA)			
TEST VOLTAGE _____KV			
Phase #1	Phase #2	Phase #3	Neutral
N/A	N/A	N/A	N/A

POTENTIAL XFMRS	INSULATION RESISTANCE (M-OMH)			TURNS RATIO
	HIGH TO LOW	HIGH TO GND	LOW TO GND	
	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) .5	CALCULATED RATIO 4
LEFT	63,000	78,300	248,000	4.040
RIGHT	63,000	78,300	248,000	4.003

BUS BAR RESISTANCE (µ-OHM)				
Ground	NEUTRAL	Phase #1	Phase #2	Phase #3
N/A	N/A	51.6	65.4	71.3

CONTROL POWER XFMR	INSULATION RESISTANCE (M-OMH)			TURNS RATIO	
	HIGH TO LOW	HIGH TO GND	LOW TO GND		
	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) .5	CALCULATED RATIO 4	
	161,000	191,000	125,000	PHASE A	3.921
				PHASE B	3.921
				PHASE C	3.921

COMMENTS: NO NAMEPLATE ON GEAR.

DEFICIENCIES:

TESTED BY: E. PENLAND, S. FRY, K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/19/2023 | AMBIENT TEMPERATURE: 20 °C | HUMIDITY: 25 % | ASSET #:
SUBSTATION: SUBSTATION 4 | POSITION: MAIN 480V BREAKER A

MANUFACTURER	GOULD	SN / SO NO.	53325E--18--03364	FRAME SIZE 1,600 AMPS 600 V	
BREAKER TYPE	TYPE K	SENSOR TAPS	1600	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	MB-1	ELECTRICALLY OPERATED	(●) YES ( ) NO
TRIP UNIT TYPE	A-C PRO	TRIP UNIT CAT #	017700036B	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	1,600	LONG	☑	0.625	X	1,600	A =	1,000	A	6.5	NA	
SENSOR TAP	1,600	SHORT	☑	1.25	X	1,600	A =	2,000	A	0.2	OFF	
		INST.	☐		X		=		A			
		GRD. FLT.	☐		X		=		A			

SETTINGS AS LEFT		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	1,600	LONG	☑	0.8	X	1,600	A =	1,280	A	6.5	NA	
SENSOR TAP	1,600	SHORT	☑	1.25	-	2,000	A			0.2	OFF	
		INST.	☐									
		GRD. FLT.	☐									

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.625	0.625	100	NA	0.625 / 0.625	0.625 / 0.625	0.625 / 0.625	NA
Long Time Delay	6.5	1.87	300	21.98 - 31.5	25.24 / 25.24	25.3 / 25.3	25.8 / 25.8	NA
Short Time PU	1.25	1.25	100	NA	1.25 / 1.25	1.25 / 1.25	1.25 / 1.25	NA
Short Time Delay	0.2	1.875	150	0.17 - 0.28	0.18 / 0.18	0.18 / 0.18	0.18 / 0.18	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	20 °C	1

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000
POLE TO FRAME	3,000,000	3,000,000	3,000,000	3,000,000	1,779,000	1,779,000
LINE TO LOAD	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
98.0	87.0	101.0

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/20/2023 | AMBIENT TEMPERATURE: 20 °C | HUMIDITY: 25 % | ASSET #:
SUBSTATION: SUBSTATION 4 | POSITION: MAIN 480V BREAKER B

MANUFACTURER	GOULD	SN / SO NO.	53325C--18--01364	FRAME SIZE 1,600 AMPS 600 V	
BREAKER TYPE	TYPE K	SENSOR TAPS	1600	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	MB-2	ELECTRICALLY OPERATED	(●) YES ( ) NO
TRIP UNIT TYPE	A-C PRO	TRIP UNIT CAT #	017700036B	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	1,600	LONG	☑	0.625	X	1,600	A =	1,000	A	6.5	NA	
SENSOR TAP	1,600	SHORT	☑	1.25	X	1,600	A =	2,000	A	0.2	OFF	
		INST.	☐		X		=		A			
		GRD. FLT.	☐		X		=		A			

SETTINGS AS LEFT		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	1,600	LONG	☑	0.625	X	1,600	A =	1,000	A	6.5	NA	
SENSOR TAP	1,600	SHORT	☑	1.25	-	2,000	A			0.2	OFF	
		INST.	☐									
		GRD. FLT.	☐									

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.625	NA	NA	NA	0.61 / 0.61	0.63 / 0.63	0.63 / 0.63	Y
Long Time Delay	6.5	1.87	300	21.98 - 31.5	26.70 / 26.70	25.05 / 25.05	24.46 / 24.46	NA
Short Time PU	1.25	NA	NA	NA	1.25 / 1.25	1.25 / 1.25	1.25 / 1.25	NA
Short Time Delay	0.2	1.875	150	0.17 - 0.28	0.17 / 0.17	0.18 / 0.18	0.18 / 0.18	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	20 °C	1

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000
POLE TO FRAME	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000
LINE TO LOAD	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
118.0	101.0	99.0

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: E. PENLAND

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/19/2023 | AMBIENT TEMPERATURE: 20 °C | HUMIDITY: 25 % | EQPT. LOCATION: TERTIARY BUILDING
SUBSTATION: SUBSTATION 4 | POSITION: MCC-M

NAMEPLATE DATA

MANUFACTURER: GOULD | SERIAL NO.: NA | TYPE: 3P3W
CATALOG NO.: NA | DRAWING NO.: 84-64321 | VOLTAGE CLASS: 480
MAIN BUS RATING: 1000 A | MAIN BUS NEUTRAL RATING: NA A | CONDUCTOR: ○ CU ◉ AL
CURRENT WITHSTAND RATING: NA | NUMBER OF SECTIONS: 7 | LISTING: ☑ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER: 0 | MLO: 1 | TYPE: NA | AMPACITY: 1000 | MAIN DISCONNECT: 0 | FUSE TYPE: NA | SIZE: NA
TOTAL POSITIONS EQUIPPED: 20 | NO. OF SPARE SPACES: 1 | TOTAL POSITIONS USED: 19

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

TEST VOLTAGE: 1 KVDC | EQUIPMENT TEMPERATURE: 20 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 1

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
MCC-M	RDG.	2,030	2,160	2,180		3,160	3,580	3,390			
	20°C	2,030	2,160	2,180		3,160	3,580	3,390			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS: INSULATION RESISTANCE TESTED WITH CABLES BACK TO SUB 4 CONNECTED.
DEFICIENCIES:

TESTED BY: E. PENLAND, S. FRY, K. HORST. C. KROUT

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/19/2023 AMBIENT TEMPERATURE °C HUMIDITY % EQPT. LOCATION TERTIARY BUILDING

SUBSTATION SUBSTATION 4 POSITION MCC-M

NAMEPLATE DATA

MANUFACTURER GOULD SERIAL NO. NA TYPE 3P3W

CATALOG NO. NA DRAWING NO. 84-64321 VOLTAGE CLASS 480

PHASE AMPACITY 1000 A WITHSTAND RATING NA KA CONDUCTOR ○ CU ◉ AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
BUS	SPARE	1329	1579	1790									
BUS	WRDP-1	837	893	953									
BUS	FASB-1	702	786	759									
BUS	EF-1/EF-2	1740	1842	1955									
BUS	MOD VALVE 9	1468	1305	1268									
BUS	LPM	492	507	554									
BUS	SEP-1	482	595	517									
BUS	S-6-2	1367	1620	1666									
BUS	FPP-C	2041	1943	2182									
BUS	S-6-1	1260	1576	1679									
BUS	EUH-1	1949	2173	2182									
BUS	EQ RECP.	1468	1757	1800									
BUS	GTWS-1-1	2367	2214	2305									
BUS	WATER HTR	1095	1229	1408									
BUS	E BLWR	577	666	650									
BUS	BWP-1	543	405	403									
BUS	ESESP	1359	1632	2332									
BUS	SEP-5	468	540	422									
BUS	FDSP-3	1500	1526	2676									
BUS	PP-2	909	909	886									
BUS	ATS	421	424	446									

COMMENTS:

DEFICIENCIES:

TESTED BY: E. PENLAND, S. FRY, K. HORST, C. KROUT

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/19/2023 | AMBIENT TEMPERATURE: 20 °C | HUMIDITY: 25 % | ASSET #:
SUBSTATION: SUBSTATION 4 | POSITION: MCC-M FEEDER

MANUFACTURER	GOULD	SN / SO NO.	53325E--24--02364	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	TYPE K	SENSOR TAPS	800	MOUNTING	(•) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	FB-1	ELECTRICALLY OPERATED	( ) YES (•) NO
TRIP UNIT TYPE	GOULD	TRIP UNIT CAT #	N/A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A			NA	MIN DELAY
SENSOR TAP	800	SHORT	☑	4	X	800	A =	3,200	A				MIN DELAY
		INST.	☑	10	X	800	A =	8,000	A		N/A	NA	
		GRD. FLT.	☐		X		=		A				

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A			NA	MIN DELAY
SENSOR TAP	800	SHORT	☑	4	-	3,200	A						MIN DELAY
		INST.	☑	10	-	8,000	A					NA	
		GRD. FLT.	☐										

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	2.67	100	NA	2.67 / 2.67	2.67 / 2.67	2.67 / 2.67	NA
Long Time Delay		8.01	300	8 - 12	8.9 / 8.9	9.01 / 9.01	8.61 / 8.61	NA
Short Time PU	4	10.7	100	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay		16	150	0.08 - 0.17	0.11 / 0.11	0.107 / 0.107	0.109 / 0.109	NA
Instant PU	10	10	10	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	NA	NA	0 - 0.05	0 / 0	0 / 0	0 / 0	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	20 °C	1

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000
POLE TO FRAME	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000
LINE TO LOAD	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
114.4	78.3	83.8

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. ICKES

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/20/2023 | AMBIENT TEMPERATURE: 22 °C | HUMIDITY: 16 % | EQPT. LOCATION: TERTIARY BUILDING
SUBSTATION: SUBSTATION 4 | POSITION: MCC-N

NAMEPLATE DATA

MANUFACTURER: GOULD | SERIAL NO.: NA | TYPE: 3P3W
CATALOG NO.: NA | DRAWING NO.: 84-64321 | VOLTAGE CLASS: 480
MAIN BUS RATING: 1000 A | MAIN BUS NEUTRAL RATING: NA A | CONDUCTOR: ○ CU ◉ AL
CURRENT WITHSTAND RATING: NA | NUMBER OF SECTIONS: 7 | LISTING: ☑ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER: 0 | MLO: 1 | TYPE: NA | AMPACITY: 1000 | MAIN DISCONNECT: 0 | FUSE TYPE: NA | SIZE: NA
TOTAL POSITIONS EQUIPPED: 21 | NO. OF SPARE SPACES: 0 | TOTAL POSITIONS USED: 21

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

TEST VOLTAGE: 1 KVDC | EQUIPMENT TEMPERATURE: 22 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 1.12

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
MCC-N	RDG.	2,190	2,030	2,520		3,260	4,320	3,640			
	20°C	2,452.8	2,273.6	2,822.4		3,651.2	4,838.4	4,076.8			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS: INSULATION RESISTANCE TESTED WITH CABLES BACK TO SUB 4 CONNECTED.
DEFICIENCIES: PEW PUMP NO. 3 AND SECONDARY EFFL. PUMP NO.6 ARE BOTH MISSING THE LINE SHIELD FOR THE MOLDED CASE SWITCHES. RECOMMEND REPLACING WITH GP-03 GLASTIC

TESTED BY: E. PENLAND, S. FRY, K. HORST, C. KROUT

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR
PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105
JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI
TELEPHONE:

DATE: 12/19/2023 AMBIENT TEMPERATURE: 22 °C HUMIDITY: 16 % EQPT. LOCATION: TERTIARY
SUBSTATION: SUBSTATION 4 POSITION: MCC-N

NAMEPLATE DATA

MANUFACTURER: GOULD SERIAL NO.: NA TYPE: 3P3W
CATALOG NO.: NA DRAWING NO.: 84-64321 VOLTAGE CLASS: 480
PHASE AMPACITY: 1000 A WITHSTAND RATING: NA KA CONDUCTOR: ○ CU ◉ AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
BUS	DE-CTAP	771	957	1058									
BUS	ROOF FAN 12	1268	1544	1853									
BUS	CP-70												
BUS	WRDP NO.2	1001	1088	1105									
BUS	FPP-B	1756	2708	9800									
BUS	MV-2,4,6,8	1451	1444	1354									
BUS	LP "N"	590	565	541									
BUS	SEP NO,2	606	618	583									
BUS	(E)S-2-2	1521	1421	1583									
BUS	EF-3,4,SF-1	1988	1984	2357									
BUS	(W) S-2-1	1633	1880	1721									
BUS	EQ RECEPT	1558	1642	1768									
BUS	EAST S-1-2	2025	2116	2484									
BUS	FCB1	915	996	1010									
BUS	RF-10	1274	1673	2053									
BUS	BWP NO.2	476	421	423									
BUS	RF-14	2027	2005	1776									
BUS	SEP NO.6	458	468	448									
BUS	FDSP NO.4	1410	1636	1879									
ATS	PP NO.3	331	313	293									
BUS	ATS	402	422	436									

COMMENTS:
DEFICIENCIES: PEW PUMP NO. 3 AND SECONDARY EFFL. PUMP NO.6 ARE MISSING THE LINE SHEILD FOR MOLDED CASE SWITCH. RECOMMEND REPLACING WITH GP-03 GLASTIC

TESTED BY: E. PENLAND, S. FRY, K. HORST, C. KROUT

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/20/2023 | AMBIENT TEMPERATURE: 20 °C | HUMIDITY: 25 % | ASSET #:
SUBSTATION: SUBSTATION 4 | POSITION: MCC-N FEEDER

MANUFACTURER	GOULD	SN / SO NO.	53325E--24--01364	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	TYPE K	SENSOR TAPS	800	MOUNTING	(•) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	FB-11	ELECTRICALLY OPERATED	( ) YES (•) NO
TRIP UNIT TYPE	GOULD	TRIP UNIT CAT #	N/A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A			NA	MIN DELAY
SENSOR TAP	800	SHORT	☑	4	X	800	A =	3,200	A				MIN DELAY
		INST.	☑	10	X	800	A =	8,000	A		N/A	NA	
		GRD. FLT.	☐		X		=		A				

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A			NA	MIN DELAY
SENSOR TAP	800	SHORT	☑	4	-	3,200	A						MIN DELAY
		INST.	☑	10	-	8,000	A					NA	
		GRD. FLT.	☐										

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	2.67	NA	NA	NA	2.7 / 2.7	2.7 / 2.7	2.7 / 2.7	NA
Long Time Delay		8.1	300	8 - 12	8.634 / 8.634	8.651 / 8.651	8.769 / 8.769	NA
Short Time PU	10.7	NA	NA	NA	10.7 / 10.7	10.7 / 10.7	10.7 / 10.7	NA
Short Time Delay		16	150	0.08-0.17	0.101 / 0.101	0.101 / 0.101	0.105 / 0.105	NA
Instant PU	10	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	NA	NA	0 - 0.05	0 / 0	0 / 0	0 / 0	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	20 °C	1

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000
POLE TO FRAME	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000
LINE TO LOAD	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
76.7	88.5	76.1

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: E. PENLAND

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/19/2023 | AMBIENT TEMPERATURE: 23 °C | HUMIDITY: 16 % | EQPT. LOCATION: TERTIARY BUILDING
SUBSTATION: SUBSTATION 4 | POSITION: MCC-P

NAMEPLATE DATA

MANUFACTURER: GOULD | SERIAL NO.: 84-64321 | TYPE: I-T-E MOTOR CONTROL
CATALOG NO.: NA | DRAWING NO.: NA | VOLTAGE CLASS: 600
MAIN BUS RATING: 600 A | MAIN BUS NEUTRAL RATING: NA A | CONDUCTOR: ○ CU ◉ AL
CURRENT WITHSTAND RATING: NA | NUMBER OF SECTIONS: 5 | LISTING: ☑ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER: 0 | MLO: 0 | TYPE: NA | AMPACITY: NA | MAIN DISCONNECT: 0 | FUSE TYPE: NA | SIZE: NA
TOTAL POSITIONS EQUIPPED: 20 | NO. OF SPARE SPACES: 2 | TOTAL POSITIONS USED: 19

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

TEST VOLTAGE: 1 KVDC | EQUIPMENT TEMPERATURE: 22 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 1.12

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - M-OHM									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
MCC-P	RDG.	1,545	1,782	1,656		2,215	2,980	3,560			
	20°C	1,730.4	1,995.84	1,854.72		2,480.8	3,337.6	3,987.2			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS: INSULATION RESISTANCE INCLUDES CABLES
DEFICIENCIES:

TESTED BY: C. KROUT, K.HORST

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR
PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105
JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI
TELEPHONE:

DATE: 12/19/2023 AMBIENT TEMPERATURE: 22 °C HUMIDITY: 16 % EQPT. LOCATION: TERTIARY BUILDING
SUBSTATION: SUBSTATION 4 POSITION: MCC-P

NAMEPLATE DATA

MANUFACTURER: GOULD SERIAL NO.: 84-64321 TYPE: I-T-E
CATALOG NO.: NA DRAWING NO.: NA VOLTAGE CLASS: 600
PHASE AMPACITY: 600 A WITHSTAND RATING: NA KA CONDUCTOR: ○ CU ◉ AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
MAIN LUGS	SPARE	649	1771	1288									
MAIN LUGS	WRDP NO.3	618	1201	1198									
MAIN LUGS	USP NO.1	1501	1590	1766									
MAIN LUGS	PP NO.1	734	491	448									
MAIN LUGS	FDSP NO.1	1535	1570	2716									
MAIN LUGS	SEP NO.3	548	625	528									
MAIN LUGS	ALT CUBE	2884	3140	3553									
MAIN LUGS	SE. IV B-2-1	1770	1787	1882									
MAIN LUGS	RV B-3-1	2220	2286	2491									
MAIN LUGS	FESP	1744	3130	2329									
MAIN LUGS	SPARE	2001	2078	2278									
MAIN LUGS	PS	2239	2722	2663									
MAIN LUGS	CP-70 NP	2194	2389	2123									
MAIN LUGS	HOIST	1556	1707	2013									
MAIN LUGS	CTIG S-16-1	2219	2125	2460									
MAIN LUGS	TEMP PUMPS	1210	1305	1462									
MAIN LUGS	TEMP POWR	1300	1388	1534									
MAIN LUGS	AIR COMP 1	1357	1655	1657									
MAIN LUGS	PP-UV-2	1429	1542	1444									

COMMENTS:
DEFICIENCIES:

TESTED BY: C. KROUT, K. HORST

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

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Brighton, MI 48116
317-879-0660

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ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/20/2023 | AMBIENT TEMPERATURE: 20 °C | HUMIDITY: 25 % | ASSET #:
SUBSTATION: SUBSTATION 4 | POSITION: MCC-P FEEDER

MANUFACTURER	GOULD	SN / SO NO.	53325F--26--04364	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	TYPE K	SENSOR TAPS	400	MOUNTING	(•) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	FB-12	ELECTRICALLY OPERATED	( ) YES (•) NO
TRIP UNIT TYPE	GOULD	TRIP UNIT CAT #	N/A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	400	LONG	☑	1	X	800	A =	800	A			NA	INT DELAY
SENSOR TAP	400	SHORT	☑	4	X	800	A =	3,200	A				INT DELAY
		INST.	☑	12	X	800	A =	9,600	A		N/A	NA	
		GRD. FLT.	☐		X		=		A				

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	400	LONG	☑	1	X	800	A =	800	A			NA	INT DELAY
SENSOR TAP	400	SHORT	☑	4	-	3,200	A						INT DELAY
		INST.	☑	12	-	9,600	A					NA	
		GRD. FLT.	☐										

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1.6	NA	NA	NA	1.4 / 1.4	1.4 / 1.4	1.4 / 1.4	NA
Long Time Delay		4.8	300	20-30	25.991 / 25.991	26.148 / 26.148	23.401 / 23.401	NA
Short Time PU	6.4	NA	NA	NA	6.6 / 6.6	6.6 / 6.6	6.6 / 6.6	NA
Short Time Delay		16	150	0.2-0.32	0.241 / 0.241	0.235 / 0.235	0.235 / 0.235	NA
Instant PU	12	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	NA	NA	0 - 0.05	0 / 0	0 / 0	0 / 0	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	20 °C	1

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000
POLE TO FRAME	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000
LINE TO LOAD	3,000,000	3,000,000	108,700	108,700	433,000	433,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
138.0	109.8	108.0

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: E. PENLAND

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

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ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/19/2023 | AMBIENT TEMPERATURE: 23 °C | HUMIDITY: 16 % | EQPT. LOCATION: TERTIARY BUILDING
SUBSTATION: SUBSTATION 4 | POSITION: MCC-Q

NAMEPLATE DATA

MANUFACTURER: GOULD | SERIAL NO.: 84-64321 | TYPE: I-T-E MOTOR CONTROL
CATALOG NO.: NA | DRAWING NO.: NA | VOLTAGE CLASS: 600
MAIN BUS RATING: 600 A | MAIN BUS NEUTRAL RATING: NA A | CONDUCTOR: ○ CU ◉ AL
CURRENT WITHSTAND RATING: NA | NUMBER OF SECTIONS: 5 | LISTING: ☑ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER: 0 | MLO: 0 | TYPE: NA | AMPACITY: NA | MAIN DISCONNECT: 0 | FUSE TYPE: NA | SIZE: NA
TOTAL POSITIONS EQUIPPED: 23 | NO. OF SPARE SPACES: 2 | TOTAL POSITIONS USED: 21

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

TEST VOLTAGE: 1 KVDC | EQUIPMENT TEMPERATURE: 23 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 1.18

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
MCC-Q	RDG.	1,584	1,623	2,450		1,965	4,300	4,640			
	20°C	1,869.12	1,915.14	2,891		2,318.7	5,074	5,475.2			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS: INSULATION RESISTANCE INCLUDES CABLES
DEFICIENCIES:

TESTED BY: C. KROUT, K. HORST

SWITCHBOARD BUS CONNECTION TEST

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CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/19/2023 AMBIENT TEMPERATURE 23 °C HUMIDITY 16 % EQPT. LOCATION TERTIARY BUILDING

SUBSTATION SUBSTATION 4 POSITION MCC-Q

NAMEPLATE DATA

MANUFACTURER GOULD SERIAL NO. 84-64321 TYPE I-T-E

CATALOG NO. NA DRAWING NO. NA VOLTAGE CLASS 600

PHASE AMPACITY 600 A WITHSTAND RATING NA KA CONDUCTOR ○ CU ◉ AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
MAIN LUGS	AIR COMP.2	1645	1695	2342									
MAIN LUGS	CE WET WEL	2848	1947	2675									
MAIN LUGS	E.CON.TANK	1343	1556	1790									
MAIN LUGS	W.CON.TANK	2065	2132	2395									
MAIN LUGS	FL.DR.SP.2	1727	1892	1977									
MAIN LUGS	SEC.EFF.P.4	473	569	471									
MAIN LUGS	SPARE	894	927	956									
MAIN LUGS	WASHRES.P4	1003	1126	1048									
MAIN LUGS	FPP-A	2224	2425	2774									
MAIN LUGS	M.VAL.1357	1882	1919	1849									
MAIN LUGS	UN.DR.SP2	1895	2116	2134									
MAIN LUGS	HEAT.BP	2670	1990	2605									
MAIN LUGS	AIRWASH.MV	1859	1919	2263									
MAIN LUGS	HV-2	1687	1598	1848									
MAIN LUGS	HOIST	2122	2264	2361									
MAIN LUGS	RF-11	1600	1949	2091									
MAIN LUGS	TEMPOWER	1221	1393	1545									
MAIN LUGS	LP-Q	1016	1052	1084									

COMMENTS: FLOOR DRAIN SUMP PUMP NO.2 BUCKET'S CONTACT RESISTANCE IS OUT OF SPECIFICATION. THIS PROBLEM WAS CORRECTED.

DEFICIENCIES:

TESTED BY: C. KROUT, K. HORST

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

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DATE: 12/19/2023 | AMBIENT TEMPERATURE: 20 °C | HUMIDITY: 25 % | ASSET #:
SUBSTATION: SUBSTATION 4 | POSITION: MCC-Q FEEDER

MANUFACTURER	GOULD	SN / SO NO.	53325E--26--01364	FRAME SIZE 800 AMPS 600	V
BREAKER TYPE	TYPE K	SENSOR TAPS	600	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	FB-2	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	ABB	TRIP UNIT CAT #	N/A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	600	LONG	☑	1	X	600	A =	600	A			NA	INT DELAY
SENSOR TAP	600	SHORT	☑	4	X	600	A =	2,400	A				INT DELAY
		INST.	☑	12	X	600	A =	7,200	A		N/A	NA	
		GRD. FLT.	☐		X		=		A				

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	600	LONG	☑	1	X	600	A =	600	A			NA	INT DELAY
SENSOR TAP	600	SHORT	☑	4	-	2,400	A						INT DELAY
		INST.	☑	12	-	7,200	A					NA	
		GRD. FLT.	☐										

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	2.4	100	NA	2.4 / 2.4	2.4 / 2.4	2.4 / 2.4	NA
Long Time Delay		7.2	300	20 - 30	25.2 / 25.2	21.2 / 21.2	22.91 / 22.91	NA
Short Time PU	4	9.6	100	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay		14.4	150	0.2 - 0.32	0.25 / 0.25	0.25 / 0.25	0.25 / 0.25	NA
Instant PU	12	12	100	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	12	100	0 - 0.05	0 / 0	0 / 0	0 / 0	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	20 °C	1

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000
POLE TO FRAME	1,860,000	1,860,000	1,936,000	1,936,000	2,030,000	2,030,000
LINE TO LOAD	3,000,000	3,000,000	3,000,000	3,000,000	78,200	78,200

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
116.0	140.0	132.0

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. ICKES

LOADBREAK DISCONNECT TEST

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Brighton, MI 48116
317-879-0660

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ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/19/2023 | AMBIENT TEMPERATURE: 20 °C | HUMIDITY: 25 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 4 | POSITION: PRIMARY SWITCH MAIN A

NAMEPLATE DATA

MANUFACTURER: SQUARE D | TYPE: HVL | SERIAL NO.: 17-30951271-019 | MFG DATE: 2014
RATED VOLTAGE: 15,000 | SYSTEM VOLTAGE: 13200 | AMPERES: 600 | INTERRUPTING RATING: 25 KA | B.I.L. RATING: 95 KV
TYPE OPERATING MECHANISM: MANUAL | MOMENTARY FAULT INTERUPTING: 40 KA | MOMENTARY FAULT CLOSING AMPS: 40 KA

FUSE DATA

MANUFACTURER: NA | TYPE: NA | HOLDER: NA | MAX. AMPS: NA
REFILL ELEMENT TYPE: NA | SIZE: NA | CAT. NO.: NA | TCC NO.: NA | VOLTAGE: NA KV

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTION	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
INTERLOCKS	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
Contacts	☑	GOOD	C/L
HEATERS	☐	NA	NA
OPERATING MECHANISM	☑	GOOD	C/L
HAZARD WARNING LABELS	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	20 °C	1

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	13,980,000	13,980,000	12,710,000	12,710,000	11,850,000	11,850,000
POLE TO FRAME	4,490,000	4,490,000	6,060,000	6,060,000	7,930,000	7,930,000
LINE TO LOAD	11,180,000	11,180,000	10,460,000	10,460,000	13,370,000	13,370,000

POLE RESISTANCE (µ©)			
	POLE 1	POLE 2	POLE 3
AS FOUND	55.2	53.2	47.5
AS LEFT	55.2	53.2	47.5

ARRESTERS TESTING (M©)			
TEST VOLTAGE KV / 1 MIN	PHASE A	PHASE B	PHASE C
5	220,000	5,210	197,400

DIELECTRIC WITHSTAND (mA)			
TEST VOLTAGE 27 KVAC	POLE 1	POLE 2	POLE 3
SWITCH CLOSED - POLE TO GND OTHER POLES GROUNDED	0.1	0.1	0.1

COMMENTS: PRIMARY CABLE INSULATION RESISTANCES: A-G - 204,000 MEGAOHMS; B-G - 196,600 MEGAOHMS; C-G - 249,000 MEGAOHMS;
A-B - 406,000 MEGAOHMS; B-C - 476,000 MEGAOHMS; C-A - 452,000 MEGAOHMS.
B PHASE ARRESTER READING IS LOWER THAN OTHER PHASES. MAY NEED A REPLACEMENT.

DEFICIENCIES:

TESTED BY: K. HORST, E. PENLAND

LOADBREAK DISCONNECT TEST

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Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/19/2023 AMBIENT TEMPERATURE 20 °C HUMIDITY 25 % EQPT. LOCATION

SUBSTATION SUBSTATION 4 POSITION PRIMARY SWITCH MAIN B

NAMEPLATE DATA

MANUFACTURER SQUARE D TYPE HVL SERIAL NO. 17-30951271-021 MFG DATE 2014

RATED VOLTAGE 15,000 SYSTEM VOLTAGE 13200 AMPERES 600 INTERRUPTING RATING 25 KA B.I.L. RATING 95 KV

TYPE OPERATING MECHANISM MANUAL MOMENTARY FAULT INTERUPTING 40 KA MOMENTARY FAULT CLOSING AMPS 40 KA

FUSE DATA

MANUFACTURER NA TYPE NA HOLDER NA MAX. AMPS NA

REFILL ELEMENT TYPE NA SIZE NA CAT. NO. NA TCC NO. NA VOLTAGE NA KV

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTION	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
INTERLOCKS	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
Contacts	☑	GOOD	C/L
HEATERS	☐	NA	NA
OPERATING MECHANISM	☑	GOOD	C/L
HAZARD WARNING LABELS	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	20 °C	1

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	6,860,000	6,860,000	4,300,000	4,300,000	5,570,000	5,570,000
POLE TO FRAME	1,593,000	1,593,000	1,677,000	1,677,000	1,563,000	1,563,000
LINE TO LOAD	10,500,000	10,500,000	7,120,000	7,120,000	7,580,000	7,580,000

POLE RESISTANCE (µ©)			
	POLE 1	POLE 2	POLE 3
AS FOUND	51.0	54.0	49.0
AS LEFT	51.0	54.0	49.0

ARRESTERS TESTING (M©)			
TEST VOLTAGE KV / 1 MIN	PHASE A	PHASE B	PHASE C
5	5,390	195,300	138,800

DIELECTRIC WITHSTAND (mA)			
TEST VOLTAGE 27 KVAC	POLE 1	POLE 2	POLE 3
SWITCH CLOSED - POLE TO GND OTHER POLES GROUNDED	0.1	0.1	0.1

COMMENTS: PRIMARY CABLE INSULATION RESISTANCES: A-G - 211,000 MEGAOHMS; B-G - 201,000 MEGAOHMS; C-G - 208,000 MEGAOHMS;
A-B - 437,000 MEGAOHMS; B-C - 436,000 MEGAOHMS; C-A - 455,000 MEGAOHMS.
A PHASE ARRESTER READING IS LOWER THAN OTHER PHASES. MAY NEED A REPLACEMENT.

DEFICIENCIES:

TESTED BY: K. HORST, S. FRY

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

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Brighton, MI 48116
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CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/19/2023 | AMBIENT TEMPERATURE: 20 °C | HUMIDITY: 25 % | ASSET #:
SUBSTATION: SUBSTATION 4 | POSITION: TB-US 46 FEEDER

MANUFACTURER	GOULD	SN / SO NO.	53325F--26--03364	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	TYPE K	SENSOR TAPS	400	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	FB-5	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	GOULD	TRIP UNIT CAT #	N/A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	400	LONG	☑	1	X	400	A =	400	A			NA	MIN DELAY
SENSOR TAP	400	SHORT	☑	4	X	400	A =	1,600	A				MIN DELAY
		INST.	☑	12	X	400	A =	4,800	A		N/A	NA	
		GRD. FLT.	☐		X		=		A				

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	400	LONG	☑	1	X	400	A =	400	A			NA	MIN DELAY
SENSOR TAP	400	SHORT	☑	4	-	1,600	A						MIN DELAY
		INST.	☑	12	-	4,800	A					NA	
		GRD. FLT.	☐										

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	1.6	100	1.4 - 1.8	1.6 / 1.6	1.6 / 1.6	1.6 / 1.6	NA
Long Time Delay		4.8	300	8 - 12	10.169 / 10.169	9.971 / 9.971	10.171 / 10.171	NA
Short Time PU	4	6.4	100	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay		9.6	300	0.8 - 0.17	0.107 / 0.107	0.106 / 0.106	0.101 / 0.101	NA
Instant PU	12	12	100	NA	12 / 12	12 / 12	12 / 12	NA
Instant Delay	N/A	12	100	0 - 0.05	0 / 0	0 / 0	0 / 0	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	20 °C	1

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000
POLE TO FRAME	2,510,000	2,510,000	2,760,000	2,760,000	3,000,000	3,000,000
LINE TO LOAD	1,494,000	1,494,000	121,300	121,300	3,000,000	3,000,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
172.5	174.7	127.0

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/19/2023 | AMBIENT TEMPERATURE: 20 °C | HUMIDITY: 25 % | ASSET #:
SUBSTATION: SUBSTATION 4 | POSITION: TIE

MANUFACTURER	GOULD	SN / SO NO.	53325F--18-02364	FRAME SIZE 1,600 AMPS 600 V	
BREAKER TYPE	TYPE K	SENSOR TAPS	1000	MOUNTING	○ D.O. ○ B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	TB1	ELECTRICALLY OPERATED	◉ YES ○ NO
TRIP UNIT TYPE	GOULD ITE	TRIP UNIT CAT #	SS-5	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	1,000	LONG	☑	1	X	1,000	A	=	1,000	A		NA	INT DELAY
SENSOR TAP	1,000	SHORT	☑	2	X	1,000	A	=	2,000	A			INT DELAY
		INST.	☐		X			=		A			
		GRD. FLT.	☐		X			=		A			

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	1,000	LONG	☑	1	X	1,000	A	=	1,000	A		NA	INT DELAY
SENSOR TAP	1,000	SHORT	☑	2	-	2,000	A						INT DELAY
		INST.	☐										
		GRD. FLT.	☐										

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	1.25	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay		3	NA	20 - 30	26.2 / 26.2	22.3 / 22.3	24.5 / 24.5	NA
Short Time PU	2	2	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay		3	NA	0.2 - 0.32	0.23 / 0.23	0.23 / 0.23	0.23 / 0.23	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	20 °C	1

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,140,000	2,140,000	3,000,000	3,000,000	3,000,000	3,000,000
POLE TO FRAME	1,473,000	1,473,000	1,602,000	1,602,000	1,177,000	1,177,000
LINE TO LOAD	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
122.0	144.0	139.0

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/20/2023 | AMBIENT TEMPERATURE: 20 °C | HUMIDITY: 25 % | ASSET #:
SUBSTATION: SUBSTATION 4 | POSITION: UV-2A FEEDER

MANUFACTURER	SQUARE D	SN / SO NO.	6WSJ0134769	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	MP08H1	SENSOR TAPS	400	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	NA	CUBICLE CODE	FB-8	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	AC-PRO-MP	TRIP UNIT CAT #	61491000C7	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	400	LONG	☑	0.5	X	400	A =	200	A	120	NA	
SENSOR TAP	400	SHORT	☑	3	X	400	A =	1,200	A	0.3	OFF	
		INST.	☐		X		=		A			
		GRD. FLT.	☐		X		=		A			

SETTINGS AS LEFT		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	400	LONG	☑	0.5	X	400	A =	200	A	120	NA	
SENSOR TAP	400	SHORT	☑	3	-	1,200	A			0.3	OFF	
		INST.	☐									
		GRD. FLT.	☐									

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.5	200	100	+ OR - 10%	210 / 210	218 / 218	215 / 215	NA
Long Time Delay	120	600	300	20 - 30	25.13 / 25.13	24.87 / 24.87	21.74 / 21.74	NA
Short Time PU	3	1200	100	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.3	1800	150	0.25-0.37	0.32 / 0.32	0.3 / 0.3	0.28 / 0.28	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	20 °C	1

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000
POLE TO FRAME	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000
LINE TO LOAD	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
20.9	21.7	17.8

COUNTER END: N/A

COMMENTS: UNABLE TO SECONDARY INJECT. MAY REQUIRE PRIMARY INJECTION TO TEST TRIP UNIT.
BREAKER WAS PRIMARY INJECTED

DEFICIENCIES:

TESTED BY: E. PENLAND

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/20/2023 | AMBIENT TEMPERATURE: 20 °C | HUMIDITY: 25 % | ASSET #:
SUBSTATION: SUBSTATION 4 | POSITION: UV-2B FEEDER

MANUFACTURER	SQUARE D	SN / SO NO.	5WSJ0138295	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	MP08H1	SENSOR TAPS	400	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	NA	CUBICLE CODE	FB-7	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	AC-PRO-MP	TRIP UNIT CAT #	5188000030	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	400	LONG	☑	0.5	X	400	A =	200	A	120	NA	
SENSOR TAP	400	SHORT	☑	3	X	400	A =	1,200	A	0.3	OFF	
		INST.	☐		X		=		A			
		GRD. FLT.	☐		X		=		A			

SETTINGS AS LEFT		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	400	LONG	☑	0.5	X	400	A =	200	A	120	NA	
SENSOR TAP	400	SHORT	☑	3	-	1,200	A			0.3	OFF	
		INST.	☐									
		GRD. FLT.	☐									

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.5	200	100	NA	220 / 220	215 / 215	220 / 220	NA
Long Time Delay	120	600	300	20 - 30	21.05 / 21.05	22.65 / 22.65	21.31 / 21.31	NA
Short Time PU	3	1200	100	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.3	1800	150	0.25-0.37	0.28 / 0.28	0.27 / 0.27	0.28 / 0.28	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	20 °C	1

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000
POLE TO FRAME	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000
LINE TO LOAD	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
17.0	17.0	16.0

COUNTER END: N/A

COMMENTS: UNABLE TO SECONDARY INJECT. MAY REQUIRE PRIMARY INJECTION TO TEST TRIP UNIT.
BREAKER WAS PRIMARY INJECTED

DEFICIENCIES:

TESTED BY: E. PENLAND

TRANSFORMER MAINTENANCE AND INSPECTION

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/19/2023 | AMBIENT TEMPERATURE: 20 °C | HUMIDITY: 25 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 4 | POSITION: XFMR 1

NAMEPLATE DATA

MANUFACTURER: SQUARE D | YR MFR: 2014 | SERIAL NO.: 30951271-022-02
IMPEDANCE: 5.77 % | NUMBER OF FANS: 0 | WEIGHT: 7000 LBS | TYPE: VPI | CLASS: AA / /
KVA: 750 / / | WINDING MATERIAL: COPPER | TEMPERATURE RISE: 115 °C | B.I.L. RATING: 10 / 95
PRIMARY V: 13,200 | DELTA | MFR LOCATION: BLAND, VA
SECONDARY V: 480 / 277.12 | WYE | ☑ EXPOSED NEUTRAL - X0 | TANK TYPE: VENTED
TAP VOLTAGES: 13,860 | 13,530 | 13,200 | 12,870 | 12,540 | INSULATING MATERIAL: PAPER
TAP POSITION: E-F | D-F | E-G | D-G | C-G | WINDING INSUATING SYSTEM: OPEN-WOUND
TAP SETTING: E-G 13,200 V | ☑ HIGH SIDE TAP | ☐ LOW SIDE TAP

VISUAL AND MECHANICAL INSPECTION

	Description	NOTES
☑	REASON FOR INSPECTION	ROUTINE
☑	CHECK FOR SIGNS OF OVERHEATING, DISCOLORATION	GOOD
☑	ENCLOSURE (OPENINGS, COVERS, PAINT, ETC)	GOOD
☑	CHECK ALL CONNECTIONS TIGHT	GOOD
☑	IMPROPER TERMINATIONS	GOOD
☑	EQUIPMENT GROUND/GROUND BAR	GOOD
☑	CORE GROUND	GOOD
☑	NEUTRAL BAR	GOOD
☑	PRIMARY SIDE (CABLE OR BUSS)	GOOD

	Description	NOTES
☑	SECONDARY SIDE (CABLE OR BUSS)	GOOD
☑	CLEAN AND INSPECT INSULATORS, SUPPORTS, AND BARRIERS	GOOD
☑	CLEAN CORE, COIL, AND ENCLOSURE (INTERIOR/EXTERIOR)	GOOD
☑	CORE AND COIL BRACING	GOOD
☑	VIBRATION ISOLATATION PADS	GOOD
☑	PROPER CLEARANCE (36 INCHES UNOBSTRUCTED)	GOOD
☐	CONTROL WIRING	NA
☐	COOLING FANS	NA
☐	ALARMS AND INDICATORS	NA

ELECTRICAL TESTS

INSULATION RESISTANCE (Mohm)

MINUTES	PRIMARY TO GROUND	SECONDARY TO GROUND	PRIMARY TO SECONDARY
Test kV	5	1	5
0.50	1,155,000	48,200	412,000
1.00	1,449,000	65,800	954,000
10.00	4,820,000	115,400	3,460,000
P. I. (10min/1min)	3.33	1.75	3.63

WINDING RESISTANCE TEST (mohm)

APPARATUS TEMP. (°C)	20	TEST AMPS	5

H3-H1		H1-H2		H2-H3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
1,789.40	1,824.56	1,786.10	1,821.19	1,804.60	1,840.05
X0-X1		X0-X2		X0-X3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
0.923	0.942	0.897	0.915	0.875	0.893

TRANSFORMER TURN RATIO TEST

TAP	CALC	PHASE A	PHASE B	PHASE C
E-G	47.633	47.715	47.720	47.720
% ERROR		0.173%	0.183%	0.183%

EXTERNAL DOCUMENTS ATTACHED TO REPORT

COMMENTS: EXCITATION CURRENT A - 1.0 MILLIAMPS; B- 0.9 MILLIAMPS; C - 1.0 MILLAMPS.
NEUTRAL BAR IS CONNECTED DIRECTLY TO GROUND AND CONNECTED TO A HIGH RESISTANCE GROUND EFFECTIVELY BYPASSING THE HIGH RESISTANCE GROUND.

TESTED BY: E. PENLAND, S. FRY

TRANSFORMER MAINTENANCE AND INSPECTION

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/20/2023 | AMBIENT TEMPERATURE: 20 °C | HUMIDITY: 25 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 4 | POSITION: XFMR 2

NAMEPLATE DATA

MANUFACTURER: SQUARE D | YR MFR: 2014 | SERIAL NO.: 30951271-022-01
IMPEDANCE: 5.77 % | NUMBER OF FANS: 0 | WEIGHT: 7000 LBS | TYPE: VPI | CLASS: AA / /
KVA: 750 / / | WINDING MATERIAL: COPPER | TEMPERATURE RISE: 115 °C | B.I.L. RATING: 10 / 95
PRIMARY V: 13,200 | DELTA | MFR LOCATION: BLAND, VA
SECONDARY V: 480 / 277.12 | WYE | ☑ EXPOSED NEUTRAL - X0 | TANK TYPE: VENTED
TAP VOLTAGES: 13,860 | 13,530 | 13,200 | 12,870 | 12,540 | INSULATING MATERIAL: PAPER
TAP POSITION: E-F | D-F | E-G | D-G | C-G | WINDING INSUATING SYSTEM: OPEN-WOUND
TAP SETTING: E-G 13,200 V | ☑ HIGH SIDE TAP | ☐ LOW SIDE TAP

VISUAL AND MECHANICAL INSPECTION

	Description	NOTES
☑	REASON FOR INSPECTION	ROUTINE
☑	CHECK FOR SIGNS OF OVERHEATING, DISCOLORATION	GOOD
☑	ENCLOSURE (OPENINGS, COVERS, PAINT, ETC)	GOOD
☑	CHECK ALL CONNECTIONS TIGHT	GOOD
☑	IMPROPER TERMINATIONS	GOOD
☑	EQUIPMENT GROUND/GROUND BAR	GOOD
☑	CORE GROUND	GOOD
☑	NEUTRAL BAR	SEE COMMENTS
☑	PRIMARY SIDE (CABLE OR BUSS)	GOOD

	Description	NOTES
☑	SECONDARY SIDE (CABLE OR BUSS)	GOOD
☑	CLEAN AND INSPECT INSULATORS, SUPPORTS, AND BARRIERS	GOOD
☑	CLEAN CORE, COIL, AND ENCLOSURE (INTERIOR/EXTERIOR)	GOOD
☑	CORE AND COIL BRACING	GOOD
☑	VIBRATION ISOLATATION PADS	GOOD
☑	PROPER CLEARANCE (36 INCHES UNOBSTRUCTED)	GOOD
☐	CONTROL WIRING	NA
☐	COOLING FANS	NA
☐	ALARMS AND INDICATORS	NA

ELECTRICAL TESTS

INSULATION RESISTANCE (Mohm)

MINUTES	PRIMARY TO GROUND	SECONDARY TO GROUND	PRIMARY TO SECONDARY
Test kV	5	1	5
0.50	600,000	50,900	610,000
1.00	844,000	68,700	792,000
10.00	2,460,000	132,300	2,330,000
P. I. (10min/1min)	2.92	1.93	2.94

NEUTRAL GROUNDING RESISTOR

NAMEPLATE VALUE	READING (ohm)
61.000	64.800

WINDING RESISTANCE TEST (mohm)

APPARATUS TEMP. (°C)	20	TEST AMPS	5

H3-H1		H1-H2		H2-H3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
1,783.40	1,818.44	1,790.20	1,825.37	1,792.60	1,827.82
X0-X1		X0-X2		X0-X3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
0.938	0.956	0.924	0.943	0.878	0.896

TRANSFORMER TURN RATIO TEST

TAP	CALC	PHASE A	PHASE B	PHASE C
E-G	47.633	47.680	47.680	47.680
% ERROR		0.099%	0.099%	0.099%

EXTERNAL DOCUMENTS ATTACHED TO REPORT

COMMENTS: NEUTRAL BAR IS CONNECTED DIRECTLY TO GROUND AND CONNECTED TO A HIGH RESISTANCE GROUND EFFECTIVELY BYPASSING THE HIGH RESISTANCE GROUND.
EXCITATION CURRENT A - 0.6 MILLIAMPS; B- 0.5 MILLIAMPS; C - 0.6 MILLAMPS.

TESTED BY: E. PENLAND, S. FRY

SWITCHGEAR INSPECTION AND TEST REPORT

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/15/2023 AMBIENT TEMPERATURE 22 °C HUMIDITY 21 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION 480V SWITCHGEAR BUS A

SWITCHGEAR NAMEPLATE

MANUFACTURER CUTLER-HAMMER TYPE SN / SO NO. 96Y7929 MFG DATE 11/2009

STYLE / CAT # / BUILD NUMBER 272P085H01 SYSTEM VOLTAGE 480 RATED VOLTAGE 480 SERVICE 3 WIRE

BUS AMPACITIES 4000 OVERCURRENT DEVICE TYPE/CAT. DIGITRIP 520/5LSIG INTERRUPT RATINGS 85kA

NEUTRAL NA Other NA

INSPECTION CHECKLIST / REMARKS

☑ REASON FOR INSPECTION	ROUTINE
☑ CLEAN SWITCHGEAR, CUBICLES, BUS, AND INSULATORS	NA
☑ OVERHEATING (CHECK FOR HOT SURFACES, DISCOLORATION)	NA
☑ CHECK FOR UNUSED OPENINGS	NA
☑ CHECK ELECTRICAL CONNECTIONS	NA
☑ VENTS AND FILTER	NA
☑ PROPER CLEARANCE	NA
☑ PANEL ID AND ARC FLASH WARNING (PANEL LABEL)	NA
☑ INDICATING LIGHTS	NA
☑ INTERLOCKS	NA
☐ HEATERS	NA
☑ PANEL SCREWS (MISSING, STRIPPED, ETC)	NA
☑ BARRIER BOARDS AND SHUTTER OPERATION	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
500 V	22 °C	1.1

INSULATION RESISTANCE	POLE 1 (M-OHM) (P1-P2)		POLE 2 (M-OHM) (P2-P3)		POLE 3 (M-OHM) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	537,000	590,700	549,000	603,900	694,000	763,400
POLE TO FRAME	360,000	396,000	222,000	244,200	311,000	342,100
LINE TO LOAD						

DIELECTRIC WITHSTAND (mA)			
TEST VOLTAGE _____KV			
Phase #1	Phase #2	Phase #3	Neutral
N/A	N/A	N/A	N/A

BUS BAR RESISTANCE (µ-OHM)				
Ground	NEUTRAL	Phase #1	Phase #2	Phase #3
N/A	N/A	68.4	58.9	72.2

CONTROL POWER XFMR	INSULATION RESISTANCE (M-OHM)			TURNS RATIO	
	HIGH TO LOW	HIGH TO GND	LOW TO GND		
	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) .5	CALCULATED RATIO 4	
	236,000	375,000	269,000	PHASE A	3.894
				PHASE B	
				PHASE C	

COMMENTS:

DEFICIENCIES:

TESTED BY: S. FRY, K. ICKES

SWITCHGEAR INSPECTION AND TEST REPORT

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/14/2023 AMBIENT TEMPERATURE 22 °C HUMIDITY 21 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION 480V SWITCHGEAR BUS B

SWITCHGEAR NAMEPLATE

MANUFACTURER CUTLER-HAMMER TYPE SN / SO NO. 96Y7929 MFG DATE 11/2009

STYLE / CAT # / BUILD NUMBER 272P085H01 SYSTEM VOLTAGE 480 RATED VOLTAGE 600 SERVICE 3 WIRE

BUS AMPACITIES 4000 OVERCURRENT DEVICE TYPE/CAT. DIGITRIP 520/5LSIG INTERRUPT RATINGS 85kA

NEUTRAL NA Other NA

INSPECTION CHECKLIST / REMARKS

☑ REASON FOR INSPECTION	ROUTINE
☑ CLEAN SWITCHGEAR, CUBICLES, BUS, AND INSULATORS	NA
☑ OVERHEATING (CHECK FOR HOT SURFACES, DISCOLORATION)	NA
☑ CHECK FOR UNUSED OPENINGS	NA
☑ CHECK ELECTRICAL CONNECTIONS	NA
☑ VENTS AND FILTER	NA
☑ PROPER CLEARANCE	NA
☑ PANEL ID AND ARC FLASH WARNING (PANEL LABEL)	NA
☑ INDICATING LIGHTS	NA
☑ INTERLOCKS	NA
☐ HEATERS	NA
☑ PANEL SCREWS (MISSING, STRIPPED, ETC)	NA
☑ BARRIER BOARDS AND SHUTTER OPERATION	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
500 V	22 °C	1.1

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	267,000	293,700	201,000	221,100	401,000	441,100
POLE TO FRAME	330,000	363,000	69,600	76,560	155,900	171,490
LINE TO LOAD						

DIELECTRIC WITHSTAND (mA)			
TEST VOLTAGE _____KV			
Phase #1	Phase #2	Phase #3	Neutral
N/A	N/A	N/A	N/A

BUS BAR RESISTANCE (µ-OHM)				
Ground	NEUTRAL	Phase #1	Phase #2	Phase #3
N/A	N/A	56.6	48.7	50.4

CONTROL POWER XFMR	INSULATION RESISTANCE (M-OMH)			TURNS RATIO	
	HIGH TO LOW	HIGH TO GND	LOW TO GND		
	TEST VOLTAGE (KV)	TEST VOLTAGE (KV)	TEST VOLTAGE (KV)	CALCULATED RATIO	
				PHASE A	
				PHASE B	
				PHASE C	

COMMENTS:

DEFICIENCIES:

TESTED BY: S. FRY, K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/15/2023 | AMBIENT TEMPERATURE: 21 °C | HUMIDITY: 16 % | ASSET #:
SUBSTATION: SUBSTATION 5 | POSITION: CFG-1 FEEDER

MANUFACTURER	EATON	SN / SO NO.	001 003	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	600	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	F4C	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	DIGITRIP 520	TRIP UNIT CAT #	5LSIG	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	600	LONG	☑	1	X	600	A =	600	A		4	NA	
SENSOR TAP	600	SHORT	☑	6	X	600	A =	3,600	A		0.2	OFF	
		INST.	☑	8	X	600	A =	4,800	A		N/A	NA	
		GRD. FLT.	☑	0.35	X	600	A =	210	A		0.2	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	600	LONG	☑	1	X	600	A =	600	A		4	NA	
SENSOR TAP	600	SHORT	☑	6	-	3,600	A				0.2	OFF	
		INST.	☑	8	-	4,800	A					NA	
		GRD. FLT.	☑	0.35	-	210	A				0.2	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	4	NA	NA	NA	11.2 / 11.2	12 / 12	10.8 / 10.8	NA
Short Time PU	6	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	NA	NA	NA	0.15 / 0.15	0.15 / 0.15	0.15 / 0.15	NA
Instant PU	8	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	NA	NA	NA	0.05 / 0.05	0.05 / 0.05	0.05 / 0.05	NA
GRD Fault PU	0.35	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	NA	NA	NA	0.2 / 0.2	0.2 / 0.2	0.2 / 0.2	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	21 °C	1.05

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000
POLE TO FRAME	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000
LINE TO LOAD	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
18.3	16.8	18.9

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/14/2023 | AMBIENT TEMPERATURE: 22 °C | HUMIDITY: 21 % | ASSET #:
SUBSTATION: SUBSTATION 5 | POSITION: CFG-2 FEEDER

MANUFACTURER	EATON	SN / SO NO.	001 008	FRAME SIZE 800 AMPS 635 V	
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	600	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	NA	CUBICLE CODE	F6C	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	DIGITRIP 520	TRIP UNIT CAT #	5LSIG	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☐	NA	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	600	LONG	☑	1	X	600	A =	600	A	4	NA	
SENSOR TAP	600	SHORT	☑	6	X	600	A =	3,600	A	0.2	OFF	
		INST.	☑	8	X	600	A =	4,800	A	N/A	NA	
		GRD. FLT.	☑	0.35	X	600	A =	210	A	0.2	OFF	

SETTINGS AS LEFT		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	600	A =	600	A	4	NA	
SENSOR TAP	800	SHORT	☑	6	-	3,600	A			0.2	OFF	
		INST.	☑	8	-	4,800	A				NA	
		GRD. FLT.	☑	0.35	-	210	A			0.2	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	5	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	4	15	300	11.2-16	NA / NA	NA / NA	NA / NA	NA
Short Time PU	30	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	45	150	0.15-0.24	NA / NA	NA / NA	NA / NA	NA
Instant PU	8	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	44	110	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault PU	1.75	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	2.625	150	0.15-0.25	NA / NA	NA / NA	NA / NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	22 °C	1.1

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000
POLE TO FRAME	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000
LINE TO LOAD	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
17.8	19.2	17.8

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: E. PENLAND

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/14/2023 | AMBIENT TEMPERATURE: 22 °C | HUMIDITY: 21 % | ASSET #:
SUBSTATION: SUBSTATION 5 | POSITION: FEEDER CFG-3

MANUFACTURER	EATON	SN / SO NO.	001-009	FRAME SIZE 800 AMPS 60 V	
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	600	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	F7C	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	DIGITRIP 520	TRIP UNIT CAT #	5LSIG	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	DIRTY	C
AUXILIARY DEVICES	☐	NA	NA
GROUND CONNECTION	☑	GOOD	NA
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	600	LONG	☑	1	X	600	A =	600	A		4	NA	
SENSOR TAP	600	SHORT	☑	6	X	600	A =	3,600	A		0.2	OFF	
		INST.	☑	8	X	600	A =	4,800	A		N/A	NA	
		GRD. FLT.	☑	0.35	X	600	A =	210	A		0.2	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	600	LONG	☑	1	X	600	A =	600	A		4	NA	
SENSOR TAP	600	SHORT	☑	6	-	3,600	A				0.2	OFF	
		INST.	☑	8	-	4,800	A					NA	
		GRD. FLT.	☑	0.35	-	210	A				0.2	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	4	NA	NA	11.2 - 16	12.3 / 12.3	11.9 / 11.9	12 / 12	NA
Short Time PU	6	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	NA	NA	NA	0.15 / 0.15	0.15 / 0.15	0.15 / 0.15	NA
Instant PU	8	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	NA	NA	NA	0.05 / 0.05	0.05 / 0.05	0.05 / 0.05	NA
GRD Fault PU	0.35	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	NA	NA	NA	0.3 / 0.3	0.3 / 0.3	0.3 / 0.3	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
500 V	22 °C	1.1

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000
POLE TO FRAME	2,370,000	2,607,000	3,000,000	3,300,000	2,720,000	2,992,000
LINE TO LOAD	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
18.6	20.3	20.1

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/15/2023 | AMBIENT TEMPERATURE: °C | HUMIDITY: % | ASSET #:
SUBSTATION: SUBSTATION 5 | POSITION: FEEDER F2H SPARE

MANUFACTURER	EATON	SN / SO NO.	001 008	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	800	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	F2H	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	DIGITRIP 520	TRIP UNIT CAT #	5LSIG	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A		4	NA	
SENSOR TAP	800	SHORT	☑	4	X	800	A =	3,200	A		0.2		
		INST.	☑	10	X	800	A =	8,000	A		N/A	NA	
		GRD. FLT.	☑	0.35	X	800	A =	280	A		0.2		

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A		4	NA	
SENSOR TAP	800	SHORT	☑	4	-	3,200	A				0.2		
		INST.	☑	10	-	8,000	A					NA	
		GRD. FLT.	☑	0.35	-	280	A				0.2		

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time PU	4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant PU	10	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault PU	0.35	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	21 °C	1.05

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000
POLE TO FRAME	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000
LINE TO LOAD	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
255.0	254.0	289.0

COUNTER END: NA

COMMENTS:
DEFICIENCIES: TRIP UNIT FAILED. RECOMMEND REPLACING TRIP UNIT

TESTED BY: K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/15/2023 | AMBIENT TEMPERATURE: 21 °C | HUMIDITY: 16 % | ASSET #:
SUBSTATION: SUBSTATION 5 | POSITION: FEEDER F5A SPARE

MANUFACTURER	EATON	SN / SO NO.	001 003	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	800	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	F5A	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	DIGITRIP 520	TRIP UNIT CAT #	5LSIG	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A		4	NA	
SENSOR TAP	800	SHORT	☑	6	X	800	A =	4,800	A		0.2	OFF	
		INST.	☑	10	X	800	A =	8,000	A		N/A	NA	
		GRD. FLT.	☑	0.35	X	800	A =	280	A		0.2		

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	600	LONG	☑	1	X	800	A =	800	A		4	NA	
SENSOR TAP	600	SHORT	☑	6	-	4,800	A				0.2	OFF	
		INST.	☑	10	-	8,000	A					NA	
		GRD. FLT.	☑	0.35	-	280	A				0.2		

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	4.2 / 4.2	4.2 / 4.2	4.2 / 4.2	NA
Long Time Delay	4	NA	NA	NA	11.7 / 11.7	10.9 / 10.9	10.2 / 10.2	NA
Short Time PU	6	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	NA	NA	NA	0.15 / 0.15	0.15 / 0.15	0.15 / 0.15	NA
Instant PU	10	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	NA	A	NA	0.05 / 0.05	0.05 / 0.05	0.05 / 0.05	NA
GRD Fault PU	0.35	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	NA	NA	NA	0.2 / 0.2	0.2 / 0.2	0.2 / 0.2	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	21 °C	1.05

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000
POLE TO FRAME	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000
LINE TO LOAD	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
31.0	30.0	28.0

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/14/2023 | AMBIENT TEMPERATURE: 22 °C | HUMIDITY: 21 % | ASSET #:
SUBSTATION: SUBSTATION 5 | POSITION: FEEDER F8D SPARE

MANUFACTURER	EATON	SN / SO NO.	001-004	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	800	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	N/A	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	DIGITRIP 520	TRIP UNIT CAT #	5LSIG	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	DIRTY	C
AUXILIARY DEVICES	☐	NA	NA
GROUND CONNECTION	☑	GOOD	NA
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A		15	NA	
SENSOR TAP	800	SHORT	☑	8	X	800	A =	6,400	A		0.2	OFF	
		INST.	☑	10	X	800	A =	8,000	A		N/A	NA	
		GRD. FLT.	☑	0.2	X	800	A =	160	A		0.35	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A		15	NA	
SENSOR TAP	800	SHORT	☑	8	-	6,400	A				0.2	OFF	
		INST.	☑	10	-	8,000	A					NA	
		GRD. FLT.	☑	0.2	-	160	A				0.35	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	15	NA	NA	NA	42.3 / 42.3	44.5 / 44.5	44.1 / 44.1	NA
Short Time PU	8	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	NA	NA	NA	0.15 / 0.15	0.15 / 0.15	0.15 / 0.15	NA
Instant PU	10	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	NA	NA	NA	0.04 / 0.04	0.04 / 0.04	0.04 / 0.04	NA
GRD Fault PU	0.2	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.35	NA	NA	NA	0.3 / 0.3	0.4 / 0.4	0.4 / 0.4	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	22 °C	1.1

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000
POLE TO FRAME	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000
LINE TO LOAD	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
24.0	34.0	26.0

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/15/2023 | AMBIENT TEMPERATURE: 21 °C | HUMIDITY: 16 % | ASSET #:
SUBSTATION: SUBSTATION 5 | POSITION: MAIN A

MANUFACTURER	EATON	SN / SO NO.	001 001	FRAME SIZE 4,000 AMPS 600 V	
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	4000	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	M2C	ELECTRICALLY OPERATED	(●) YES ( ) NO
TRIP UNIT TYPE	DIGITRIP 520	TRIP UNIT CAT #	5LSIG	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C
LOADING AND ARCING CONTACTS	☑	GOOD	C/L
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	4,000	LONG	☑	0.8	X	4,000	A =	3,200	A		4	NA	
SENSOR TAP	4,000	SHORT	☑	12	X	3,200	A =	38,400	A		0.3	OFF	
		INST.	☐		X		=		A				
		GRD. FLT.	☑	0.3	X	4,000	A =	1,200	A		0.4	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	4,000	LONG	☑	1	X	4,000	A =	4,000	A		4	NA	
SENSOR TAP	4,000	SHORT	☑	12	-	38,400	A				0.3	OFF	
		INST.	☐										
		GRD. FLT.	☑	0.3	-	1,200	A				0.4	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.8	NA	NA	NA	4 / 4	4 / 4	4 / 4	NA
Long Time Delay	4	NA	NA	11.2 - 16	11.2 / 11.2	11.4 / 11.4	11.9 / 11.9	NA
Short Time PU	12	12	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.3	NA	NA	0.24 - 0.34	0.26 / 0.26	0.26 / 0.26	0.26 / 0.26	NA
GRD Fault PU	0.3	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.4	NA	NA	NA	0.1 / 0.1	0.1 / 0.1	0.1 / 0.1	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	21 °C	1.05

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000
POLE TO FRAME	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000
LINE TO LOAD	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
17.0	18.0	18.0

COUNTER END: NA

COMMENTS:
BREAKER IS A DOUBLE WIDE. LISTED BELOW IS OTHER PHASES INSULATION RESISTANCE.
L - L : A - 3,000,000 , B - 3,000,000 , C - 3,000,000
P - P : A - B - 3,000,000 , B - C - 3,000,000 , C - A - 3,000,000
P - G : A - G - 3,000,000 , B - G , 3,000,000 , C - G , 3,000,000
CONTACT RESISTANCE - A: 17 B:18 C:19

DEFICIENCIES:

TESTED BY: K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/14/2023 | AMBIENT TEMPERATURE: 21 °C | HUMIDITY: 21 % | ASSET #:
SUBSTATION: SUBSTATION 5 | POSITION: MAIN B

MANUFACTURER	EATON	SN / SO NO.	001-002	FRAME SIZE 4,000 AMPS 600 V	
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	4000	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	N/A	ELECTRICALLY OPERATED	(●) YES ( ) NO
TRIP UNIT TYPE	DIGITRIP 520	TRIP UNIT CAT #	5LSIG	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	NEW	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	DIRTY	C
AUXILIARY DEVICES	☐	NA	NA
GROUND CONNECTION	☑	GOOD	NA
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	4,000	LONG	☑	0.8	X	4,000	A	=	3,200	A	4	NA	
SENSOR TAP	4,000	SHORT	☑	2.5	X	3,200	A	=	8,000	A	0.3	OFF	
		INST.	☐		X			=		A			
		GRD. FLT.	☑	0.3	X	4,000	A	=	1,200	A	0.4	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	4,000	LONG	☑	0.8	X	4,000	A	=	3,200	A	4	NA	
SENSOR TAP	4,000	SHORT	☑	2.5	-	8,000	A				0.3	OFF	
		INST.	☐										
		GRD. FLT.	☑	0.3	-	1,200	A				0.4	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.8	4.2	100	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	4	12	300	11.2 - 16	11.6 / 11.6	11.6 / 11.6	11.6 / 11.6	NA
Short Time PU	2.5	6	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.3	12	NA	0.24 - 0.34	0.28 / 0.28	0.28 / 0.28	0.28 / 0.28	NA
GRD Fault PU	0.3	2	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.4	2	NA	0.24 - 0.34	0.3 / 0.3	0.3 / 0.3	0.3 / 0.3	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	22 °C	1.1

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000
POLE TO FRAME	2,370,000	2,607,000	2,550,000	2,805,000	3,000,000	3,300,000
LINE TO LOAD	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
20.0	26.0	29.0

COUNTER END: NA

COMMENTS:
BREAKER IS DOUBLE WIDE. WILL HAVE 2 INSULATION RESISTANCE READINGS. SECOND SIDE DESIGNATED BELOW
L-L : A2 - 3,000,000 , B2 - 3,000,000 , C2 - 3,000,000
P-F : A2 -G - 3,000,000 , B2 - G 3,000,000 , C2 - G - 3,000,000
P-P : A2 - B2 - 3,000,000 , B2 - C2 - 3,000,000 , C2 - A2 -C2 - 3,000,000
CONTACT RESISTANCE - A2 - 23 , B2 - 22 , C2 - 21

DEFICIENCIES:

TESTED BY: K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/15/2023 | AMBIENT TEMPERATURE: 21 °C | HUMIDITY: 16 % | ASSET #:
SUBSTATION: SUBSTATION 5 | POSITION: MCC 51A FEEDER

MANUFACTURER	EATON	SN / SO NO.	001 007	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	800	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	F3A	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	DIGITRIP 520	TRIP UNIT CAT #	5LSIG	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A		15	NA	
SENSOR TAP	800	SHORT	☑	6	X	800	A =	4,800	A		0.2		
		INST.	☑	10	X	800	A =	8,000	A		N/A	NA	
		GRD. FLT.	☑	0.35	X	800	A =	280	A		0.2		

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A		15	NA	
SENSOR TAP	800	SHORT	☑	6	-	4,800	A				0.2		
		INST.	☑	10	-	8,000	A					NA	
		GRD. FLT.	☑	0.35	-	280	A				0.2		

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	15	NA	NA	42 - 60	48.9 / 48.9	44.6 / 44.6	47.3 / 47.3	NA
Short Time PU	6	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	NA	NA	0.15 - 0.24	0.18 / 0.18	0.18 / 0.18	0.18 / 0.18	NA
Instant PU	10	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	NA	NA	0 - 0.05	0.05 / 0.05	0.05 / 0.05	0.05 / 0.05	NA
GRD Fault PU	0.35	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	NA	NA	NA	0.2 / 0.2	0.2 / 0.2	0.2 / 0.2	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	21 °C	1.05

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000
POLE TO FRAME	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000
LINE TO LOAD	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
18.0	18.0	17.0

COUNTER END: NA

COMMENTS: TURNED DOWN INSTANTANEOUS AND SHORT TIME SETTINGS FOR TEST SET RESTRICTIONS
DEFICIENCIES:

TESTED BY: K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/14/2023 | AMBIENT TEMPERATURE: 22 °C | HUMIDITY: 21 % | ASSET #:
SUBSTATION: SUBSTATION 5 | POSITION: MCC 51B FEEDER

MANUFACTURER	EATON	SN / SO NO.	001-001	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	800	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	F7A	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	DIGITRIP 520	TRIP UNIT CAT #	5LSIG	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A		15	NA	
SENSOR TAP	800	SHORT	☑	6	X	800	A =	4,800	A		0.2	OFF	
		INST.	☑	10	X	800	A =	8,000	A		N/A	NA	
		GRD. FLT.	☑	0.35	X	800	A =	280	A		0.2	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A		15	NA	
SENSOR TAP	800	SHORT	☑	6	-	4,800	A				0.2	OFF	
		INST.	☑	10	-	8,000	A					NA	
		GRD. FLT.	☑	0.35	-	280	A				0.2	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	15	NA	NA	42 - 60	43.7 / 43.7	44.7 / 44.7	42.6 / 42.6	NA
Short Time PU	6	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	NA	NA	NA	0.15 / 0.15	0.15 / 0.15	0.15 / 0.15	NA
Instant PU	10	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	NA	NA	NA	0.03 / 0.03	0.03 / 0.03	0.03 / 0.03	NA
GRD Fault PU	0.35	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	NA	NA	NA	0.3 / 0.3	0.3 / 0.3	0.3 / 0.3	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	22 °C	1.1

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000
POLE TO FRAME	2,670,000	2,937,000	3,000,000	3,300,000	2,340,000	2,574,000
LINE TO LOAD	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
26.0	26.0	21.0

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/15/2023 | AMBIENT TEMPERATURE: 21 °C | HUMIDITY: 16 % | ASSET #:
SUBSTATION: SUBSTATION 5 | POSITION: MCC 52A FEEDER

MANUFACTURER	EATON	SN / SO NO.	001 006	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	800	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	F3B	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	DIGITRIP 520	TRIP UNIT CAT #	5LSIG	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A		15	NA	
SENSOR TAP	800	SHORT	☑	6	X	800	A =	4,800	A		0.2	OFF	
		INST.	☑	10	X	800	A =	8,000	A		N/A	NA	
		GRD. FLT.	☑	0.35	X	800	A =	280	A		0.2		

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A		15	NA	
SENSOR TAP	800	SHORT	☑	6	-	4,800	A				0.2	OFF	
		INST.	☑	10	-	8,000	A					NA	
		GRD. FLT.	☑	0.35	-	280	A				0.2		

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	15	NA	NA	42 - 60	48.6 / 48.6	45.1 / 45.1	51.2 / 51.2	NA
Short Time PU	6	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	NA	NA	0.15 - 0.24	0.15 / 0.15	0.15 / 0.15	0.15 / 0.15	NA
Instant PU	10	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	NA	NA	0 - 0.05	0.05 / 0.05	0.05 / 0.05	0.05 / 0.05	NA
GRD Fault PU	0.35	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	NA	NA	NA	0.3 / 0.3	0.3 / 0.3	0.3 / 0.3	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	21 °C	1.05

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000
POLE TO FRAME	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000
LINE TO LOAD	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
18.2	17.4	19.3

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/14/2023 | AMBIENT TEMPERATURE: 22 °C | HUMIDITY: 21 % | ASSET #:
SUBSTATION: SUBSTATION 5 | POSITION: MCC 52B FEEDER

MANUFACTURER	EATON	SN / SO NO.	001-002	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	800	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	F7B	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	DIGITRIP 520	TRIP UNIT CAT #	5LSIG	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	DIRTY	C
AUXILIARY DEVICES	☐	NA	NA
GROUND CONNECTION	☑	GOOD	NA
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A		15	NA	
SENSOR TAP	800	SHORT	☑	6	X	800	A =	4,800	A		0.2	OFF	
		INST.	☑	10	X	800	A =	8,000	A		N/A	NA	
		GRD. FLT.	☑	0.35	X	800	A =	280	A		0.2	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A		15	NA	
SENSOR TAP	800	SHORT	☑	6	-	4,800	A				0.2	OFF	
		INST.	☑	10	-	8,000	A					NA	
		GRD. FLT.	☑	0.35	-	280	A				0.2	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	5	100	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	15	15	300	42 - 60	42.5 / 42.5	42.9 / 42.9	43.9 / 43.9	NA
Short Time PU	6	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	NA	NA	NA	0.15 / 0.15	0.15 / 0.15	0.15 / 0.15	NA
Instant PU	10	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	NA	NA	NA	0.04 / 0.04	0.04 / 0.04	0.04 / 0.04	NA
GRD Fault PU	0.35	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	NA	NA	NA	0.3 / 0.3	0.3 / 0.3	0.3 / 0.3	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	22 °C	1.1

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000
POLE TO FRAME	3,000,000	3,300,000	2,630,000	2,893,000	2,490,000	2,739,000
LINE TO LOAD	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
17.9	19.2	25.1

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/15/2023 | AMBIENT TEMPERATURE: 22 °C | HUMIDITY: 21 % | ASSET #:
SUBSTATION: SUBSTATION 5 | POSITION: MCC 53A FEEDER

MANUFACTURER	EATON	SN / SO NO.	001 004	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	600	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	F3D	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	DIGITRIP 520	TRIP UNIT CAT #	5LSIG	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	600	LONG	☑	1	X	600	A =	600	A		15	NA	
SENSOR TAP	600	SHORT	☑	6	X	600	A =	3,600	A		0.2		
		INST.	☑	10	X	600	A =	6,000	A		N/A	NA	
		GRD. FLT.	☑	0.35	X	600	A =	210	A		0.2		

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	600	A =	600	A		15	NA	
SENSOR TAP	800	SHORT	☑	6	-	3,600	A				0.2		
		INST.	☑	10	-	6,000	A					NA	
		GRD. FLT.	☑	0.35	-	210	A				0.2		

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	15	NA	NA	42 - 60	44.7 / 44.7	48.9 / 48.9	43.7 / 43.7	NA
Short Time PU	6	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	NA	NA	0.15 - 0.24	0.15 / 0.15	0.15 / 0.15	0.15 / 0.15	NA
Instant PU	10	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	NA	NA	0 - 0.05	0.05 / 0.05	0.05 / 0.05	0.05 / 0.05	NA
GRD Fault PU	0.35	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	NA	NA	NA	0.1 / 0.1	0.1 / 0.1	0.1 / 0.1	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	21 °C	1.05

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000
POLE TO FRAME	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000
LINE TO LOAD	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
16.2	17.6	17.5

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/14/2023 | AMBIENT TEMPERATURE: 22 °C | HUMIDITY: 21 % | ASSET #:
SUBSTATION: SUBSTATION 5 | POSITION: MCC 53B FEEDER

MANUFACTURER	EATON	SN / SO NO.	001 002	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	600	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	F7D	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	DIGITRIP 520	TRIP UNIT CAT #	5LSIG	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA
GROUND CONNECTION	☑	GOOD	NA
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	600	LONG	☑	1	X	600	A =	600	A	15	NA	
SENSOR TAP	600	SHORT	☑	6	X	600	A =	3,600	A	0.2	OFF	
		INST.	☑	10	X	600	A =	6,000	A	N/A	NA	
		GRD. FLT.	☑	0.35	X	600	A =	210	A	0.2	0FF	

SETTINGS AS LEFT		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	600	LONG	☑	1	X	600	A =	600	A	15	NA	
SENSOR TAP	600	SHORT	☑	6	-	3,600	A			0.2	OFF	
		INST.	☑	10	-	6,000	A				NA	
		GRD. FLT.	☑	0.35	-	210	A			0.2	0FF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	5	100	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	15	15	300	42 - 60	47.4 / 47.4	43.7 / 43.7	42.9 / 42.9	NA
Short Time PU	6	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	12.5	NA	NA	0.15 / 0.15	0.15 / 0.15	0.15 / 0.15	NA
Instant PU	10	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	12.5	NA	NA	0.05 / 0.05	0.05 / 0.05	0.05 / 0.05	NA
GRD Fault PU	0.35	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	2	NA	NA	0.4 / 0.4	0.4 / 0.4	0.4 / 0.4	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	22 °C	1.1

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000
POLE TO FRAME	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000
LINE TO LOAD	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
15.2	17.4	19.0

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/15/2023 | AMBIENT TEMPERATURE: 21 °C | HUMIDITY: 16 % | ASSET #:
SUBSTATION: SUBSTATION 5 | POSITION: MCC 54A FEEDER

MANUFACTURER	EATON	SN / SO NO.	001 009	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	800	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	F4A	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	DIGITRIP 520	TRIP UNIT CAT #	5LSIG	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A		15	NA	
SENSOR TAP	800	SHORT	☑	6	X	800	A =	4,800	A		0.2	OFF	
		INST.	☑	10	X	800	A =	8,000	A		N/A	NA	
		GRD. FLT.	☑	0.35	X	800	A =	280	A		0.2		

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A		15	NA	
SENSOR TAP	800	SHORT	☑	6	-	4,800	A				0.2	OFF	
		INST.	☑	10	-	8,000	A					NA	
		GRD. FLT.	☑	0.35	-	280	A				0.2		

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	15	NA	NA	42 - 60	45.7 / 45.7	43.3 / 43.3	50.5 / 50.5	NA
Short Time PU	6	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	NA	NA	0.15 - 0.24	0.15 / 0.15	0.15 / 0.15	0.15 / 0.15	NA
Instant PU	10	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	NA	NA	0 - 0.05	0.05 / 0.05	0.05 / 0.05	0.05 / 0.05	NA
GRD Fault PU	0.35	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	NA	NA	NA	0.2 / 0.2	0.2 / 0.2	0.2 / 0.2	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	21 °C	1.05

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000
POLE TO FRAME	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000
LINE TO LOAD	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
61.0	51.0	56.0

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/15/2023 | AMBIENT TEMPERATURE: 21 °C | HUMIDITY: 16 % | ASSET #:
SUBSTATION: SUBSTATION 5 | POSITION: MCC 55A FEEDER

MANUFACTURER	EATON	SN / SO NO.	001 007	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	600	MOUNTING	(•) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	F4B	ELECTRICALLY OPERATED	( ) YES (•) NO
TRIP UNIT TYPE	DIGITRIP 520	TRIP UNIT CAT #	5LSIG	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	600	LONG	☑	1	X	600	A =	600	A		15	NA	
SENSOR TAP	600	SHORT	☑	6	X	600	A =	3,600	A		0.2		
		INST.	☑	10	X	600	A =	6,000	A		N/A	NA	
		GRD. FLT.	☑	0.35	X	600	A =	210	A		0.2	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	600	LONG	☑	1	X	600	A =	600	A		15	NA	
SENSOR TAP	600	SHORT	☑	6	-	3,600	A				0.2		
		INST.	☑	10	-	6,000	A					NA	
		GRD. FLT.	☑	0.35	-	210	A				0.2	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	15	NA	NA	42 - 60	46.7 / 46.7	44.9 / 44.9	49.2 / 49.2	NA
Short Time PU	6	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	NA	NA	0.15 - 0.24	0.2 / 0.2	0.2 / 0.2	0.2 / 0.2	NA
Instant PU	10	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	NA	NA	0 - 0.05	0.05 / 0.05	0.05 / 0.05	0.05 / 0.05	NA
GRD Fault PU	0.35	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	NA	NA	NA	0.1 / 0.1	0.1 / 0.1	0.1 / 0.1	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	21 °C	1.05

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000
POLE TO FRAME	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000
LINE TO LOAD	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
33.8	38.7	37.2

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/15/2023 | AMBIENT TEMPERATURE: 21 °C | HUMIDITY: 16 % | ASSET #:
SUBSTATION: SUBSTATION 5 | POSITION: MCC 56A FEEDER

MANUFACTURER	EATON	SN / SO NO.	001 005	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	600	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	F4D	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	DIGITRIP 520	TRIP UNIT CAT #	5LSIG	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	600	LONG	☑	1	X	600	A =	600	A		15	NA	
SENSOR TAP	600	SHORT	☑	6	X	600	A =	3,600	A		0.2	OFF	
		INST.	☑	10	X	600	A =	6,000	A		N/A	NA	
		GRD. FLT.	☑	0.35	X	600	A =	210	A		0.2	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	600	LONG	☑	1	X	600	A =	600	A		15	NA	
SENSOR TAP	600	SHORT	☑	6	-	3,600	A				0.2	OFF	
		INST.	☑	10	-	6,000	A					NA	
		GRD. FLT.	☑	0.35	-	210	A				0.2	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	15	NA	NA	42 - 60	46.2 / 46.2	44.5 / 44.5	47.1 / 47.1	NA
Short Time PU	6	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	NA	NA	0.15 - 0.24	0.15 / 0.15	0.15 / 0.15	0.15 / 0.15	NA
Instant PU	10	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	NA	NA	0 - 0.05	0.05 / 0.05	0.05 / 0.05	0.05 / 0.05	NA
GRD Fault PU	0.35	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	NA	NA	NA	0.3 / 0.3	0.3 / 0.3	0.3 / 0.3	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	21 °C	1.05

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000
POLE TO FRAME	3,000,000	3,150,000	2,230,000	2,341,500	3,000,000	3,150,000
LINE TO LOAD	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
21.9	16.9	16.7

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. ICKES

MOLDED CASE CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/15/2023 AMBIENT TEMPERATURE 21 °C HUMIDITY 16 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION MCC-51-A

BREAKER IDENTIFICATION	MANUFACTURER	SERIAL NUMBER	TYPE	FRAME RATING (Amps)	FRAME RATING (Volts)	TRIP RATING	INSTANTANEOUS TRIP	ELEMENT TYPE
MAIN	CUTLER-HAMMER	NA	HMDL 65K	800	600	800	1600	THERMAL ADJUSTABLE

INSULATION RESISTANCE (M©) @ 1000 VDC									POLE RESISTANCE (µ©)		
A - B	B - C	C - A	A - GND	B - GND	C - GND	A	B	C			
POLE TO POLE			POLE TO FRAME			LINE TO LOAD			A	B	C
258,000	276,000	321,000	203,000	211,000	238,000	667,000	612,000	723,000	481.00	256.00	668.00

	RANGE	MIN TIME	MAX TIME	TRIP TESTS	A	B	C
Manual Trip Function ☑	AMPS			INSTANTANEOUS TRIP AMPS			
Exercise Breaker ☑	SECONDS			TRIP TIME IN SECONDS @ 300% RATED CURRENT			

BREAKER IDENTIFICATION	MANUFACTURER	SERIAL NUMBER	TYPE	FRAME RATING (Amps)	FRAME RATING (Volts)	TRIP RATING	INSTANTANEOUS TRIP	ELEMENT TYPE
ATS-51-A	CUTLER-HAMMER	NA	HLD 65K	600	600	600	1200	THERMAL ADJUSTABLE

INSULATION RESISTANCE (M©) @ 1000 VDC									POLE RESISTANCE (µ©)		
A - B	B - C	C - A	A - GND	B - GND	C - GND	A	B	C			
POLE TO POLE			POLE TO FRAME			LINE TO LOAD			A	B	C
258,000	276,000	321,000	203,000	211,000	238,000	168,800	186,900	200,000	985.00	1,136.00	354.00

	RANGE	MIN TIME	MAX TIME	TRIP TESTS	A	B	C
Manual Trip Function ☑	AMPS			INSTANTANEOUS TRIP AMPS			
Exercise Breaker ☑	SECONDS			TRIP TIME IN SECONDS @ 300% RATED CURRENT			

COMMENTS: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE FOR MAIN PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO SUB-5 CONNECTED. ATS BREAKER INSULATION RESISTANCE PHASE TO PHASE AND PHASE TO GROUND TESTED FROM THE LINE SIDE WITH BREAKER OPEN DUE TO PTs IN THE ATS.

DEFICIENCIES:

TESTED BY: E. PENLAND, K. HORST

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/15/2023 | AMBIENT TEMPERATURE: 21 °C | HUMIDITY: 16 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 5 | POSITION: MCC-51-A

NAMEPLATE DATA

MANUFACTURER: EATON | SERIAL NO.: NA | TYPE: IT.024-FVC
CATALOG NO.: MDT03545 | DRAWING NO.: NA | VOLTAGE CLASS: 600
MAIN BUS RATING: 800 A | MAIN BUS NEUTRAL RATING: NA A | CONDUCTOR: ○ CU ◉ AL
CURRENT WITHSTAND RATING: 65,000 A | NUMBER OF SECTIONS: 6 | LISTING: ☑ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER: 1 | MLO: 0 | TYPE: CUTLER | AMPACITY: 800 | MAIN DISCONNECT: 0 | FUSE TYPE: NA | SIZE: NA
TOTAL POSITIONS EQUIPPED: 10 | NO. OF SPARE SPACES: 2 | TOTAL POSITIONS USED: 8

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	NA

TEST VOLTAGE: 1 KVDC | EQUIPMENT TEMPERATURE: 21 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
BUS A	RDG.	203,000	211,000	238,000		258,000	321,000	276,000			
	20°C	215,180	223,660	252,280		273,480	340,260	292,560			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:
DEFICIENCIES:

TESTED BY: E. PENLAND, K. HORST

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/15/2023 AMBIENT TEMPERATURE 21 °C HUMIDITY 16 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION MCC-51-A

NAMEPLATE DATA

MANUFACTURER EATON SERIAL NO. NA TYPE IT.024-FVC

CATALOG NO. MDT03545 DRAWING NO. NA VOLTAGE CLASS 600

PHASE AMPACITY 800 A WITHSTAND RATING 65 KA CONDUCTOR ○ CU ◉ AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
BUS	MAIN 51-A	225	216	202									
BUS	TVSS-51A	780	738	843									
BUS	ATS-51-A	217	204	193									
BUS	MRH-2	631	565	630									
BUS	DPTP-1	618	689	830									
BUS	STWP-1	373	354	454									
BUS	TPIP-1	529	676	713									
BUS	SPARE SIZE 1	556	642	688									
BUS	SPARE SIZE 3	306	349	463									
BUS	LB-1	262	232	267									

COMMENTS:

DEFICIENCIES:

TESTED BY: E. PENLAND, K. HORST

MOLDED CASE CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/14/2023 AMBIENT TEMPERATURE 21 °C HUMIDITY 16 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION MCC-51-B

BREAKER IDENTIFICATION	MANUFACTURER	SERIAL NUMBER	TYPE	FRAME RATING (Amps)	FRAME RATING (Volts)	TRIP RATING	INSTANTANEOUS TRIP	ELEMENT TYPE
MAIN	CUTLER-HAMMER	NA	HMDL 65K	800	600	800	1600	THERMAL ADJUSTABLE

INSULATION RESISTANCE (M©) @ 1000 VDC									POLE RESISTANCE (µ©)		
A - B	B - C	C - A	A - GND	B - GND	C - GND	A	B	C	A	B	C
POLE TO POLE			POLE TO FRAME			LINE TO LOAD					
60,300	61,800	98,000	22,300	30,600	27,600	28,300	32,300	26,300	317.00	750.00	185.00

	RANGE	MIN TIME	MAX TIME	TRIP TESTS	A	B	C
Manual Trip Function ☑	AMPS			INSTANTANEOUS TRIP AMPS			
Exercise Breaker ☑	SECONDS			TRIP TIME IN SECONDS @ 300% RATED CURRENT			

BREAKER IDENTIFICATION	MANUFACTURER	SERIAL NUMBER	TYPE	FRAME RATING (Amps)	FRAME RATING (Volts)	TRIP RATING	INSTANTANEOUS TRIP	ELEMENT TYPE
ATS-51-B	CUTLER-HAMMER	NA	HLD 65K	600	600	600	1200	THERMAL ADJUSTABLE

INSULATION RESISTANCE (M©) @ 1000 VDC									POLE RESISTANCE (µ©)		
A - B	B - C	C - A	A - GND	B - GND	C - GND	A	B	C	A	B	C
POLE TO POLE			POLE TO FRAME			LINE TO LOAD					
60,300	61,800	98,000	22,300	30,600	27,600	34,700	42,500	49,700	278.00	333.00	264.00

	RANGE	MIN TIME	MAX TIME	TRIP TESTS	A	B	C
Manual Trip Function ☑	AMPS			INSTANTANEOUS TRIP AMPS			
Exercise Breaker ☑	SECONDS			TRIP TIME IN SECONDS @ 300% RATED CURRENT			

COMMENTS: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE FOR MAIN PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO SUB-5 CONNECTED. ATS BREAKER INSULATION RESISTANCE PHASE TO PHASE AND PHASE TO GROUND TESTED FROM THE LINE SIDE WITH BREAKER OPEN DUE TO PTs IN THE ATS.

DEFICIENCIES:

TESTED BY: E. PENLAND, K. HORST

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/14/2023 | AMBIENT TEMPERATURE: 21 °C | HUMIDITY: 16 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 5 | POSITION: MCC-51-B

NAMEPLATE DATA

MANUFACTURER: EATON | SERIAL NO.: NA | TYPE: IT.024-FVC
CATALOG NO.: MDT03545 | DRAWING NO.: NA | VOLTAGE CLASS: 600
MAIN BUS RATING: 800 A | MAIN BUS NEUTRAL RATING: NA A | CONDUCTOR: ○ CU ◉ AL
CURRENT WITHSTAND RATING: 65,000 A | NUMBER OF SECTIONS: 6 | LISTING: ☑ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER: 1 | MLO: 0 | TYPE: CUTLER | AMPACITY: 800 | MAIN DISCONNECT: 0 | FUSE TYPE: NA | SIZE: NA
TOTAL POSITIONS EQUIPPED: 9 | NO. OF SPARE SPACES: 3 | TOTAL POSITIONS USED: 6

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	NA

TEST VOLTAGE: 1 KVDC | EQUIPMENT TEMPERATURE: 21 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
BUS B	RDG.	22,300	30,600	27,600		60,300	98,000	61,800			
	20°C	23,638	32,436	29,256		63,918	103,880	65,508			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:
DEFICIENCIES:

TESTED BY: E. PENLAND, K. HORST

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/14/2023 AMBIENT TEMPERATURE 21 °C HUMIDITY 16 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION MCC-51-B

NAMEPLATE DATA

MANUFACTURER EATON SERIAL NO. NA TYPE IT.024-FVC

CATALOG NO. MDT03545 DRAWING NO. NA VOLTAGE CLASS 600

PHASE AMPACITY 800 A WITHSTAND RATING 65 KA CONDUCTOR ○ CU ◉ AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
BUS	MAIN 51-B	226.3	215.8	204.1									
BUS	TVSS-51B	770.9	691.2	898									
BUS	ATS-51-B	220.3	206.4	194.2									
BUS	DPTP-2	553.3	833	946									
BUS	STWP-2	332.9	357.8	407.1									
BUS	TPIP-2	585	734.3	903									
BUS	SPARE FEED	253	277	300									
BUS	SPARE SIZE 1	517	580	731									
BUS	SPARE SIZE 3	305	363	489									

COMMENTS:

DEFICIENCIES:

TESTED BY: E. PENLAND, K. HORST

MOLDED CASE CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/18/2023 AMBIENT TEMPERATURE 21 °C HUMIDITY 16 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION MCC-52-A

BREAKER IDENTIFICATION	MANUFACTURER	SERIAL NUMBER	TYPE	FRAME RATING (Amps)	FRAME RATING (Volts)	TRIP RATING	INSTANTANEOUS TRIP	ELEMENT TYPE
MAIN	CUTLER-HAMMER	NA	HMDL 65K	800	600	800	1600	THERMAL ADJUSTABLE

INSULATION RESISTANCE (M©) @ 1000 VDC									POLE RESISTANCE (µ©)		
A - B	B - C	C - A	A - GND	B - GND	C - GND	A	B	C			
POLE TO POLE			POLE TO FRAME			LINE TO LOAD			A	B	C
143,100	147,100	201,000	125,300	136,900	139,400	341,000	357,000	426,000	243.00	1,775.00	225.00

Manual Trip Function ☑	RANGE	MIN TIME	MAX TIME	TRIP TESTS	A	B	C
	AMPS			INSTANTANEOUS TRIP AMPS			
Exercise Breaker ☑	SECONDS			TRIP TIME IN SECONDS @ 300% RATED CURRENT			

BREAKER IDENTIFICATION	MANUFACTURER	SERIAL NUMBER	TYPE	FRAME RATING (Amps)	FRAME RATING (Volts)	TRIP RATING	INSTANTANEOUS TRIP	ELEMENT TYPE
ATS-52-A	CUTLER-HAMMER	NA	HLD 65K	600	600	600	1200	THERMAL ADJUSTABLE

INSULATION RESISTANCE (M©) @ 1000 VDC									POLE RESISTANCE (µ©)		
A - B	B - C	C - A	A - GND	B - GND	C - GND	A	B	C			
POLE TO POLE			POLE TO FRAME			LINE TO LOAD			A	B	C
143,100	147,100	201,000	125,300	136,900	139,400	230,000	243,000	313,000	1,144.00	144.00	638.00

Manual Trip Function ☑	RANGE	MIN TIME	MAX TIME	TRIP TESTS	A	B	C
	AMPS			INSTANTANEOUS TRIP AMPS			
Exercise Breaker ☑	SECONDS			TRIP TIME IN SECONDS @ 300% RATED CURRENT			

COMMENTS: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE FOR MAIN PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO SUB-5 CONNECTED. ATS BREAKER INSULATION RESISTANCE PHASE TO PHASE AND PHASE TO GROUND TESTED FROM THE LINE SIDE WITH BREAKER OPEN DUE TO PTs IN THE ATS.

DEFICIENCIES:

TESTED BY: E. PENLAND, K. HORST, S. FRY

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/18/2023 | AMBIENT TEMPERATURE: 21 °C | HUMIDITY: 16 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 5 | POSITION: MCC-52-A

NAMEPLATE DATA

MANUFACTURER: EATON | SERIAL NO.: NA | TYPE: IT.024-FVC
CATALOG NO.: MDT03545 | DRAWING NO.: NA | VOLTAGE CLASS: 600
MAIN BUS RATING: 800 A | MAIN BUS NEUTRAL RATING: NA A | CONDUCTOR: ○ CU ◉ AL
CURRENT WITHSTAND RATING: 65,000 A | NUMBER OF SECTIONS: 6 | LISTING: ☑ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER: 1 | MLO: 0 | TYPE: CUTLER | AMPACITY: 800 | MAIN DISCONNECT: 0 | FUSE TYPE: NA | SIZE: NA
TOTAL POSITIONS EQUIPPED: 12 | NO. OF SPARE SPACES: 3 | TOTAL POSITIONS USED: 9

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	NA

TEST VOLTAGE: 1 KVDC | EQUIPMENT TEMPERATURE: 21 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
BUS A	RDG.	125,300	136,900	139,400		143,100	20,100	147,100			
	20°C	132,818	145,114	147,764		151,686	21,306	155,926			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:
DEFICIENCIES:

TESTED BY: E. PENLAND, K. HORST, S. FRY

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/15/2023 AMBIENT TEMPERATURE 21 °C HUMIDITY 16 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION MCC-52-A

NAMEPLATE DATA

MANUFACTURER EATON SERIAL NO. NA TYPE IT.024-FVC

CATALOG NO. MDT03545 DRAWING NO. NA VOLTAGE CLASS 600

PHASE AMPACITY 800 A WITHSTAND RATING 65 KA CONDUCTOR ○ CU ◉ AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
BUS	MAIN 52-A	233	224	208									
BUS	TVSS-52A	638	701	1160									
BUS	ATS-52-A	220	198	195									
BUS	WTM-1	687	742	751									
BUS	LDTM-2	598	657	473									
BUS	NO NAME	653	636	759									
BUS	SPARE SIZE 2	591	651	711									
BUS	BTAB-1	523	693	739									
BUS	BTAB-3	1224	707	837									
BUS	SPARE SIZE 1	546	629	712									
BUS	SPARE SIZE 1	538	615	800									
BUS	LB-2	203	226	278									

COMMENTS:

DEFICIENCIES:

TESTED BY: E. PENLAND, K. HORST, S. FRY

MOLDED CASE CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/18/2023 AMBIENT TEMPERATURE 21 °C HUMIDITY 16 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION MCC-52-B

BREAKER IDENTIFICATION	MANUFACTURER	SERIAL NUMBER	TYPE	FRAME RATING (Amps)	FRAME RATING (Volts)	TRIP RATING	INSTANTANEOUS TRIP	ELEMENT TYPE
MAIN	CUTLER-HAMMER	NA	HMDL 65K	800	600	800	1600	THERMAL ADJUSTABLE

INSULATION RESISTANCE (M©) @ 1000 VDC									POLE RESISTANCE (µ©)		
A - B	B - C	C - A	A - GND	B - GND	C - GND	A	B	C			
POLE TO POLE			POLE TO FRAME			LINE TO LOAD			A	B	C
114,800	155,800	147,100	52,200	71,800	62,400	396,000	401,000	464,000	129.00	109.00	525.00

	RANGE	MIN TIME	MAX TIME	TRIP TESTS	A	B	C
Manual Trip Function ☑	AMPS			INSTANTANEOUS TRIP AMPS			
Exercise Breaker ☑	SECONDS			TRIP TIME IN SECONDS @ 300% RATED CURRENT			

BREAKER IDENTIFICATION	MANUFACTURER	SERIAL NUMBER	TYPE	FRAME RATING (Amps)	FRAME RATING (Volts)	TRIP RATING	INSTANTANEOUS TRIP	ELEMENT TYPE
ATS-52-B	CUTLER-HAMMER	NA	HLD 65K	600	600	600	1200	THERMAL ADJUSTABLE

INSULATION RESISTANCE (M©) @ 1000 VDC									POLE RESISTANCE (µ©)		
A - B	B - C	C - A	A - GND	B - GND	C - GND	A	B	C			
POLE TO POLE			POLE TO FRAME			LINE TO LOAD			A	B	C
114,800	155,800	147,100	52,200	71,800	62,400	55,000	63,400	77,500	360.00	111.00	482.00

	RANGE	MIN TIME	MAX TIME	TRIP TESTS	A	B	C
Manual Trip Function ☑	AMPS			INSTANTANEOUS TRIP AMPS			
Exercise Breaker ☑	SECONDS			TRIP TIME IN SECONDS @ 300% RATED CURRENT			

COMMENTS: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE FOR MAIN PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO SUB-5 CONNECTED. ATS BREAKER INSULATION RESISTANCE PHASE TO PHASE AND PHASE TO GROUND TESTED FROM THE LINE SIDE WITH BREAKER OPEN DUE TO PTs IN THE ATS.

DEFICIENCIES: ATS BREAKER COVER MISSING A SCREW. RECOMMEND REPLACE.

TESTED BY: E. PENLAND, K. HORST, S. FRY

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/18/2023 | AMBIENT TEMPERATURE: 21 °C | HUMIDITY: 16 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 5 | POSITION: MCC-52-B

NAMEPLATE DATA

MANUFACTURER: EATON | SERIAL NO.: NA | TYPE: IT.024-FVC
CATALOG NO.: MDT03545 | DRAWING NO.: NA | VOLTAGE CLASS: 600
MAIN BUS RATING: 800 A | MAIN BUS NEUTRAL RATING: NA A | CONDUCTOR: ○ CU ◉ AL
CURRENT WITHSTAND RATING: 65,000 A | NUMBER OF SECTIONS: 6 | LISTING: ☑ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER: 1 | MLO: 0 | TYPE: CUTLER | AMPACITY: 800 | MAIN DISCONNECT: 0 | FUSE TYPE: NA | SIZE: NA
TOTAL POSITIONS EQUIPPED: 11 | NO. OF SPARE SPACES: 4 | TOTAL POSITIONS USED: 7

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	NA

TEST VOLTAGE: 1 KVDC | EQUIPMENT TEMPERATURE: 21 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
BUS B	RDG.	52,200	71,800	62,400		114,800	147,100	155,800			
	20°C	55,332	76,108	66,144		121,688	155,926	165,148			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:
DEFICIENCIES:

TESTED BY: E. PENLAND, K. HORST, S. FRY

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/15/2023 AMBIENT TEMPERATURE 21 °C HUMIDITY 16 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION MCC-52-B

NAMEPLATE DATA

MANUFACTURER EATON SERIAL NO. NA TYPE IT.024-FVC

CATALOG NO. MDT03545 DRAWING NO. NA VOLTAGE CLASS 600

PHASE AMPACITY 800 A WITHSTAND RATING 65 KA CONDUCTOR ○ CU ◉ AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
BUS	MAIN 52-B	230	220	205									
BUS	TVSS-52B	548	662	810									
BUS	ATS-52-B	220	205	195									
BUS	WTM-2	716	685	749									
BUS	LDTM-1	899	758	862									
BUS	SPARE SIZE 2	1023	676	777									
BUS	BTAB-2	649	686	730									
BUS	TEMP DEWAT	563	777	817									
BUS	SPARE SIZE 1	550	637	1331									
BUS	SPARE SIZE 1	546	682	802									
BUS	SPARE FEED	200	225	259									

COMMENTS:
DEFICIENCIES:

TESTED BY: E. PENLAND, K. HORST, S. FRY

MOLDED CASE CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/18/2023 AMBIENT TEMPERATURE 21 °C HUMIDITY 16 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION MCC-53-A

BREAKER IDENTIFICATION	MANUFACTURER	SERIAL NUMBER	TYPE	FRAME RATING (Amps)	FRAME RATING (Volts)	TRIP RATING	INSTANTANEOUS TRIP	ELEMENT TYPE
MAIN	CUTLER-HAMMER	NA	HMDL 65K	800	600	800	1600	THERMAL ADJUSTABLE

INSULATION RESISTANCE (M©) @ 1000 VDC									POLE RESISTANCE (µ©)		
A - B	B - C	C - A	A - GND	B - GND	C - GND	A	B	C			
POLE TO POLE			POLE TO FRAME			LINE TO LOAD			A	B	C
268,000	252,000	304,000	189,900	185,000	258,000	589,000	573,000	608,000	407.00	732.00	736.00

	RANGE	MIN TIME	MAX TIME	TRIP TESTS	A	B	C
Manual Trip Function ☑	AMPS			INSTANTANEOUS TRIP AMPS			
Exercise Breaker ☑	SECONDS			TRIP TIME IN SECONDS @ 300% RATED CURRENT			

COMMENTS: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE FOR MAIN PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO SUB-5 CONNECTED.TESTED WITH CABLE TO SUB-5 CONNECTED.

DEFICIENCIES:

TESTED BY: E. PENLAND, K. HORST. S. FRY

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/18/2023 | AMBIENT TEMPERATURE: 21 °C | HUMIDITY: 16 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 5 | POSITION: MCC-53-A

NAMEPLATE DATA

MANUFACTURER: EATON | SERIAL NO.: NA | TYPE: IT.024-FVC
CATALOG NO.: MDT03545 | DRAWING NO.: NA | VOLTAGE CLASS: 600
MAIN BUS RATING: 800 A | MAIN BUS NEUTRAL RATING: NA A | CONDUCTOR: ○ CU ◉ AL
CURRENT WITHSTAND RATING: 65,000 A | NUMBER OF SECTIONS: 6 | LISTING: ☑ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER: 1 | MLO: 0 | TYPE: CUTLER | AMPACITY: 800 | MAIN DISCONNECT: 0 | FUSE TYPE: NA | SIZE: NA
TOTAL POSITIONS EQUIPPED: 20 | NO. OF SPARE SPACES: 3 | TOTAL POSITIONS USED: 17

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	NA

TEST VOLTAGE: 1 KVDC | EQUIPMENT TEMPERATURE: 21 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
BUS A	RDG.	189,900	185,000	258,000		268,000	304,000	252,000			
	20°C	201,294	196,100	273,480		284,080	322,240	267,120			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:
DEFICIENCIES:

TESTED BY: E. PENLAND, K. HORST. S. FRY

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/15/2023 AMBIENT TEMPERATURE 21 °C HUMIDITY 16 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION MCC-53-A

NAMEPLATE DATA

MANUFACTURER EATON SERIAL NO. NA TYPE IT.024-FVC

CATALOG NO. MDT03545 DRAWING NO. NA VOLTAGE CLASS 600

PHASE AMPACITY 800 A WITHSTAND RATING 65 KA CONDUCTOR ○ CU ◉ AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
BUS	MAIN 53-A	265	250	241									
BUS	TVSS-53A	648	734	966									
BUS	SPARE SIZE 2	519	599	800									
BUS	CR1-HSP-1	549	600	711									
BUS	CR1-HSP-5	627	610	728									
BUS	CR1-HSP-7	599	734	765									
BUS	SPARE SIZE 1	508	588	741									
BUS	CR2-HSP-1	478	627	740									
BUS	CF2-AHU-1	513	645	810									
BUS	CF1-EAF-5	632	834	788									
BUS	NO NAME	359	389	474									
BUS	SPARE SIZE 1	954	587	3446									
BUS	CR2-HSP-3	590	583	952									
BUS	CF1-EAF-2	764	764	989									
BUS	CF1-EAF-4	543	693	1053									
BUS	CF1-EAF-6	489	694	634									
BUS	CF2-EAF-1	681	593	755									
BUS	CF2-EAF-3	571	649	937									
BUS	CF2-EAF-5	793	684	839									
BUS	CF2-AHU-3	188	160	216									

COMMENTS:

DEFICIENCIES:

TESTED BY: E. PENLAND, K. HORST. S. FRY

MOLDED CASE CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/18/2023 AMBIENT TEMPERATURE 21 °C HUMIDITY 16 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION MCC-53-B

BREAKER IDENTIFICATION	MANUFACTURER	SERIAL NUMBER	TYPE	FRAME RATING (Amps)	FRAME RATING (Volts)	TRIP RATING	INSTANTANEOUS TRIP	ELEMENT TYPE
MAIN	CUTLER-HAMMER	NA	HMDL 65K	800	600	800	1600	THERMAL ADJUSTABLE

INSULATION RESISTANCE (M©) @ 1000 VDC									POLE RESISTANCE (µ©)		
A - B	B - C	C - A	A - GND	B - GND	C - GND	A	B	C			
POLE TO POLE			POLE TO FRAME			LINE TO LOAD			A	B	C
226,000	181,500	338,000	106,300	115,700	173,500	646,000	586,000	379,000	565.00	244.00	651.00

Manual Trip Function ☑	RANGE	MIN TIME	MAX TIME	TRIP TESTS	A	B	C
Exercise Breaker ☑	AMPS			INSTANTANEOUS TRIP AMPS			
	SECONDS			TRIP TIME IN SECONDS @ 300% RATED CURRENT			

COMMENTS: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE FOR MAIN PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO SUB-5 CONNECTED.

DEFICIENCIES:

TESTED BY: E. PENLAND, K. HORST. S. FRY

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/18/2023 AMBIENT TEMPERATURE 21 °C HUMIDITY 16 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION MCC-53-B

NAMEPLATE DATA

MANUFACTURER EATON SERIAL NO. NA TYPE IT.024-FVC

CATALOG NO. MDT03545 DRAWING NO. NA VOLTAGE CLASS 600

MAIN BUS RATING 800 A MAIN BUS NEUTRAL RATING NA A CONDUCTOR ○ CU ◉ AL

CURRENT WITHSTAND RATING 65,000 A NUMBER OF SECTIONS 6 LISTING ☑ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER 1 MLO 0 TYPE CUTLER AMPACITY 800 MAIN DISCONNECT 0 FUSE TYPE NA SIZE NA

TOTAL POSITIONS EQUIPPED 18 NO. OF SPARE SPACES 4 TOTAL POSITIONS USED 14

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	NA

TEST VOLTAGE 1 KVDC EQUIPMENT TEMPERATURE 21 °C TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
BUS B	RDG.	106,300	115,700	173,500		226,000	338,000	181,500			
	20°C	112,678	122,642	183,910		239,560	358,280	192,390			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES:

TESTED BY: E. PENLAND, K. HORST. S. FRY

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/15/2023 AMBIENT TEMPERATURE 21 °C HUMIDITY 16 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION MCC-53-B

NAMEPLATE DATA

MANUFACTURER EATON SERIAL NO. NA TYPE IT.024-FVC

CATALOG NO. MDT03545 DRAWING NO. NA VOLTAGE CLASS 600

PHASE AMPACITY 800 A WITHSTAND RATING 65 KA CONDUCTOR ○ CU ◉ AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
BUS	MAIN 53-B	262	252	241									
BUS	TVSS-53B	642	691	813									
BUS	SPARE SIZE 2	499	566	680									
BUS	CR1-HSP-2	522	611	685									
BUS	CR1-HSP-6	552	660	787									
BUS	CF2-HSP-2	551	710	783									
BUS	CF2-AHU-2	587	643	715									
BUS	CF2-EAF-4	596	713	749									
BUS	CF2-EAF-6	563	753	793									
BUS	SPARE SIZE 1	541	542	773									
BUS	CF2-EAF-7	312	572	713									
BUS	CF2-EAF8	551	587	730									
BUS	DL1-EAF-1	524	754	608									
BUS	SPARE SIZE 1	393	530	600									
BUS	DL1-EAF-2	492	550	643									
BUS	DL2-EAF-1	472	565	748									
BUS	DL2-EAF-2	576	589	705									
BUS	SPARE SIZE 3	326	243	256									

COMMENTS:

DEFICIENCIES:

TESTED BY: E. PENLAND, K. HORST. S. FRY

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/14/2023 | AMBIENT TEMPERATURE: 22 °C | HUMIDITY: 21 % | ASSET #:
SUBSTATION: SUBSTATION 5 | POSITION: MCC-54 BUS B FEEDER

MANUFACTURER	EATON	SN / SO NO.	001 010	FRAME SIZE 800 AMPS 635 V	
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	800	MOUNTING	(•) D.O. ( ) B.I.
FUSE CAT. NO.	NA	CUBICLE CODE	F6A	ELECTRICALLY OPERATED	( ) YES (•) NO
TRIP UNIT TYPE	DIGITRIP 520	TRIP UNIT CAT #	5LSIG	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☐	NA	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A	15	NA	
SENSOR TAP	800	SHORT	☑	6	X	800	A =	4,800	A	0.2	OFF	
		INST.	☑	10	X	800	A =	8,000	A	N/A	NA	
		GRD. FLT.	☑	0.35	X	800	A =	280	A	0.2	OFF	

SETTINGS AS LEFT		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A	15	NA	
SENSOR TAP	800	SHORT	☑	6	-	4,800	A			0.2	OFF	
		INST.	☑	10	-	8,000	A				NA	
		GRD. FLT.	☑	0.35	-	280	A			0.2	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	5	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	15	15	300	42-60	48.7 / 48.7	49.3 / 49.3	51.2 / 51.2	NA
Short Time PU	30	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	45	150	0.15-0.24	0.18 / 0.18	0.18 / 0.18	0.18 / 0.18	NA
Instant PU	50	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	55	110	0 - 0.05	0.05 / 0.05	0.05 / 0.05	0.05 / 0.05	NA
GRD Fault PU	1.75	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	2.625	150	0.15-0.25	0.2 / 0.2	0.2 / 0.2	0.2 / 0.2	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	22 °C	1.1

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000
POLE TO FRAME	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000
LINE TO LOAD	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
52.0	39.0	58.0

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: E. PENLAND

MOLDED CASE CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/22/2023 AMBIENT TEMPERATURE 20 °C HUMIDITY 24 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION MCC-54-A

BREAKER IDENTIFICATION	MANUFACTURER	SERIAL NUMBER	TYPE	FRAME RATING (Amps)	FRAME RATING (Volts)	TRIP RATING	INSTANTANEOUS TRIP	ELEMENT TYPE
MAIN	CUTLER-HAMMER	NA	HMDL 65K	800	600	800	1600	THERMAL ADJUSTABLE

INSULATION RESISTANCE (M©) @ 1000 VDC									POLE RESISTANCE (µ©)		
A - B	B - C	C - A	A - GND	B - GND	C - GND	A	B	C			
POLE TO POLE			POLE TO FRAME			LINE TO LOAD			A	B	C
145,700	146,800	188,200	63,500	70,500	51,300	430,000	521,000	503,000	127.00	110.00	371.00

	RANGE	MIN TIME	MAX TIME	TRIP TESTS	A	B	C
Manual Trip Function ☑	AMPS			INSTANTANEOUS TRIP AMPS			
Exercise Breaker ☑	SECONDS			TRIP TIME IN SECONDS @ 300% RATED CURRENT			

COMMENTS: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE FOR MAIN PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO SUB-5 CONNECTED.

DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/22/2023 AMBIENT TEMPERATURE 20 °C HUMIDITY 24 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION MCC-54-A

NAMEPLATE DATA

MANUFACTURER EATON SERIAL NO. NA TYPE IT.027-FVC

CATALOG NO. MDT03545 DRAWING NO. NA VOLTAGE CLASS 600

MAIN BUS RATING 800 A MAIN BUS NEUTRAL RATING NA A CONDUCTOR ○ CU ◉ AL

CURRENT WITHSTAND RATING 65,000 A NUMBER OF SECTIONS 6 LISTING ☑ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER 1 MLO 0 TYPE CUTLER AMPACITY 800 MAIN DISCONNECT 0 FUSE TYPE NA SIZE NA

TOTAL POSITIONS EQUIPPED 16 NO. OF SPARE SPACES 3 TOTAL POSITIONS USED 13

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	NA

TEST VOLTAGE 1 KVDC EQUIPMENT TEMPERATURE 20 °C TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
BUS-54-A	RDG.	63,500	70,500	51,300		145,700	188,200	146,800			
	20°C	63,500	70,500	51,300		145,700	188,200	146,800			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/22/2023 AMBIENT TEMPERATURE 20 °C HUMIDITY 24 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION MCC-54-A

NAMEPLATE DATA

MANUFACTURER EATON SERIAL NO. NA TYPE IT.027-FVC

CATALOG NO. MDT03545 DRAWING NO. NA VOLTAGE CLASS 600

PHASE AMPACITY 800 A WITHSTAND RATING 65 KA CONDUCTOR ○ CU ◉ AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
BUS	MAIN 54-A	221	194	181									
BUS	TVSS-54-A	511	305	774									
BUS	SHTM-1	668	804	884									
BUS	SHTM-3	685	722	902									
BUS	ELEV-1	313	340	361									
BUS	SPARE FDRB	309	324	345									
BUS	WWBP-1	658	678	799									
BUS	EQ SPARE	448	641	638									
BUS	ATS-54-A	338	186	165									
BUS	MRH-1	640	623	720									
BUS	EQ SPARE	528	478	602									
BUS	SLC-3	432	540	674									
BUS	SLC-6	482	604	641									
BUS	SLC-1	518	552	677									
BUS	SLC-4	339	361	375									

COMMENTS:

DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT, S. FRY

MOLDED CASE CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/22/2023 AMBIENT TEMPERATURE 20 °C HUMIDITY 24 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION MCC-54-B

BREAKER IDENTIFICATION	MANUFACTURER	SERIAL NUMBER	TYPE	FRAME RATING (Amps)	FRAME RATING (Volts)	TRIP RATING	INSTANTANEOUS TRIP	ELEMENT TYPE
MAIN	CUTLER-HAMMER	NA	HMDL 65K	800	600	800	1600	THERMAL ADJUSTABLE

INSULATION RESISTANCE (M©) @ 1000 VDC									POLE RESISTANCE (µ©)		
A - B	B - C	C - A	A - GND	B - GND	C - GND	A	B	C			
POLE TO POLE			POLE TO FRAME			LINE TO LOAD			A	B	C
134,800	90,000	131,200	67,100	53,800	33,600	338,000	354,000	342,000	774.00	543.00	449.00

	RANGE	MIN TIME	MAX TIME	TRIP TESTS	A	B	C
Manual Trip Function ☑	AMPS			INSTANTANEOUS TRIP AMPS			
Exercise Breaker ☑	SECONDS			TRIP TIME IN SECONDS @ 300% RATED CURRENT			

COMMENTS: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE FOR MAIN PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO SUB-5 CONNECTED.

DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/22/2023 AMBIENT TEMPERATURE 20 °C HUMIDITY 24 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION MCC-54-B

NAMEPLATE DATA

MANUFACTURER EATON SERIAL NO. NA TYPE IT.027-FVC

CATALOG NO. MDT03545 DRAWING NO. NA VOLTAGE CLASS 600

MAIN BUS RATING 800 A MAIN BUS NEUTRAL RATING NA A CONDUCTOR ○ CU ◉ AL

CURRENT WITHSTAND RATING 65,000 A NUMBER OF SECTIONS 6 LISTING ☑ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER 1 MLO 0 TYPE CUTLER AMPACITY 800 MAIN DISCONNECT 0 FUSE TYPE NA SIZE NA

TOTAL POSITIONS EQUIPPED 13 NO. OF SPARE SPACES 3 TOTAL POSITIONS USED 10

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	NA

TEST VOLTAGE 1 KVDC EQUIPMENT TEMPERATURE 20 °C TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
BUS-54-B	RDG.	61,700	53,800	33,600		134,800	131,200	90,000			
	20°C	61,700	53,800	33,600		134,800	131,200	90,000			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/22/2023 AMBIENT TEMPERATURE 20 °C HUMIDITY 24 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION MCC-54-B

NAMEPLATE DATA

MANUFACTURER EATON SERIAL NO. NA TYPE IT.027-FVC

CATALOG NO. MDT03545 DRAWING NO. NA VOLTAGE CLASS 600

PHASE AMPACITY 800 A WITHSTAND RATING 65 KA CONDUCTOR ○ CU ◉ AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
BUS	MAIN 54-B	125	111	101									
BUS	TVSS-54B	558	685	761									
BUS	SHTM-2	677	733	860									
BUS	SHTM-4	697	838	884									
BUS	WWBP-2	613	720	926									
BUS	SPARE SIZE 1	523	687	730									
BUS	ATS-54-B	396	247	238									
BUS	SPARE SIZE 3	477	401	369									
BUS	SPARE SIZE 1	574	591	725									
BUS	SLC-7	683	590	763									
BUS	SLC-2	424	535	785									
BUS	SLC-5	184	252	288									

COMMENTS:

DEFICIENCIES:

TESTED BY: K. HORST, C. KROUT

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/14/2023 | AMBIENT TEMPERATURE: 22 °C | HUMIDITY: 21 % | ASSET #:
SUBSTATION: SUBSTATION 5 | POSITION: MCC-55 BUS B FEEDER

MANUFACTURER	EATON	SN / SO NO.	001 001	FRAME SIZE 800 AMPS 635 V	
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	600	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	NA	CUBICLE CODE	F6A	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	DIGITRIP 520	TRIP UNIT CAT #	5LSIG	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☐	NA	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	600	LONG	☑	1	X	600	A =	600	A	15	NA	
SENSOR TAP	600	SHORT	☑	6	X	600	A =	3,600	A	0.2	OFF	
		INST.	☑	10	X	600	A =	6,000	A	N/A	NA	
		GRD. FLT.	☑	0.35	X	600	A =	210	A	0.2	OFF	

SETTINGS AS LEFT		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	600	A =	600	A	15	NA	
SENSOR TAP	800	SHORT	☑	6	-	3,600	A			0.2	OFF	
		INST.	☑	10	-	6,000	A				NA	
		GRD. FLT.	☑	0.35	-	210	A			0.2	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	5	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	15	15	300	42-60	NA / NA	NA / NA	NA / NA	NA
Short Time PU	30	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	45	150	0.15-0.24	NA / NA	NA / NA	NA / NA	NA
Instant PU	50	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	55	110	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault PU	1.75	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	2.625	150	0.15-0.25	NA / NA	NA / NA	NA / NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	22 °C	1.1

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000
POLE TO FRAME	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000
LINE TO LOAD	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
68.5	48.2	52.3

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: E. PENLAND

MOLDED CASE CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/22/2023 AMBIENT TEMPERATURE 19 °C HUMIDITY 24 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION MCC-55-A

BREAKER IDENTIFICATION	MANUFACTURER	SERIAL NUMBER	TYPE	FRAME RATING (Amps)	FRAME RATING (Volts)	TRIP RATING	INSTANTANEOUS TRIP	ELEMENT TYPE
MAIN	CUTLER-HAMMER	NA	HMDL 65K	800	600	800	1600	THERMAL ADJUSTABLE

INSULATION RESISTANCE (M©) @ 1000 VDC									POLE RESISTANCE (µ©)		
A - B	B - C	C - A	A - GND	B - GND	C - GND	A	B	C			
POLE TO POLE			POLE TO FRAME			LINE TO LOAD			A	B	C
117,400	122,100	124,800	33,200	30,100	32,600	425,000	401,000	361,000	400.00	598.00	300.00

Manual Trip Function ☑	RANGE	MIN TIME	MAX TIME	TRIP TESTS	A	B	C
Exercise Breaker ☑	AMPS			INSTANTANEOUS TRIP AMPS			
	SECONDS			TRIP TIME IN SECONDS @ 300% RATED CURRENT			

COMMENTS: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE FOR MAIN PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO SUB-5 CONNECTED.

DEFICIENCIES:

TESTED BY: K. HORST, S. FRY

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/22/2023 | AMBIENT TEMPERATURE: 19 °C | HUMIDITY: 24 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 5 | POSITION: MCC-55-A

NAMEPLATE DATA

MANUFACTURER: EATON | SERIAL NO.: NA | TYPE: IT.028-FVC
CATALOG NO.: MDT03545 | DRAWING NO.: NA | VOLTAGE CLASS: 600
MAIN BUS RATING: 800 A | MAIN BUS NEUTRAL RATING: NA A | CONDUCTOR: ○ CU ◉ AL
CURRENT WITHSTAND RATING: 65,000 A | NUMBER OF SECTIONS: 6 | LISTING: ☑ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER: 1 | MLO: 0 | TYPE: CUTLER | AMPACITY: 800 | MAIN DISCONNECT: 0 | FUSE TYPE: NA | SIZE: NA
TOTAL POSITIONS EQUIPPED: 18 | NO. OF SPARE SPACES: 2 | TOTAL POSITIONS USED: 16

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	NA

TEST VOLTAGE: 1 KVDC | EQUIPMENT TEMPERATURE: 19 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 0.95

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
MCC-55-A	RDG.	33,200	30,100	32,600		117,400	122,100	124,800			
	20°C	31,540	28,595	30,970		111,530	115,995	118,560			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, S. FRY

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/22/2023 AMBIENT TEMPERATURE 19 °C HUMIDITY 24 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION MCC-55-A

NAMEPLATE DATA

MANUFACTURER EATON SERIAL NO. NA TYPE IT.028-FVC

CATALOG NO. MDT03545 DRAWING NO. NA VOLTAGE CLASS 600

PHASE AMPACITY 800 A WITHSTAND RATING 65 KA CONDUCTOR ○ CU ◉ AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
BUS	MAIN-55-A	273	291	268									
BUS	TVSS-55A	583	700	819									
BUS	SPARE SIZE 1	589	717	780									
BUS	CR3-RAF-1	637	711	962									
BUS	CR3-RAF-2	589	697	882									
BUS	SPARE SIZE 1	574	594	748									
BUS	CR3-ACU-2	579	598	785									
BUS	CR3-HSP-1	661	712	813									
BUS	CR3-ACU-1	617	658	781									
BUS	CR3-EAF-1	581	690	809									
BUS	CR3-EAF-6	975	771	966									
BUS	CR3-EAF-8	436	541	571									
BUS	CR3-EAF-10	471	622	585									
BUS	CR4-EAF-1	864	600	644									
BUS	CR4-EAF-3	511	585	697									
BUS	DL3-EAF-1	547	591	721									
BUS	ATS-55-A	41	41	47									

COMMENTS:

DEFICIENCIES:

TESTED BY: K. HORST, S. FRY

MOLDED CASE CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/22/2023 AMBIENT TEMPERATURE 19 °C HUMIDITY 24 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION MCC-55-B

BREAKER IDENTIFICATION	MANUFACTURER	SERIAL NUMBER	TYPE	FRAME RATING (Amps)	FRAME RATING (Volts)	TRIP RATING	INSTANTANEOUS TRIP	ELEMENT TYPE
MAIN	CUTLER-HAMMER	NA	HMDL 65K	800	600	800	1600	THERMAL ADJUSTABLE

INSULATION RESISTANCE (M©) @ 1000 VDC									POLE RESISTANCE (µ©)		
A - B	B - C	C - A	A - GND	B - GND	C - GND	A	B	C			
POLE TO POLE			POLE TO FRAME			LINE TO LOAD			A	B	C
223,000	198,900	281,000	52,300	51,800	53,400	474,000	467,000	473,000	548.00	407.00	517.00

Manual Trip Function ☑	RANGE	MIN TIME	MAX TIME	TRIP TESTS	A	B	C
Exercise Breaker ☑	AMPS			INSTANTANEOUS TRIP AMPS			
	SECONDS			TRIP TIME IN SECONDS @ 300% RATED CURRENT			

COMMENTS: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE FOR MAIN PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO SUB-5 CONNECTED.

DEFICIENCIES:

TESTED BY: K. HORST, S. FRY

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/22/2023 | AMBIENT TEMPERATURE: 19 °C | HUMIDITY: 24 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 5 | POSITION: MCC-55-B

NAMEPLATE DATA

MANUFACTURER: EATON | SERIAL NO.: NA | TYPE: IT.028-FVC
CATALOG NO.: MDT03545 | DRAWING NO.: NA | VOLTAGE CLASS: 600
MAIN BUS RATING: 800 A | MAIN BUS NEUTRAL RATING: NA A | CONDUCTOR: ○ CU ◉ AL
CURRENT WITHSTAND RATING: 65,000 A | NUMBER OF SECTIONS: 6 | LISTING: ☑ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER: 1 | MLO: 0 | TYPE: CUTLER | AMPACITY: 800 | MAIN DISCONNECT: 0 | FUSE TYPE: NA | SIZE: NA
TOTAL POSITIONS EQUIPPED: 17 | NO. OF SPARE SPACES: 2 | TOTAL POSITIONS USED: 15

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	NA

TEST VOLTAGE: 1 KVDC | EQUIPMENT TEMPERATURE: 19 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 0.95

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
MCC-55-B	RDG.	52,300	51,800	53,400		223,000	281,000	198,900			
	20°C	49,685	49,210	50,730		211,850	266,950	188,955			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:
DEFICIENCIES:

TESTED BY: K. HORST, S. FRY

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/22/2023 AMBIENT TEMPERATURE 19 °C HUMIDITY 24 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION MCC-55-B

NAMEPLATE DATA

MANUFACTURER EATON SERIAL NO. NA TYPE IT.028-FVC

CATALOG NO. MDT03545 DRAWING NO. NA VOLTAGE CLASS 600

PHASE AMPACITY 800 A WITHSTAND RATING 65 KA CONDUCTOR ○ CU ◉ AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
BUS	MAIN-55-B	295	280	269									
BUS	TVSS-55B	614	670	701									
BUS	CR3-AHU-2	644	722	879									
BUS	CR3-AHU-3	644	721	993									
BUS	CR3-AHU-1	639	804	788									
BUS	SPARE SIZE 1	526	640	737									
BUS	CR3-HSP-2	550	633	767									
BUS	CR3-HSP-3	697	690	763									
BUS	CR4-ACU-1	512	631	833									
BUS	CF3-EAF-7	646	810	762									
BUS	CR3-EAF-9	658	682	992									
BUS	CR3-EAF-1	570	728	779									
BUS	SPARE SIZE 2	551	563	675									
BUS	CR4-EAF-2	551	657	857									
BUS	DL3-EAF-2	874	683	754									
BUS	ATS-55-B	43	42	47									

COMMENTS:

DEFICIENCIES:

TESTED BY: K. HORST, S. FRY

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/14/2023 | AMBIENT TEMPERATURE: 22 °C | HUMIDITY: 21 % | ASSET #:
SUBSTATION: SUBSTATION 5 | POSITION: MCC-56 BUS B FEEDER

MANUFACTURER	EATON	SN / SO NO.	001 006	FRAME SIZE 800 AMPS 635 V	
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	600	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	NA	CUBICLE CODE	F6D	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	DIGITRIP 520	TRIP UNIT CAT #	5LSIG	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☐	NA	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	600	LONG	☑	1	X	600	A =	600	A	15	NA	
SENSOR TAP	600	SHORT	☑	6	X	600	A =	3,600	A	0.2	OFF	
		INST.	☑	10	X	600	A =	6,000	A	N/A	NA	
		GRD. FLT.	☑	0.35	X	600	A =	210	A	0.2	OFF	

SETTINGS AS LEFT		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	600	A =	600	A	15	NA	
SENSOR TAP	800	SHORT	☑	6	-	3,600	A			0.2	OFF	
		INST.	☑	10	-	6,000	A				NA	
		GRD. FLT.	☑	0.35	-	210	A			0.2	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	5	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	15	15	300	42-60	NA / NA	NA / NA	NA / NA	NA
Short Time PU	30	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	45	150	0.15-0.24	NA / NA	NA / NA	NA / NA	NA
Instant PU	50	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	55	110	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault PU	1.75	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	2.625	150	0.15-0.25	NA / NA	NA / NA	NA / NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	22 °C	1.1

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000
POLE TO FRAME	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000
LINE TO LOAD	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
39.5	28.8	29.9

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: E. PENLAND

MOLDED CASE CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/12/2023 AMBIENT TEMPERATURE 13 °C HUMIDITY 25 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION MCC-56-A

BREAKER IDENTIFICATION	MANUFACTURER	SERIAL NUMBER	TYPE	FRAME RATING (Amps)	FRAME RATING (Volts)	TRIP RATING	INSTANTANEOUS TRIP	ELEMENT TYPE
MAIN	CUTLER HAMMER	NA	HLD65K	600	600	600	1200	THERMAL ADJUSTABLE

INSULATION RESISTANCE (M©) @ 1000 VDC									POLE RESISTANCE (µ©)		
A - B	B - C	C - A	A - GND	B - GND	C - GND	A	B	C			
POLE TO POLE			POLE TO FRAME			LINE TO LOAD			A	B	C
53,000	67,800	56,800	22,200	30,500	29,600	451,000	477,000	681,000	122.00	806.00	120.00

Manual Trip Function ☑	RANGE	MIN TIME	MAX TIME	TRIP TESTS	A	B	C
Exercise Breaker ☑	AMPS			INSTANTANEOUS TRIP AMPS			
	SECONDS			TRIP TIME IN SECONDS @ 300% RATED CURRENT			

COMMENTS: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO SUB 5 CONNECTED.

DEFICIENCIES:

TESTED BY: E. PENLAND, S. FRY, K. ICKES

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/12/2023 | AMBIENT TEMPERATURE: 13 °C | HUMIDITY: 25 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 5 | POSITION: MCC-56-A

NAMEPLATE DATA

MANUFACTURER: CUTLER-HAMMER | SERIAL NO.: NA | TYPE: FREEDOM SERIES 2100
CATALOG NO.: MDT03545 | DRAWING NO.: NA | VOLTAGE CLASS: 480
MAIN BUS RATING: 600 A | MAIN BUS NEUTRAL RATING: NA A | CONDUCTOR: (●) CU ( ) AL
CURRENT WITHSTAND RATING: 65 kA | NUMBER OF SECTIONS: 3 | LISTING: ☑ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER: 1 | MLO: 0 | TYPE: CUTLER | AMPACITY: 600 | MAIN DISCONNECT: 0 | FUSE TYPE: NA | SIZE: NA
TOTAL POSITIONS EQUIPPED: 9 | NO. OF SPARE SPACES: 1 | TOTAL POSITIONS USED: 8

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

TEST VOLTAGE: 1 KVDC | EQUIPMENT TEMPERATURE: 13 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 0.65

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
A BUS	RDG.	22,200	30,500	29,600		53,000	56,800	67,800			
	20°C	14,430	19,825	19,240		34,450	36,920	44,070			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS: SOME CONTROL WIRING FOUND LOOSE AND IT WAS CORRECTED.
DEFICIENCIES:

TESTED BY: E. PENLAND, S. FRY, K. ICKES

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/12/2023 AMBIENT TEMPERATURE 13 °C HUMIDITY 25 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION MCC-56-A

NAMEPLATE DATA

MANUFACTURER CUTLER-HAMMER SERIAL NO. NA TYPE FREEDOM SERIES 2100

CATALOG NO. MDT03545 DRAWING NO. NA VOLTAGE CLASS 480

PHASE AMPACITY 600 A WITHSTAND RATING 65 KA CONDUCTOR (•) CU ( ) AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
BUS	TBSS-56A	3047	3078	3348									
BUS	BT1-1M	640	624	558									
BUS	OHD-1	29000	27000	27000									
BUS	SCMP-1	3223	2673	7272									
BUS	SCOL-1	28000	28000	28000									
BUS	SP-1	10000	2946	3158									
BUS	SCVR-1	29000	29000	32000									
BUS	SPARE	28000	44000	42000									
BUS	MAIN	227	199	199									

COMMENTS: DUE TO CONSTRUCTION OF MCC BUCKETS, CONTACT RESTANCES ARE READ THROUGH MOLDED CASE BREAKERS. SPARE BREAKER WAS FOUND ON. PREMIER POWER LEFT OFF.

DEFICIENCIES:

TESTED BY: E. PENLAND, S. FRY, K. ICKES

MOLDED CASE CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/12/2023 AMBIENT TEMPERATURE 13 °C HUMIDITY 25 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION MCC-56-B

BREAKER IDENTIFICATION	MANUFACTURER	SERIAL NUMBER	TYPE	FRAME RATING (Amps)	FRAME RATING (Volts)	TRIP RATING	INSTANTANEOUS TRIP	ELEMENT TYPE
MAIN	CUTLER HAMMER	NA	HLD65K	600	600	600	1200	THERMAL ADJUSTABLE

INSULATION RESISTANCE (M©) @ 1000 VDC									POLE RESISTANCE (µ©)		
A - B	B - C	C - A	A - GND	B - GND	C - GND	A	B	C	A	B	C
POLE TO POLE			POLE TO FRAME			LINE TO LOAD					
94,300	86,200	87,900	45,300	43,000	40,700	522,000	342,000	395,000	935.00	165.00	177.00

	RANGE	MIN TIME	MAX TIME	TRIP TESTS	A	B	C
Manual Trip Function ☑	AMPS			INSTANTANEOUS TRIP AMPS			
Exercise Breaker ☑	SECONDS			TRIP TIME IN SECONDS @ 300% RATED CURRENT			

COMMENTS: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO SUB 5 CONNECTED.

DEFICIENCIES:

TESTED BY: E. PENLAND, S. FRY, K. ICKES

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/12/2023 | AMBIENT TEMPERATURE: 13 °C | HUMIDITY: 25 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 5 | POSITION: MCC-56-B

NAMEPLATE DATA

MANUFACTURER: CUTLER-HAMMER | SERIAL NO.: NA | TYPE: FREEDOM SERIES 2100
CATALOG NO.: MDT03545 | DRAWING NO.: NA | VOLTAGE CLASS: 480
MAIN BUS RATING: 600 A | MAIN BUS NEUTRAL RATING: NA A | CONDUCTOR: (●) CU ( ) AL
CURRENT WITHSTAND RATING: 65 kA | NUMBER OF SECTIONS: 3 | LISTING: [x] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER: 1 | MLO: 0 | TYPE: CUTLER | AMPACITY: 600 | MAIN DISCONNECT: 0 | FUSE TYPE: NA | SIZE: NA
TOTAL POSITIONS EQUIPPED: 11 | NO. OF SPARE SPACES: 1 | TOTAL POSITIONS USED: 10

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

TEST VOLTAGE: 1 KVDC | EQUIPMENT TEMPERATURE: 13 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 0.65

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
B BUS	RDG.	45,300	43,000	40,700		94,300	87,900	86,200			
	20°C	29,445	27,950	26,455		61,295	57,135	56,030			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS: SOME CONTROL WIRING FOUND LOOSE AND IT WAS CORRECTED.
DEFICIENCIES:

TESTED BY: E. PENLAND, S. FRY, K. ICKES

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/12/2023 AMBIENT TEMPERATURE 13 °C HUMIDITY 25 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION MCC-56-B

NAMEPLATE DATA

MANUFACTURER CUTLER-HAMMER SERIAL NO. NA TYPE FREEDOM SERIES 2100

CATALOG NO. MDT03545 DRAWING NO. NA VOLTAGE CLASS 480

PHASE AMPACITY 600 A WITHSTAND RATING 65 KA CONDUCTOR (●) CU ( ) AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
BUS	MAIN	209	195	174									
BUS	TVSS-56B	3669	3022	3711									
BUS	BT2-1M	923	551	4549									
BUS	DP-56	104	205	96									
BUS	SCMP-2	2674	2725	3020									
BUS	SCOL-2	28500	40360	29120									
BUS	SP-2	2769	2982	3691									
BUS	SCVR-2	32420	44270	29860									
BUS	RF-26	159000	164000	165000									
BUS	SPARE	39500	13453	3504									
BUS	GT-1	8035	7595	7420									

COMMENTS: DUE TO CONSTRUCTION OF MCC BUCKETS, CONTACT RESTANCES ARE READ THROUGH MOLDED CASE BREAKERS. SPARE BREAKER WAS FOUND ON. PREMIER POWER LEFT OFF.

DEFICIENCIES:

TESTED BY: E. PENLAND, S. FRY, K. ICKES

LOADBREAK DISCONNECT TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/15/2023 AMBIENT TEMPERATURE 22 °C HUMIDITY 21 % EQPT. LOCATION

SUBSTATION SUBSTATION 5 POSITION PRIMARY SWITCH MAIN A

NAMEPLATE DATA

MANUFACTURER EATON TYPE MVS SERIAL NO. MDT03545-002 MFG DATE 2016

RATED VOLTAGE 15,000 SYSTEM VOLTAGE 13200 AMPERES 1200 INTERRUPTING RATING 61 KA B.I.L. RATING 95 KV

TYPE OPERATING MECHANISM MANUAL MOMENTARY FAULT INTERUPTING 61 KA MOMENTARY FAULT CLOSING AMPS 47 KA

FUSE DATA

MANUFACTURER EATON TYPE 5982C44A43 HOLDER CLIP MAX. AMPS 200

REFILL ELEMENT TYPE NA SIZE 200E CAT. NO. 15RBA4-200E TCC NO. NA VOLTAGE 15.5 KV

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTION	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
INTERLOCKS	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
Contacts	☑	GOOD	C/L
HEATERS	☐	NA	NA
OPERATING MECHANISM	☑	GOOD	C/L
HAZARD WARNING LABELS	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	22 °C	1.1

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	15,000,000	16,500,000	15,000,000	16,500,000	15,000,000	16,500,000
POLE TO FRAME	5,350,000	5,885,000	12,340,000	13,574,000	13,650,000	15,015,000
LINE TO LOAD	15,000,000	16,500,000	15,000,000	16,500,000	15,000,000	16,500,000

POLE RESISTANCE (µ©)			
	POLE 1	POLE 2	POLE 3
AS FOUND	34.9	31.5	38.1
AS LEFT	34.9	31.5	38.1

FUSE TESTING (m©)		
PHASE A	PHASE B	PHASE C
0.6454	0.6944	0.7955

ARRESTERS TESTING (M©)			
TEST VOLTAGE KV / 1 MIN	PHASE A	PHASE B	PHASE C
5	135,800	136,800	134,300

DIELECTRIC WITHSTAND (mA)			
TEST VOLTAGE 27 KVAC	POLE 1	POLE 2	POLE 3
SWITCH CLOSED - POLE TO GND OTHER POLES GROUNDED	0.1	0.1	0.1

COMMENTS: PRIMARY CABLE INSULATION RESISTANCES: A-G - 59,500 MEGAOHMS; B-G - 65,100 MEGAOHMS; C-G - 52,600 MEGAOHMS; A-B - 121,300 MEGAOHMS; B-C - 128,900 MEGAOHMS; C-A - 125,100 MEGAOHMS.

DEFICIENCIES:

TESTED BY: K. HORST, E. PENLAND

LOADBREAK DISCONNECT TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/14/2023 | AMBIENT TEMPERATURE: 22 °C | HUMIDITY: 21 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 5 | POSITION: PRIMARY SWITCH MAIN B

NAMEPLATE DATA

MANUFACTURER: EATON | TYPE: MVS | SERIAL NO.: MDT03545-001 | MFG DATE: 2016
RATED VOLTAGE: 15,000 | SYSTEM VOLTAGE: 13200 | AMPERES: 1200 | INTERRUPTING RATING: 61 KA | B.I.L. RATING: 95 KV
TYPE OPERATING MECHANISM: MANUAL | MOMENTARY FAULT INTERUPTING: 61 KA | MOMENTARY FAULT CLOSING AMPS: 47 KA

FUSE DATA

MANUFACTURER: EATON | TYPE: 5982C44A43 | HOLDER: CLIP | MAX. AMPS: 200
REFILL ELEMENT TYPE: NA | SIZE: 200E | CAT. NO.: 15RBA4-200E | TCC NO.: NA | VOLTAGE: 15.5 KV

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTION	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
INTERLOCKS	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
Contacts	☑	GOOD	C/L
HEATERS	☐	NA	NA
OPERATING MECHANISM	☑	GOOD	C/L
HAZARD WARNING LABELS	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	22 °C	1.1

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	15,000,000	16,500,000	15,000,000	16,500,000	15,000,000	16,500,000
POLE TO FRAME	6,440,000	7,084,000	8,160,000	8,976,000	9,440,000	10,384,000
LINE TO LOAD	15,000,000	16,500,000	15,000,000	16,500,000	15,000,000	16,500,000

POLE RESISTANCE (µ©)			
	POLE 1	POLE 2	POLE 3
AS FOUND	36.9	43.4	45.0
AS LEFT	36.9	43.4	45.0

FUSE TESTING (m©)		
PHASE A	PHASE B	PHASE C
0.768	0.718	0.824

ARRESTERS TESTING (M©)			
TEST VOLTAGE KV / 1 MIN	PHASE A	PHASE B	PHASE C
5	132,600	125,800	119,500

DIELECTRIC WITHSTAND (mA)			
TEST VOLTAGE 27 KVAC	POLE 1	POLE 2	POLE 3
SWITCH CLOSED - POLE TO GND OTHER POLES GROUNDED	0.1	0.1	0.1

COMMENTS: PRIMARY CABLE INSULATION RESISTANCES: A-G - 63,800 MEGAOHMS; B-G - 70,200 MEGAOHMS; C-G - 71,000 MEGAOHMS; A-B - 137,400 MEGAOHMS; B-C - 146,500 MEGAOHMS; C-A - 149,100 MEGAOHMS.
STORED ENERGY SPRING HAS MISSING PARTS, WASHER AND COTTER PIN. REPLACED IN THE FIELD.

DEFICIENCIES:

TESTED BY: E. PENLAND, K. HORST, B. BURGESS

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/14/2023 | AMBIENT TEMPERATURE: 22 °C | HUMIDITY: 21 % | ASSET #:
SUBSTATION: SUBSTATION 5 | POSITION: SPARE

MANUFACTURER	EATON	SN / SO NO.	001 005	FRAME SIZE 800 AMPS 635 V	
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	800	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	NA	CUBICLE CODE	F5H	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	DIGITRIP 520	TRIP UNIT CAT #	5LSIG	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☐	NA	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A	12	NA	
SENSOR TAP	800	SHORT	☑	6	X	800	A =	4,800	A	0.2	OFF	
		INST.	☑	10	X	800	A =	8,000	A	N/A	NA	
		GRD. FLT.	☑	0.35	X	800	A =	280	A	0.2	OFF	

SETTINGS AS LEFT		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A	12	NA	
SENSOR TAP	800	SHORT	☑	6	-	4,800	A			0.2	OFF	
		INST.	☑	10	-	8,000	A				NA	
		GRD. FLT.	☑	0.35	-	280	A			0.2	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	5	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	12	15	300	33.6-48	NA / NA	NA / NA	NA / NA	NA
Short Time PU	30	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	45	150	0.15-0.24	NA / NA	NA / NA	NA / NA	NA
Instant PU	50	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	55	110	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault PU	1.75	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	2.625	150	0.15-0.25	NA / NA	NA / NA	NA / NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	22 °C	1.1

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000
POLE TO FRAME	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000
LINE TO LOAD	3,000,000	3,300,000	3,000,000	3,300,000	3,000,000	3,300,000

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
21.0	17.5	20.4

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: E. PENLAND

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/15/2023 | AMBIENT TEMPERATURE: 21 °C | HUMIDITY: 16 % | ASSET #:
SUBSTATION: SUBSTATION 5 | POSITION: TIE

MANUFACTURER	EATON	SN / SO NO.	001 001	FRAME SIZE 4,000 AMPS	600 V
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	3200	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	T5B	ELECTRICALLY OPERATED	(●) YES ( ) NO
TRIP UNIT TYPE	DIGITRIP 520	TRIP UNIT CAT #	5LSIG	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	3,200	LONG	☑	0.9	X	3,200	A =	2,880	A	4	NA	
SENSOR TAP	3,200	SHORT	☑	2.5	X	2,880	A =	7,200	A	0.3	OFF	
		INST.	☐		X		=		A			
		GRD. FLT.	☑	0.3	X	3,200	A =	960	A	0.3	OFF	

SETTINGS AS LEFT		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	3,200	LONG	☑	0.9	X	3,200	A =	2,880	A	4	NA	
SENSOR TAP	3,200	SHORT	☑	25	-	7,200	A			0.3	OFF	
		INST.	☐									
		GRD. FLT.	☑	0.3	-	960	A			0.3	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.9	4.5	100	4 - 4.9	4.8 / 4.8	4.8 / 4.8	4.8 / 4.8	NA
Long Time Delay	4	13.5	300	11.2 - 16	12.8 / 12.8	14.2 / 14.2	13.1 / 13.1	NA
Short Time PU	2.5	11.2	100	N/A	13 / 13	13 / 13	13 / 13	NA
Short Time Delay	0.3	20	150	0.24 - 0.34	0.28 / 0.28	0.29 / 0.29	0.3 / 0.3	NA
GRD Fault PU	0.3	0.3	100	N/A	N/A / N/A	N/A / N/A	N/A / N/A	NA
GRD Fault Delay	0.3	0.5	150	0.2 - 0.34	0.3 / 0.3	0.3 / 0.3	0.3 / 0.3	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	21 °C	1.05

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000
POLE TO FRAME	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000
LINE TO LOAD	3,000,000	3,150,000	3,000,000	3,150,000	3,000,000	3,150,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
56.4	69.0	48.0

COUNTER END: NA

COMMENTS:
BREAKER IS A DOUBLE WIDE LISTED BELOW IS OTHER PHASES INSULATION RESISTANCE
L - L : A - 3,000,000 , B - 3,000,000 , C - 3,000,000
P - P : A - B - 3,000,000 , B - C - 3,000,000 , C - A - 3,000,000
P - G : A - G - 3,000,000 , B - G , 3,000,000 , C - G , 3,000,000
CONTACT RESISTANCE - A : 74.9 B: 59.8 C: 48.7

DEFICIENCIES:

TESTED BY: K. ICKES

TRANSFORMER MAINTENANCE AND INSPECTION

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/15/2023 | AMBIENT TEMPERATURE: 22 °C | HUMIDITY: 21 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 5 | POSITION: XFMR 1

NAMEPLATE DATA

MANUFACTURER: CUTLER-HAMMER | YR MFR: 2009 | SERIAL NO.: DS84963001
IMPEDANCE: 5.94 % | NUMBER OF FANS: 12 | WEIGHT: 16700 LBS | TYPE: CAST | CLASS: AA / AA / FA
KVA: 2,000 / 2,200 / 2,933 | WINDING MATERIAL: COPPER | TEMPERATURE RISE: 100 °C | B.I.L. RATING: 30 / 95
PRIMARY V: 13,200 | DELTA | MFR LOCATION: BLAND, VA
SECONDARY V: 480 / 277.12 | WYE | ☑ EXPOSED NEUTRAL - X0 | TANK TYPE: VENTED
TAP VOLTAGES: 13,860 | 13,530 | 13,200 | 12,870 | 12,540 | INSULATING MATERIAL: PAPER
TAP POSITION: G-K | F-K | G-L | F-L | E-L | WINDING INSUATING SYSTEM: OPEN-WOUND
TAP SETTING: G-L 13,200 V | ☑ HIGH SIDE TAP | ☐ LOW SIDE TAP

VISUAL AND MECHANICAL INSPECTION

	Description	NOTES
☑	REASON FOR INSPECTION	ROUTINE
☑	CHECK FOR SIGNS OF OVERHEATING, DISCOLORATION	GOOD
☑	ENCLOSURE (OPENINGS, COVERS, PAINT, ETC)	GOOD
☑	CHECK ALL CONNECTIONS TIGHT	GOOD
☑	IMPROPER TERMINATIONS	GOOD
☑	EQUIPMENT GROUND/GROUND BAR	GOOD
☑	CORE GROUND	GOOD
☑	NEUTRAL BAR	GOOD
☑	PRIMARY SIDE (CABLE OR BUSS)	GOOD

	Description	NOTES
☑	SECONDARY SIDE (CABLE OR BUSS)	GOOD
☑	CLEAN AND INSPECT INSULATORS, SUPPORTS, AND BARRIERS	GOOD
☑	CLEAN CORE, COIL, AND ENCLOSURE (INTERIOR/EXTERIOR)	GOOD
☑	CORE AND COIL BRACING	GOOD
☑	VIBRATION ISOLATATION PADS	GOOD
☑	PROPER CLEARANCE (36 INCHES UNOBSTRUCTED)	GOOD
☑	CONTROL WIRING	GOOD
☑	COOLING FANS	NO CRTL PWR
☐	ALARMS AND INDICATORS	NA

ELECTRICAL TESTS

INSULATION RESISTANCE (Mohm)

MINUTES	PRIMARY TO GROUND	SECONDARY TO GROUND	PRIMARY TO SECONDARY
Test kV	5	1	5
0.50	845,000	99,700	1,597,000
1.00	1,300,000	158,200	2,520,000
10.00	2,960,000	392,000	3,720,000
P. I. (10min/1min)	2.28	2.48	1.48

WINDING RESISTANCE TEST (mohm)

APPARATUS TEMP. (°C)	22	TEST AMPS	10

H3-H1		H1-H2		H2-H3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
302.30	305.84	303.06	306.60	301.50	305.03
X0-X1		X0-X2		X0-X3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
0.325	0.329	0.308	0.311	0.283	0.286

TRANSFORMER TURN RATIO TEST

TAP	CALC	PHASE A	PHASE B	PHASE C
G-L	47.633	47.755	47.756	47.765
% ERROR		0.257%	0.259%	0.278%

EXTERNAL DOCUMENTS ATTACHED TO REPORT

COMMENTS: EXCITATION CURRENT A - 3.3 MILLIAMPS; B- 2.7 MILLIAMPS; C - 3.4 MILLAMPS.
DEFICIENCIES:

TESTED BY: E. PENLAND, S. FRY

TRANSFORMER MAINTENANCE AND INSPECTION

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/14/2023 | AMBIENT TEMPERATURE: 22 °C | HUMIDITY: 21 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 5 | POSITION: XFMR 2

NAMEPLATE DATA

MANUFACTURER: CUTLER-HAMMER | YR MFR: 2009 | SERIAL NO.: DS84964001
IMPEDANCE: 5.91 % | NUMBER OF FANS: 12 | WEIGHT: 16700 LBS | TYPE: CAST | CLASS: AA / AA / FA
KVA: 2,000 / 2,200 / 2,933 | WINDING MATERIAL: COPPER | TEMPERATURE RISE: 100 °C | B.I.L. RATING: 30 / 95
PRIMARY V: 13,200 | DELTA | MFR LOCATION: BLAND, VA
SECONDARY V: 480 / 277.12 | WYE | ☑ EXPOSED NEUTRAL - X0 | TANK TYPE: VENTED
TAP VOLTAGES: 13,860 | 13,530 | 13,200 | 12,870 | 12,540 | INSULATING MATERIAL: PAPER
TAP POSITION: G-K | F-K | G-L | F-L | E-L | WINDING INSUATING SYSTEM: OPEN-WOUND
TAP SETTING: G-L 13,200 V | ☑ HIGH SIDE TAP | ☐ LOW SIDE TAP

VISUAL AND MECHANICAL INSPECTION

	Description	NOTES
☑	REASON FOR INSPECTION	ROUTINE
☑	CHECK FOR SIGNS OF OVERHEATING, DISCOLORATION	GOOD
☑	ENCLOSURE (OPENINGS, COVERS, PAINT, ETC)	GOOD
☑	CHECK ALL CONNECTIONS TIGHT	GOOD
☑	IMPROPER TERMINATIONS	GOOD
☑	EQUIPMENT GROUND/GROUND BAR	GOOD
☑	CORE GROUND	GOOD
☑	NEUTRAL BAR	GOOD
☑	PRIMARY SIDE (CABLE OR BUSS)	GOOD

	Description	NOTES
☑	SECONDARY SIDE (CABLE OR BUSS)	GOOD
☑	CLEAN AND INSPECT INSULATORS, SUPPORTS, AND BARRIERS	GOOD
☑	CLEAN CORE, COIL, AND ENCLOSURE (INTERIOR/EXTERIOR)	GOOD
☑	CORE AND COIL BRACING	GOOD
☑	VIBRATION ISOLATATION PADS	GOOD
☑	PROPER CLEARANCE (36 INCHES UNOBSTRUCTED)	GOOD
☑	CONTROL WIRING	GOOD
☑	COOLING FANS	SEE COMMENTS
☐	ALARMS AND INDICATORS	NA

ELECTRICAL TESTS

INSULATION RESISTANCE (Mohm)

MINUTES	PRIMARY TO GROUND	SECONDARY TO GROUND	PRIMARY TO SECONDARY
Test kV	5	1	5
0.50	315,000	55,500	305,000
1.00	395,000	111,300	741,000
10.00	467,000	412,000	885,000
P. I. (10min/1min)	1.18	3.70	1.19

WINDING RESISTANCE TEST (mohm)

APPARATUS TEMP. (°C)	22	TEST AMPS	10

H3-H1		H1-H2		H2-H3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
302.66	306.20	302.16	305.69	302.92	306.46
X0-X1		X0-X2		X0-X3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
0.332	0.336	0.314	0.318	0.293	0.296

TRANSFORMER TURN RATIO TEST

TAP	CALC	PHASE A	PHASE B	PHASE C
G-L	47.633	47.740	47.720	47.735
% ERROR		0.225%	0.183%	0.215%

EXTERNAL DOCUMENTS ATTACHED TO REPORT

COMMENTS: EXCITATION CURRENT A - 2.5 MILLIAMPS; B- 1.8 MILLIAMPS; C - 2.3 MILLAMPS.
DEFICIENCIES: 1 BAD FAN. FRONT OF THE TRANSFORMER, CENTER PHASE, RIGHT FAN. RECOMMEND REPLACE.

TESTED BY: E. PENLAND, S. FRY

SWITCHGEAR INSPECTION AND TEST REPORT

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/1/2023 AMBIENT TEMPERATURE 25 °C HUMIDITY 25 % EQPT. LOCATION EAST BLOWER BUILDING

SUBSTATION SUBSTATION 6 POSITION 480V SWITCHGEAR BUS A

SWITCHGEAR NAMEPLATE

MANUFACTURER SQUARE D TYPE ARC RESISTANT SN / SO NO. G-726036 G-801552 MFG DATE 2014

STYLE / CAT # / BUILD NUMBER 30951271-024 SYSTEM VOLTAGE 480 RATED VOLTAGE 600 SERVICE 3 WIRE

BUS AMPACITIES 1600 OVERCURRENT DEVICE TYPE/CAT. MICROLOGIC 6.0A INTERRUPT RATINGS 100KA

NEUTRAL NO Other NA

INSPECTION CHECKLIST / REMARKS

☑ REASON FOR INSPECTION	ROUTINE MAINTENANCE AND TESTING
☑ CLEAN SWITCHGEAR, CUBICLES, BUS, AND INSULATORS	YES
☑ OVERHEATING (CHECK FOR HOT SURFACES, DISCOLORATION)	NO SIGNS OF OVERHEATING
☑ CHECK FOR UNUSED OPENINGS	2 UNUSED CUBUCLES
☑ CHECK ELECTRICAL CONNECTIONS	GOOD
☑ VENTS AND FILTER	VENTS ARE GOOD, NO FILTERS
☑ PROPER CLEARANCE	GOOD
☑ PANEL ID AND ARC FLASH WARNING (PANEL LABEL)	NO ARC FLASH LABELS
☑ INDICATING LIGHTS	GOOD
☑ INTERLOCKS	GOOD
☐ HEATERS	N/A
☑ PANEL SCREWS (MISSING, STRIPPED, ETC)	NO MISSING SCREWS
☑ BARRIER BOARDS AND SHUTTER OPERATION	BARRIER BOARDS IN GOOD SHAPE. NO SHUTTERS INSTALLED

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
500 V	24 °C	1.2

INSULATION RESISTANCE	POLE 1 (M-OHM) (P1-P2)		POLE 2 (M-OHM) (P2-P3)		POLE 3 (M-OHM) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1,044,000	1,252,800	1,487,000	1,784,400	1,489,000	1,786,800
POLE TO FRAME	1,079,000	1,294,800	531,000	637,200	998,000	1,197,600
LINE TO LOAD						

DIELECTRIC WITHSTAND (mA)			
TEST VOLTAGE _____KV			
Phase #1	Phase #2	Phase #3	Neutral
N/A	N/A	N/A	N/A

POTENTIAL XFMRS	INSULATION RESISTANCE (M-OHM)			TURNS RATIO
	HIGH TO LOW	HIGH TO GND	LOW TO GND	
	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) .5	CALCULATED RATIO 4
LEFT	239,000	327,000	271,000	3.998
CENTER	239,000	327,000	271,000	3.998
RIGHT	239,000	327,000	271,000	3.999

BUS BAR RESISTANCE (µ-OHM)				
Ground	NEUTRAL	Phase #1	Phase #2	Phase #3
N/A	N/A	48	51	51

CONTROL POWER XFMR	INSULATION RESISTANCE (M-OHM)			TURNS RATIO	
	HIGH TO LOW	HIGH TO GND	LOW TO GND		
	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) .5	CALCULATED RATIO 4	
	1,016,000	1,761,000	1,500,000	PHASE A	3.889
				PHASE B	3.889
				PHASE C	3.889

COMMENTS: SURGE LOGIC FUNCTIONING NORMALLY

DEFICIENCIES:

TESTED BY: C. KROUT

SWITCHGEAR INSPECTION AND TEST REPORT

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 11/29/2023 AMBIENT TEMPERATURE 24 °C HUMIDITY 15 % EQPT. LOCATION EAST BLOWER BUILDING

SUBSTATION SUBSTATION 6 POSITION 480V SWITCHGEAR BUS B

SWITCHGEAR NAMEPLATE

MANUFACTURER SQUARE D TYPE ARC RESISTANT SN / SO NO. G-8015552 G-726039 MFG DATE 2014

STYLE / CAT # / BUILD NUMBER 30951271-024 SYSTEM VOLTAGE 480 RATED VOLTAGE 600 SERVICE 3 WIRE

BUS AMPACITIES 1600 OVERCURRENT DEVICE TYPE/CAT. MICROLOGIC 6.0A INTERRUPT RATINGS 100KA

NEUTRAL NO Other NA

INSPECTION CHECKLIST / REMARKS

☑ REASON FOR INSPECTION	ROUTINE MAINTENANCE AND TESTING
☑ CLEAN SWITCHGEAR, CUBICLES, BUS, AND INSULATORS	YES
☑ OVERHEATING (CHECK FOR HOT SURFACES, DISCOLORATION)	NO SIGNS OF OVERHEATING
☑ CHECK FOR UNUSED OPENINGS	2 UNUSED CUBUCLES
☑ CHECK ELECTRICAL CONNECTIONS	GOOD
☑ VENTS AND FILTER	VENTS ARE GOOD, NO FILTERS
☑ PROPER CLEARANCE	GOOD
☑ PANEL ID AND ARC FLASH WARNING (PANEL LABEL)	NO ARC FLASH LABELS
☑ INDICATING LIGHTS	GOOD
☑ INTERLOCKS	GOOD
☐ HEATERS	N/A
☑ PANEL SCREWS (MISSING, STRIPPED, ETC)	NO MISSING SCREWS
☑ BARRIER BOARDS AND SHUTTER OPERATION	BARRIER BOARDS IN GOOD SHAPE. NO SHUTTERS INSTALLED

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
500 V	24 °C	1.2

INSULATION RESISTANCE	POLE 1 (M-OHM) (P1-P2)		POLE 2 (M-OHM) (P2-P3)		POLE 3 (M-OHM) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1,500,000	1,800,000	1,966,000	2,359,200	2,480,000	2,976,000
POLE TO FRAME	2,480,000	2,976,000	918,000	1,101,600	1,470,000	1,764,000
LINE TO LOAD						

DIELECTRIC WITHSTAND (mA)			
TEST VOLTAGE _____KV			
Phase #1	Phase #2	Phase #3	Neutral
N/A	N/A	N/A	N/A

POTENTIAL XFMRS	INSULATION RESISTANCE (M-OHM)			TURNS RATIO
	HIGH TO LOW	HIGH TO GND	LOW TO GND	
	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) .5	CALCULATED RATIO 4
LEFT	213,000	208,000	297,000	3.955
CENTER	213,000	208,000	297,000	3.995
RIGHT	213,000	208,000	297,000	3.995

BUS BAR RESISTANCE (µ-OHM)				
Ground	NEUTRAL	Phase #1	Phase #2	Phase #3
N/A	N/A	47.9	51.3	50.1

CONTROL POWER XFMR	INSULATION RESISTANCE (M-OHM)			TURNS RATIO	
	HIGH TO LOW	HIGH TO GND	LOW TO GND		
	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) .5	CALCULATED RATIO 4	
	671,000	879,000	838,000	PHASE A	3.885
				PHASE B	3.885
				PHASE C	3.885

COMMENTS: SURGE LOGIC FUNCTIONING NORMALLY

DEFICIENCIES:

TESTED BY: C. KROUT, E. PENLAND

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/1/2023 | AMBIENT TEMPERATURE: 25 °C | HUMIDITY: 28 % | ASSET #:
SUBSTATION: SUBSTATION 6 | POSITION: MAIN A 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085262997101	FRAME SIZE 1,600 AMPS 600 V	
BREAKER TYPE	WA6EER44A9CFFFWSEA	SENSOR TAPS	1600	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	NA	CUBICLE CODE	1B	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	MICROLOGIC 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C
CONTACT FINGERS	☑	GOOD	C
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	C
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	C

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	1,600	LONG	☑	0.9	X	1,600	A =	1,440	A		2	NA	
SENSOR TAP	1,600	SHORT	☑	2.5	X	1,600	A =	4,000	A		0.3	0FF	
		INST.	☐		X		=		A				
		GRD. FLT.	☑	0.4	X	1,600	A =	640	A		0.4	0FF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	1,600	LONG	☑	0.9	X	1,600	A =	1,440	A		2	NA	
SENSOR TAP	1,600	SHORT	☑	2.5	-	4,000	A				0.3	0FF	
		INST.	☐										
		GRD. FLT.	☑	0.4	-	640	A				0.4	0FF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.9	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	2	2880	NA	NA	19.430 / 19.430	19.430 / 19.430	19.430 / 19.430	NA
Short Time PU	2.5	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.3	4500	NA	NA	0.288 / 0.288	0.288 / 0.288	0.288 / 0.288	NA
GRD Fault PU	0.4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.4	1280	NA	NA	0.402 / 0.402	0.402 / 0.402	0.402 / 0.402	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	25 °C	1.25

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,750,000	3,000,000	3,750,000	3,000,000	3,750,000
POLE TO FRAME	3,000,000	3,750,000	3,000,000	3,750,000	3,000,000	3,750,000
LINE TO LOAD	3,000,000	3,750,000	3,000,000	3,750,000	3,000,000	3,750,000

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
11.8	11.8	12.2

COUNTER END: NA

COMMENTS: ALL BREAKERS TESTING WITH AS FOUND SETTINGS. PASS SECONDARY INJECTION
DEFICIENCIES:

TESTED BY: C. KROUT

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/29/2023 | AMBIENT TEMPERATURE: 24 °C | HUMIDITY: 15 % | ASSET #:
SUBSTATION: SUBSTATION 6 | POSITION: MAIN B 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085262997103	FRAME SIZE 1,600 AMPS 600 V	
BREAKER TYPE	WA6EER44A9CFFFWSEA	SENSOR TAPS	1600	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	NA	CUBICLE CODE	4B	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	MICROLOGIC 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C
CONTACT FINGERS	☑	GOOD	C
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	C
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	C

SETTINGS AS FOUND	FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	LONG	☑	0.9	X	1,600	A =	1,440	A		2	NA	
SENSOR TAP	SHORT	☑	2.5	X	1,600	A =	4,000	A		0.3	0FF	
	INST.	☐		X		=		A				
	GRD. FLT.	☑	0.4	X	1,600	A =	640	A		0.4	OFF	

SETTINGS AS LEFT	FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	LONG	☑	0.9	X	1,600	A =	1,440	A		2	NA	
SENSOR TAP	SHORT	☑	2.5	-	4,000	A				0.3	0FF	
	INST.	☐										
	GRD. FLT.	☑	0.4	-	640	A				0.4	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.9	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	2	2880	NA	NA	19.478 / 19.478	19.478 / 19.478	19.478 / 19.478	NA
Short Time PU	2.5	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.3	4500	NA	NA	0.278 / 0.278	0.278 / 0.278	0.278 / 0.278	NA
GRD Fault PU	0.4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.4	1280	NA	NA	0.402 / 0.402	0.402 / 0.402	0.402 / 0.402	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	24 °C	1.2

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1,376,000	1,651,200	3,000,000	3,600,000	3,000,000	3,600,000
POLE TO FRAME	2,980,000	3,576,000	2,880,000	3,456,000	3,000,000	3,600,000
LINE TO LOAD	3,000,000	3,600,000	3,000,000	3,600,000	3,000,000	3,600,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
11.6	10.8	10.9

COUNTER END: NA

COMMENTS: ALL BREAKERS TESTING WITH AS FOUND SETTINGS. PASS SECONDARY INJECTION
DEFICIENCIES:

TESTED BY: C. KROUT

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/1/2023 | AMBIENT TEMPERATURE: 24 °C | HUMIDITY: 25 % | EQPT. LOCATION: EAST BLOWER BUILDING
SUBSTATION: SUBSTATION 6 | POSITION: MCC-EBB-A

NAMEPLATE DATA

MANUFACTURER: SQUARE D | SERIAL NO.: A1248058 | TYPE: MODEL 6
CATALOG NO.: 3095127-141 | DRAWING NO.: 80459-641-01 | VOLTAGE CLASS: 600
MAIN BUS RATING: 600 A | MAIN BUS NEUTRAL RATING: NA A | CONDUCTOR: ○ CU ◉ AL
CURRENT WITHSTAND RATING: 35 KA | NUMBER OF SECTIONS: 6 | LISTING: ☑ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER: 0 | MLO: YES | TYPE: 12 | AMPACITY: NA | MAIN DISCONNECT: NA | FUSE TYPE: NA | SIZE: NA
TOTAL POSITIONS EQUIPPED: 26 | NO. OF SPARE SPACES: 8 | TOTAL POSITIONS USED: 34

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Good	NA
INSULATING MEMBERS	☑	Good	NA
CUBICLES	☑	Good	NA
GROUND CONNECTIONS	☑	Good	NA
AUXILIARY DEVICES	☑	Good	NA

TEST VOLTAGE: 1,000 KVDC | EQUIPMENT TEMPERATURE: 24 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 1.24

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
	RDG.	285,000	278,000	258,000		478,000	389,000	466,000			
	20°C	353,400	344,720	319,920		592,720	482,360	577,840			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS: INCLUDES FEEDER CABLES
DEFICIENCIES:

TESTED BY: K. HORST

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/1/2023 AMBIENT TEMPERATURE 24 °C HUMIDITY 25 % EQPT. LOCATION EAST BLOWER BUILDING

SUBSTATION SUBSTATION 6 POSITION MCC-EBB-A

NAMEPLATE DATA

MANUFACTURER SQUARE D SERIAL NO. A1248058 TYPE MODEL 6

CATALOG NO. 3095127-141 DRAWING NO. 80459-641-01 VOLTAGE CLASS 480

PHASE AMPACITY 600 A WITHSTAND RATING 35 KA CONDUCTOR ○ CU ◉ AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
	SURGE	635	635	565									
	SPARE	647	707	623									
	EQUIP REC	641	657	691									
	SPARE												
	HOIST 1	615	638	615									
	SPARE	706	601	615									
	SC-E1	681	700	655									
	SC-E3	1067	823	886									
	RASP-E1	447	423	365									
	RASP-E3	436	478	386									
	RASP-E5	468	494	414									
	EBB-EF-6	811	706	694									
	LP-U	541	493	451									
	LP-O	529	520	482									
	SSCP-E1	513	424	417									
	ADP-E2	445	406	395									
	RASP-E7	564	539	506									
	WASP-E1	840	789	795									
	SUMP PUMP2	857	815	807									
	PP-EBB-A	347	292	267									
	HOIST 2	899	840	827									
	SUMP PUMP4	841	831	812									
	EBB-HV-1	770	824	704									
	EBB-RF-4	958	983	910									
	EBB-EF-10	779	916	764									

COMMENTS: PP-EBB-A HAD LOOSE BOLT CONNECTING 400A LJ BREAKER TO THE BUS WITH VERY HIGH RESISTANCE.
REMOVED THE BOLT, CHASED THE THREADS AND REINSTALLED BUT THE BOLTS WERE TOO LONG.
PLACED A WASHER UNDER THE BOLT HEAD AND NOW IT HAS PROPER RESISTANCE

DEFICIENCIES:

TESTED BY: K. HORST

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/1/2023 | AMBIENT TEMPERATURE: 25 °C | HUMIDITY: 28 % | ASSET #:
SUBSTATION: SUBSTATION 6 | POSITION: MCC-EBB-A 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085267997201	FRAME SIZE 800 AMPS 600	V
BREAKER TYPE	WA6ATR44B9CXFXWXAA	SENSOR TAPS	600	MOUNTING (●) D.O. ( ) B.I.	
FUSE CAT. NO.	NA	CUBICLE CODE	2C	ELECTRICALLY OPERATED ( ) YES (●) NO	
TRIP UNIT TYPE	MICROLOGIC 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING NA	

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C
CONTACT FINGERS	☑	GOOD	C
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	C
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	C

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	600	LONG	☑	1	X	600	A =	600	A		8	NA	
SENSOR TAP	600	SHORT	☑	3	X	600	A =	1,800	A		0.1	0FF	
		INST.	☑	15	X		A =		A		N/A	NA	
		GRD. FLT.	☑	0.4	X	600	A =	240	A		0.2		

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	600	LONG	☑	1	X	600	A =	600	A		8	NA	
SENSOR TAP	600	SHORT	☑	3	-	1,800	A				0.1	0FF	
		INST.	☑	15	-		A					NA	
		GRD. FLT.	☑	0.4	-	240	A				0.2		

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	8	1400	NA	NA	49.897 / 49.897	49.897 / 49.897	49.897 / 49.897	NA
Short Time PU	3	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.1	5400	NA	NA	0.096 / 0.096	0.096 / 0.096	0.096 / 0.096	NA
Instant PU	15	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay		11250	NA	NA	0.037 / 0.037	0.037 / 0.037	0.037 / 0.037	NA
GRD Fault PU	0.4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	480	NA	NA	0.155 / 0.155	0.155 / 0.155	0.155 / 0.155	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	25 °C	1.25

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,750,000	3,000,000	3,750,000	3,000,000	3,750,000
POLE TO FRAME	3,000,000	3,750,000	3,000,000	3,750,000	3,000,000	3,750,000
LINE TO LOAD	3,000,000	3,750,000	3,000,000	3,750,000	3,000,000	3,750,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
11.7	12.3	11.8

COUNTER END: NA

COMMENTS: ALL BREAKERS TESTING WITH AS FOUND SETTINGS. PASS SECONDARY INJECTION
DEFICIENCIES:

TESTED BY: C. KROUT

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/30/2023 | AMBIENT TEMPERATURE: °C | HUMIDITY: % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 6 | POSITION: MCC-EBB-B

NAMEPLATE DATA

MANUFACTURER: SQUARE D | SERIAL NO.: A0291310 | TYPE: 12
CATALOG NO.: 30951271-142 | DRAWING NO.: 80459-641-01 | VOLTAGE CLASS: 600
MAIN BUS RATING: 600 A | MAIN BUS NEUTRAL RATING: NA A | CONDUCTOR: ○ CU ◉ AL
CURRENT WITHSTAND RATING: NA | NUMBER OF SECTIONS: 6 | LISTING: ☑ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER: 0 | MLO: 0 | TYPE: NA | AMPACITY: NA | MAIN DISCONNECT: 0 | FUSE TYPE: NA | SIZE: NA
TOTAL POSITIONS EQUIPPED: 34 | NO. OF SPARE SPACES: 7 | TOTAL POSITIONS USED: 27

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

TEST VOLTAGE: 1 KVDC | EQUIPMENT TEMPERATURE: 22 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 1.12

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
MCC-EBB-B	RDG.	494,000	473,000	388,000		507,000	664,000	524,000			
	20°C	553,280	529,760	434,560		567,840	743,680	586,880			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:
DEFICIENCIES:

TESTED BY: C. KROUT

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 11/30/2023 AMBIENT TEMPERATURE 22.2 °C HUMIDITY 25 % EQPT. LOCATION EAST BLOWER BUILDING

SUBSTATION SUBSTATION 6 POSITION MCC-EBB-B

NAMEPLATE DATA

MANUFACTURER SQUARE D SERIAL NO. A0291310 TYPE 12

CATALOG NO. 30951271-142 DRAWING NO. 80459-641-01 VOLTAGE CLASS 600

PHASE AMPACITY 600 A WITHSTAND RATING NA KA CONDUCTOR ○ CU ◉ AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
MAIN	SURGE PRO	584	655	611									
MAIN	E RECEPT	609	569	614									
MAIN	PP-EBB-B	374	427	321									
MAIN	10 HP SPARE	645	576	609									
MAIN	RASP-E6	432	386	409									
MAIN	SPARE	651	595	634									
MAIN	RASP-E8	436	406	381									
MAIN	LP-T	445	403	402									
MAIN	ADP-E1	304	258	297									
MAIN	RASP-E2	465	645	435									
MAIN	RASP-E4	448	436	439									
MAIN	SP 1	810	695	738									
MAIN	SP 3	781	797	794									
MAIN	EBB-EF7	711	660	697									
MAIN	EBB-EF9	755	749	704									
MAIN	SSCPE2	931	861	847									
MAIN	EBB-EDH-1	792	937	779									
MAIN	SPARE	850	769	789									
MAIN	EBB-EF5	956	952	1194									
MAIN	PP-EBB-A	309	278	281									
MAIN	SC-E4	885	881	897									
MAIN	SC-E2	999	817	1003									
MAIN	EBB-EUH-1	742	721	746									
MAIN	WASP-E2	773	767	754									

COMMENTS:

DEFICIENCIES:

TESTED BY: C. KROUT

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/29/2023 | AMBIENT TEMPERATURE: 24.5 °C | HUMIDITY: 15 % | ASSET #:
SUBSTATION: SUBSTATION 6 | POSITION: MCC-EBB-B 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085262997202	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	WA6ATR44B9CXFXWXAA	SENSOR TAPS	600	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	NA	CUBICLE CODE	3C	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	MICROLOGIC 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C
CONTACT FINGERS	☑	GOOD	C
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	C
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	C

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	600	LONG	☑	1	X	600	A =	600	A		8	NA	
SENSOR TAP	600	SHORT	☑	3	X	600	A =	1,800	A		0.1	OFF	
		INST.	☑	15	X	600	A =	9,000	A		N/A	NA	
		GRD. FLT.	☑	0.4	X	600	A =	240	A		0.2		

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	600	LONG	☑	1	X	600	A =	600	A		8	NA	
SENSOR TAP	600	SHORT	☑	3	-	1,800	A				0.1	OFF	
		INST.	☑	15	-	9,000	A					NA	
		GRD. FLT.	☑	0.4	-	240	A				0.2		

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	8	1400	NA	NA	51.920 / 51.920	51.920 / 51.920	51.920 / 51.920	NA
Short Time PU	3	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.1	5400	NA	NA	0.096 / 0.096	0.096 / 0.096	0.096 / 0.096	NA
Instant PU	15	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay		11250	NA	NA	0.046 / 0.046	0.046 / 0.046	0.046 / 0.046	NA
GRD Fault PU	0.4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.2	480	NA	NA	0.156 / 0.156	0.156 / 0.156	0.156 / 0.156	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	24.5 °C	1.225

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,675,000	3,000,000	3,675,000	3,000,000	3,675,000
POLE TO FRAME	3,000,000	3,675,000	1,775,000	2,174,375	3,000,000	3,675,000
LINE TO LOAD	3,000,000	3,675,000	3,000,000	3,675,000	3,000,000	3,675,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
10.7	10.9	11.1

COUNTER END: NA

COMMENTS: ALL BREAKERS TESTING WITH AS FOUND SETTINGS. PASS SECONDARY INJECTION
DEFICIENCIES:

TESTED BY: C. KROUT

MOLDED CASE CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/11/2023 AMBIENT TEMPERATURE 13 °C HUMIDITY 25 % EQPT. LOCATION EAST BLOWER BUILDING

SUBSTATION SUBSTATION 6 POSITION MCC-EPB-A

BREAKER IDENTIFICATION	MANUFACTURER	SERIAL NUMBER	TYPE	FRAME RATING (Amps)	FRAME RATING (Volts)	TRIP RATING	INSTANTANEOUS TRIP	ELEMENT TYPE
MAIN	SQUARE D	7NKG0242706	LJ400	400	600	200	1000	THERMAL ADJUSTABLE

INSULATION RESISTANCE (M©) @ 1000 VDC									POLE RESISTANCE (µ©)		
A - B	B - C	C - A	A - GND	B - GND	C - GND	A	B	C	A	B	C
POLE TO POLE			POLE TO FRAME			LINE TO LOAD					
7,740	8,700	6,830	4,150	4,750	3,900	363,000	403,000	557,000	136.80	180.10	191.50

	RANGE	MIN TIME	MAX TIME	TRIP TESTS	A	B	C
Manual Trip Function ☑	AMPS			INSTANTANEOUS TRIP AMPS			
Exercise Breaker ☑	SECONDS			TRIP TIME IN SECONDS @ 300% RATED CURRENT			

COMMENTS: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO SUB 6 CONNECTED.

DEFICIENCIES:

TESTED BY: E. PENLAND, S. FRY

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/11/2023 | AMBIENT TEMPERATURE: 13 °C | HUMIDITY: 25 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 6 | POSITION: MCC-EPB-A

NAMEPLATE DATA

MANUFACTURER: SQUARE D | SERIAL NO.: A029519 | TYPE: 12
CATALOG NO.: 30951271-139 | DRAWING NO.: 80459-641-01 | VOLTAGE CLASS: 600
MAIN BUS RATING: 600 A | MAIN BUS NEUTRAL RATING: NA A | CONDUCTOR: ○ CU ◉ AL
CURRENT WITHSTAND RATING: NA | NUMBER OF SECTIONS: 7 | LISTING: ☑ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER: 1 | MLO: 0 | TYPE: SQUARE D | AMPACITY: 400 | MAIN DISCONNECT: 0 | FUSE TYPE: NA | SIZE: NA
TOTAL POSITIONS EQUIPPED: 38 | NO. OF SPARE SPACES: 5 | TOTAL POSITIONS USED: 33

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

TEST VOLTAGE: 1 KVDC | EQUIPMENT TEMPERATURE: 13 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 0.65

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
BUS A	RDG.	4,150	4,750	3,900		7,740	6,830	8,700			
	20°C	2,697.5	3,087.5	2,535		5,031	4,439.5	5,655			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS: SOME CONTROL WIRING FOUND LOOSE AND WAS CORRECTED.
DEFICIENCIES:

TESTED BY: E. PENLAND

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/11/2023 AMBIENT TEMPERATURE 13 °C HUMIDITY 25 % EQPT. LOCATION

SUBSTATION SUBSTATION 6 POSITION MCC-EPB-A

NAMEPLATE DATA

MANUFACTURER SQUARE D SERIAL NO. A029515 TYPE 12

CATALOG NO. 30951271-139 DRAWING NO. 80459-641-01 VOLTAGE CLASS 600

PHASE AMPACITY 600 A WITHSTAND RATING NA KA CONDUCTOR ○ CU ◉ AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
MAIN	SPARE	546	597	553			MAIN	F-2-6	1012	995	968		
MAIN	PSCP-E1	611	557	659			MAIN	ANMX-E3B	896	1041	1110		
MAIN	SURGE PROT	447	532	482			MAIN	ANMX-E3C	947	908	868		
MAIN	PC-E3	687	644	650			MAIN	ANMX-E3D	1004	1017	1171		
MAIN	PC-E1	706	685	746			MAIN	SWMX-E3	994	964	957		
MAIN	TIE	354	347	336			MAIN	SPARE	988	971	982		
MAIN	PDP-E1	595	631	622			MAIN	LP-V	821	771.	758		
MAIN	EPI-SAP-4	713	745	703									
MAIN	EPE-SAP-5	747	785	686									
MAIN	EPB-SUP-1	828	773	795									
MAIN	10HP SPARE	832	791	811									
MAIN	10HP SPARE	1122	1059	834									
MAIN	AXMX-E1A	723	694	711									
MAIN	AXMX-E1B	801	751	795									
MAIN	AXMX-E1C	836	818	820									
MAIN	AXMX-E3A	882	944	964									
MAIN	PSLPM-E3	852	855	937									
MAIN	PSLP-E3	906	893	903									
MAIN	AXMX-E3B	812	880	779									
MAIN	AXMX-E3C	960	784	792									
MAIN	ANMX-E1A	894	959	837									
MAIN	ANMX-E1B	938	891	978									
MAIN	PSLP-E1	975	887	866									
MAIN	SPARE	980	921	932									
MAIN	ANMX-E1C	803	844	790									
MAIN	ANMX-E1D	909	844	810									
MAIN	SWMX-E1	892	1002	886									
MAIN	ANMX-E3A	955	1036	1184									
MAIN	F-2-13	1019	950	951									

COMMENTS:

DEFICIENCIES:

TESTED BY: E. PENLAND, S. FRY

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/1/2023 | AMBIENT TEMPERATURE: 25 °C | HUMIDITY: 28 % | ASSET #:
SUBSTATION: SUBSTATION 6 | POSITION: MCC-EPB-A 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085262997301	FRAME SIZE 800 AMPS 600	V
BREAKER TYPE	WA6PPR44A9CXFXWXAA	SENSOR TAPS	250	MOUNTING (●) D.O. ( ) B.I.	
FUSE CAT. NO.	NA	CUBICLE CODE	2D	ELECTRICALLY OPERATED ( ) YES (●) NO	
TRIP UNIT TYPE	MICROLOGIC 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING NA	

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C
CONTACT FINGERS	☑	GOOD	C
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	C
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	C

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	250	LONG	☑	0.8	X	250	A =	200	A		4	NA	
SENSOR TAP	250	SHORT	☑	10	X	250	A =	2,500	A		0.1	OFF	
		INST.	☑	15	X	250	A =	3,750	A		N/A	NA	
		GRD. FLT.	☑	0.4	X	250	A =	100	A		0.1	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	250	LONG	☑	0.8	X	250	A =	200	A		4	NA	
SENSOR TAP	250	SHORT	☑	10	-	2,500	A				0.1	OFF	
		INST.	☑	15	-	3,750	A					NA	
		GRD. FLT.	☑	0.4	-	100	A				0.1	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.8	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	4	1400	NA	NA	2.581 / 2.581	2.581 / 2.581	2.581 / 2.581	NA
Short Time PU	10	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.1	2875	NA	NA	0.104 / 0.104	0.104 / 0.104	0.104 / 0.104	NA
Instant PU	15	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay		4688	NA	NA	0.037 / 0.037	0.037 / 0.037	0.037 / 0.037	NA
GRD Fault PU	0.4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.1	200	NA	NA	0.097 / 0.097	0.097 / 0.097	0.097 / 0.097	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	25 °C	1.25

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,750,000	3,000,000	3,750,000	3,000,000	3,750,000
POLE TO FRAME	3,000,000	3,750,000	3,000,000	3,750,000	2,880,000	3,600,000
LINE TO LOAD	2,590,000	3,237,500	3,000,000	3,750,000	3,000,000	3,750,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
11.6	11.2	11.7

COUNTER END: NA

COMMENTS: ALL BREAKERS TESTING WITH AS FOUND SETTINGS. PASS SECONDARY INJECTION
DEFICIENCIES:

TESTED BY: C. KROUT

MOLDED CASE CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 11/28/2023 AMBIENT TEMPERATURE 13 °C HUMIDITY 25 % EQPT. LOCATION EAST BLOWER BUILDING

SUBSTATION SUBSTATION 6 POSITION MCC-EPB-B

BREAKER IDENTIFICATION	MANUFACTURER	SERIAL NUMBER	TYPE	FRAME RATING (Amps)	FRAME RATING (Volts)	TRIP RATING	INSTANTANEOUS TRIP	ELEMENT TYPE
MAIN	SQUARE D	4NSA0191574	LJP36400U44XL	400	600	200	1000	THERMAL ADJUSTABLE

INSULATION RESISTANCE (M©) @ 1000 VDC									POLE RESISTANCE (µ©)		
A - B	B - C	C - A	A - GND	B - GND	C - GND	A	B	C	A	B	C
POLE TO POLE			POLE TO FRAME			LINE TO LOAD					
11,800	13,700	9,800	6,160	7,270	5,820	221,000	290,000	864,000	278.00	210.00	245.00

	RANGE	MIN TIME	MAX TIME	TRIP TESTS	A	B	C
Manual Trip Function ☑	AMPS			INSTANTANEOUS TRIP AMPS			
Exercise Breaker ☑	SECONDS			TRIP TIME IN SECONDS @ 300% RATED CURRENT			

COMMENTS: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO SUB 6 CONNECTED.

DEFICIENCIES:

TESTED BY: C. KROUT, K. HORST, K. ICKES, S. FRY

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/30/2023 | AMBIENT TEMPERATURE: 15 °C | HUMIDITY: 25 % | EQPT. LOCATION: EAST BLOWER BUILDING
SUBSTATION: SUBSTATION 6 | POSITION: MCC-EPB-B

NAMEPLATE DATA

MANUFACTURER: SQUARE D | SERIAL NO.: A0292528 | TYPE: 12
CATALOG NO.: 30951271-140 | DRAWING NO.: 80459-641-01 | VOLTAGE CLASS: 600
MAIN BUS RATING: 600 A | MAIN BUS NEUTRAL RATING: NA A | CONDUCTOR: ○ CU ◉ AL
CURRENT WITHSTAND RATING: NA | NUMBER OF SECTIONS: 7 | LISTING: ☑ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER: 1 | MLO: 0 | TYPE: SQUARE D | AMPACITY: 400 | MAIN DISCONNECT: 0 | FUSE TYPE: NA | SIZE: NA
TOTAL POSITIONS EQUIPPED: 42 | NO. OF SPARE SPACES: 2 | TOTAL POSITIONS USED: 40

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

TEST VOLTAGE: 1 KVDC | EQUIPMENT TEMPERATURE: 15 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 0.75

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
MCC-EPB-B	RDG.	6,160	7,270	5,820		11,800	13,700	9,800			
	20°C	4,620	5,452.5	4,365		8,850	10,275	7,350			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:
DEFICIENCIES:

TESTED BY: C. KROUT, K. HORST, K. ICKES, S. FRY

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR
PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105
JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI
TELEPHONE:

DATE: 11/30/2023 AMBIENT TEMPERATURE: 16.5 °C HUMIDITY: 25 % EQPT. LOCATION: EAST BLOWER BUI;DING
SUBSTATION: SUBSTATION 6 POSITION: MCC-EPB-B

NAMEPLATE DATA

MANUFACTURER: SQUARE D SERIAL NO.: A0292528 TYPE: 12
CATALOG NO.: 30951271-140 DRAWING NO.: 80459-641-01 VOLTAGE CLASS: 600
PHASE AMPACITY: 600 A WITHSTAND RATING: NA KA CONDUCTOR: ○ CU ◉ AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
	PSCP-E2	566	634	559				ANMX-E4C	883	903	915		
	PSLPM-E2	532	533	970				ANMX-E4D	1132	1009	1367		
	PSLP-E2	681	611	5734				EPB-SUP-2	1026	994	964		
	PC-E2	1642	730	1361				SWMX-E4	871	847	899		
	HV1	734	693	693				10HP SPARE	871	920	885		
	HOIST	770	697	684				10HP SPARE	932	857	877		
	PDP-E2	744	727	719				SPARE	869	868	856		
	PC-E4	816	791	764									
	SPARE	904	841	862									
	RF-1	954	722	688									
	AXMX-E2A	841	744	895									
	AXMX-E2B	953	806	792									
	SWMX-E2	859	868	780									
	E RECEPT	853	802	817									
	PSLPM-E1	856	864	925									
	AXMX-E2C	760	759	742									
	AXMX-E4A	889	810	1026									
	AXMX-E4B	854	814	798									
	AXMX-E4C	906	887	881									
	SLIDEGATET	852	993	949									
	SLIDEGATEB	928	903	874									
	ANMX-E2A	816	798	824									
	ANMX-E2B	827	810	1090									
	ANMX-E2C	876	826	934									
	ANMX-E2D	924	880	874									
	EPB-EUH-1	916	924	894									
	LP-W	714	691	681									
	ANMX-E4A	839	825	795									
	ANMX-E4B	858	845	801									

COMMENTS:
DEFICIENCIES:

TESTED BY: C. KROUT, K. HORST, K. ICKES, S. FRY

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/29/2023 | AMBIENT TEMPERATURE: 24 °C | HUMIDITY: 14 % | ASSET #:
SUBSTATION: SUBSTATION 6 | POSITION: MCC-EPB-B 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085262997302	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	WA6PPR44ASCXFXWXAA	SENSOR TAPS	250	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	NA	CUBICLE CODE	3D	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	MICROLOGIC 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C
CONTACT FINGERS	☑	GOOD	C
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	C
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	C

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	250	LONG	☑	0.8	X	250	A =	200	A		4	NA	
SENSOR TAP	250	SHORT	☑	10	X	250	A =	2,500	A		0.1	OFF	
		INST.	☑	15	X	250	A =	3,750	A		N/A	NA	
		GRD. FLT.	☑	0.4	X	250	A =	100	A		0.1	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	250	LONG	☑	0.8	X	250	A =	200	A		4	NA	
SENSOR TAP	250	SHORT	☑	10	-	2,500	A				0.1	OFF	
		INST.	☑	15	-	3,750	A					NA	
		GRD. FLT.	☑	0.4	-	100	A				0.1	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.8	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	4	1400	NA	NA	2.468 / 2.468	2.468 / 2.468	2.468 / 2.468	NA
Short Time PU	10	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.1	2875	NA	NA	0.104 / 0.104	0.104 / 0.104	0.104 / 0.104	NA
Instant PU	15	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	4688	NA	NA	0.036 / 0.036	0.036 / 0.036	0.036 / 0.036	NA
GRD Fault PU	0.4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.1	200	NA	NA	0.088 / 0.088	0.088 / 0.088	0.088 / 0.088	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	23.5 °C	1.175

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,525,000	3,000,000	3,525,000	3,000,000	3,525,000
POLE TO FRAME	3,000,000	3,525,000	3,000,000	3,525,000	3,000,000	3,525,000
LINE TO LOAD	3,000,000	3,525,000	3,000,000	3,525,000	3,000,000	3,525,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
11.1	11.1	10.4

COUNTER END: NA

COMMENTS: ALL BREAKERS TESTING WITH AS FOUND SETTINGS. PASS SECONDARY INJECTION
DEFICIENCIES:

TESTED BY: C. KROUT

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/1/2023 | AMBIENT TEMPERATURE: 25 °C | HUMIDITY: 28 % | ASSET #:
SUBSTATION: SUBSTATION 6 | POSITION: SPARE A 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085262997401	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	WA6AAR44A9CXFXWXAA	SENSOR TAPS	400	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	NA	CUBICLE CODE	2B	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	MICROLOGIC 6.0A	TRIP UNIT CAT #	MICOLOGIC 6.0A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C
CONTACT FINGERS	☑	GOOD	C
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	C
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	C

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	400	LONG	☑	0.5	X	400	A =	200	A		0.5	NA	
SENSOR TAP	400	SHORT	☑	1.5	X	400	A =	600	A		0.1	ON	
		INST.	☑	2	X	400	A =	800	A		N/A	NA	
		GRD. FLT.	☑	0.3	X	400	A =	120	A		0.1	0N	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	400	LONG	☑	0.5	X	400	A =	200	A		0.5	NA	
SENSOR TAP	400	SHORT	☑	1.5	-	600	A				0.1	ON	
		INST.	☑	2	-	800	A					NA	
		GRD. FLT.	☑	0.3	-	120	A				0.1	0N	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.5	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	0.5	267	NA	NA	14.322 / 14.322	14.322 / 14.322	14.322 / 14.322	NA
Short Time PU	1.5	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.1	550	NA	NA	1.429 / 1.429	1.429 / 1.429	1.429 / 1.429	NA
Instant PU	2	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay		1000	NA	NA	0.036 / 0.036	0.036 / 0.036	0.036 / 0.036	NA
GRD Fault PU	0.3	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.1	240	NA	NA	0.263 / 0.263	0.263 / 0.263	0.263 / 0.263	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	25 °C	1.25

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,750,000	3,000,000	3,750,000	3,000,000	3,750,000
POLE TO FRAME	3,000,000	3,750,000	3,000,000	3,750,000	3,000,000	3,750,000
LINE TO LOAD	3,000,000	3,750,000	3,000,000	3,750,000	3,000,000	3,750,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
12.1	12.2	14.7

COUNTER END: NA

COMMENTS: ALL BREAKERS TESTING WITH AS FOUND SETTINGS. PASS SECONDARY INJECTION
DEFICIENCIES:

TESTED BY: C. KROUT

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/29/2023 | AMBIENT TEMPERATURE: 24 °C | HUMIDITY: 14 % | ASSET #:
SUBSTATION: SUBSTATION 6 | POSITION: SPARE B 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085262997402	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	WA6AAR44A9CXFXWXAA	SENSOR TAPS	400	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	NA	CUBICLE CODE	4B	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	MICROLOGIC 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C
CONTACT FINGERS	☑	GOOD	C
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	C
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	C

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	400	LONG	☑	0.5	X	400	A =	200	A		0.5	NA	
SENSOR TAP	400	SHORT	☑	1.5	X	400	A =	600	A		0.1	ON	
		INST.	☑	2	X	400	A =	800	A		N/A	NA	
		GRD. FLT.	☑	0.3	X	400	A =	120	A		0.1	ON	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	400	LONG	☑	0.5	X	400	A =	200	A		0.5	NA	
SENSOR TAP	400	SHORT	☑	1.5	-	600	A				0.1	ON	
		INST.	☑	2	-	800	A					NA	
		GRD. FLT.	☑	0.3	-	120	A				0.1	ON	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.5	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	0.5	267	NA	NA	14.03 / 14.03	14.03 / 14.03	14.03 / 14.03	NA
Short Time PU	1.5	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.1	550	NA	NA	1.413 / 1.413	1.413 / 1.413	1.413 / 1.413	NA
Instant PU	2	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	1000	NA	NA	0.035 / 0.035	0.035 / 0.035	0.035 / 0.035	NA
GRD Fault PU	0.3	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.1	240	NA	NA	0.263 / 0.263	0.263 / 0.263	0.263 / 0.263	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	24 °C	1.2

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,600,000	3,000,000	3,600,000	3,000,000	3,600,000
POLE TO FRAME	3,000,000	3,600,000	3,000,000	3,600,000	3,000,000	3,600,000
LINE TO LOAD	3,000,000	3,600,000	3,000,000	3,600,000	3,000,000	3,600,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
13.0	13.0	17.0

COUNTER END: NA

COMMENTS: ALL BREAKERS TESTING WITH AS FOUND SETTINGS. PASS SECONDARY INJECTION
DEFICIENCIES:

TESTED BY: C. KROUT

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/29/2023 | AMBIENT TEMPERATURE: 24.5 °C | HUMIDITY: 15 % | ASSET #:
SUBSTATION: SUBSTATION 6 | POSITION: TIE 480V BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085262997102	FRAME SIZE 1,600 AMPS 600 V	
BREAKER TYPE	WA6EER44A9CFFFWSEA	SENSOR TAPS	1600	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	NA	CUBICLE CODE	2B	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	MICROLOGIC 6.0A	TRIP UNIT CAT #	MICROLOGIC 6.0A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C
CONTACT FINGERS	☑	GOOD	C
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	C
GROUND CONNECTION	☑	GOOD	C
TRIP UNIT	☑	GOOD	C

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	1,600	LONG	☑	1	X	1,600	A =	1,600	A		8	NA	
SENSOR TAP	1,600	SHORT	☑	3	X	1,600	A =	4,800	A		0.1	ON	
		INST.	☑	15	X	1,600	A =	24,000	A		N/A	NA	
		GRD. FLT.	☑	0.4	X	0.2	A =	0.08	A				

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	1,600	LONG	☑	1	X	1,600	A =	1,600	A		8	NA	
SENSOR TAP	1,600	SHORT	☑	3	-	4,800	A				0.1	ON	
		INST.	☑	15	-	24,000	A					NA	
		GRD. FLT.	☑	0.4	-	0.08	A						

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	8	1400	NA	NA	51.920 / 51.920	51.920 / 51.920	51.920 / 51.920	NA
Short Time PU	3	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.1	5400	NA	NA	0.096 / 0.096	0.096 / 0.096	0.096 / 0.096	NA
Instant PU	15	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay		11250	NA	NA	0.046 / 0.046	0.046 / 0.046	0.046 / 0.046	NA
GRD Fault PU	0.4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay		480	NA	NA	0.156 / 0.156	0.156 / 0.156	0.156 / 0.156	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	24.5 °C	1.225

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	3,675,000	3,000,000	3,675,000	3,000,000	3,675,000
POLE TO FRAME	3,000,000	3,675,000	1,536,000	1,881,600	3,000,000	3,675,000
LINE TO LOAD	3,000,000	3,675,000	3,000,000	3,675,000	3,000,000	3,675,000

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
12.1	13.0	12.1

COUNTER END: NA

COMMENTS: ALL BREAKERS TESTING WITH AS FOUND SETTINGS. PASS SECONDARY INJECTION
DEFICIENCIES:

TESTED BY: C. KROUT

TRANSFORMER MAINTENANCE AND INSPECTION

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/1/2023 | AMBIENT TEMPERATURE: 24 °C | HUMIDITY: 26 % | EQPT. LOCATION: EAST BLOWER BUILDING
SUBSTATION: SUBSTATION 6 | POSITION: XFMR 1

NAMEPLATE DATA

MANUFACTURER: SQUARE D | YR MFR: 6/3/2014 | SERIAL NO.: 309511271-023-01
IMPEDANCE: 5.6 % | NUMBER OF FANS: 0 | WEIGHT: 6900 LBS | TYPE: VPI | CLASS: AA / / /
KVA: 1,000 / / | WINDING MATERIAL: COPPER | TEMPERATURE RISE: 115 °C | B.I.L. RATING: 30 / 10
PRIMARY V: 4,160 | DELTA | MFR LOCATION: BLAND, VA
SECONDARY V: 480 / 277.12 | WYE | ☑ EXPOSED NEUTRAL - X0 | TANK TYPE: VENTED
TAP VOLTAGES: 4,368 | 4,264 | 4,160 | 4,056 | 3,952 | INSULATING MATERIAL: PAPER
TAP POSITION: E-F | D-F | E-G | D-G | C-G | WINDING INSUATING SYSTEM: OPEN-WOUND
TAP SETTING: E-G 4,160 V | ☑ HIGH SIDE TAP | ☐ LOW SIDE TAP

VISUAL AND MECHANICAL INSPECTION

	Description	NOTES
☑	REASON FOR INSPECTION	ROUTINE
☑	CHECK FOR SIGNS OF OVERHEATING, DISCOLORATION	GOOD
☑	ENCLOSURE (OPENINGS, COVERS, PAINT, ETC)	GOOD
☑	CHECK ALL CONNECTIONS TIGHT	GOOD
☑	IMPROPER TERMINATIONS	GOOD
☑	EQUIPMENT GROUND/GROUND BAR	GOOD
☑	CORE GROUND	GOOD
☑	NEUTRAL BAR	GOOD
☑	PRIMARY SIDE (CABLE OR BUSS)	GOOD

	Description	NOTES
☑	SECONDARY SIDE (CABLE OR BUSS)	GOOD
☑	CLEAN AND INSPECT INSULATORS, SUPPORTS, AND BARRIERS	GOOD
☑	CLEAN CORE, COIL, AND ENCLOSURE (INTERIOR/EXTERIOR)	GOOD
☑	CORE AND COIL BRACING	GOOD
☑	VIBRATION ISOLATATION PADS	GOOD
☑	PROPER CLEARANCE (36 INCHES UNOBSTRUCTED)	GOOD
☐	CONTROL WIRING	NA
☐	COOLING FANS	NA
☐	ALARMS AND INDICATORS	NA

ELECTRICAL TESTS

INSULATION RESISTANCE (Mohm)

MINUTES	PRIMARY TO GROUND	SECONDARY TO GROUND	PRIMARY TO SECONDARY
Test kV	2.5	1	2.5
0.50	574,000	11,300	841,000
1.00	872,000	175,000	1,270,000
10.00	3,600,000	401,000	4,360,000
P. I. (10min/1min)	4.13	2.29	3.43

ARRESTERS TESTING (Mohm)

SIDE	TEST VOLTAGE KV / 1 MIN	PHASE A	PHASE B	PHASE C
HIGH	5	3,180	6,630	5,990

WINDING RESISTANCE TEST (mohm)

APPARATUS TEMP. (°C)	24	TEST AMPS	10

H3-H1		H1-H2		H2-H3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
115.72	116.17	115.95	116.40	115.22	115.67
X0-X1		X0-X2		X0-X3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
0.718	0.721	0.697	0.700	0.675	0.678

TRANSFORMER TURN RATIO TEST

TAP	CALC	PHASE A	PHASE B	PHASE C
E-G	15.012	15.010	15.010	15.010
% ERROR		0.010%	0.010%	0.010%

EXTERNAL DOCUMENTS ATTACHED TO REPORT

COMMENTS:

CABLE INSULATION RESISTANCE PHASE TO PHASE A-B=99900 MOHMS, B-C=120900 MOHMS, A-C=97800 MOHMS
PHASE TO GROUND A-G=3180 MOHMS, B-G=6630 MOHMS, C-G= 5990 MOHMS
EXCITATION CURRENT A - 17.4 MILLIAMPS; B- 14.5 MILLIAMPS; C - 15.2 MILLAMPS.

TESTED BY: K. HORST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

COMMENTS:	NAME PLATE CAPACITANCE OF CAPACITORS: A - .5 MICROFARADS; B - . 5 MICROFARADS; C - .5 MICROFARADS CAPACITANCE OF CAPACITORS: A - .5 MICROFARADS: B - .5 MICROFARADS; C - .5 MICROFARADS CAPACITOR RESISTANCE: A - 84.0 MEGAOHMS; B - 84.3 MEGAOHMS; C - 83.5 MEGAOHMS
DEFICIENCIES:	

TRANSFORMER MAINTENANCE AND INSPECTION

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/29/2023 | AMBIENT TEMPERATURE: 24 °C | HUMIDITY: 16 % | EQPT. LOCATION: EAST BLOWER BUILDING
SUBSTATION: SUBSTATION 6 | POSITION: XFMR 2

NAMEPLATE DATA

MANUFACTURER: SQUARE D | YR MFR: 6/3/2014 | SERIAL NO.: 30951271-025-01
IMPEDANCE: 5.62 % | NUMBER OF FANS: | WEIGHT: 6900 LBS | TYPE: VPI | CLASS: AA / /
KVA: 1,000 / / | WINDING MATERIAL: COPPER | TEMPERATURE RISE: 115 °C | B.I.L. RATING: 30HV / 10LV
PRIMARY V: 4,160 | DELTA | MFR LOCATION: BLAND, VA
SECONDARY V: 480 / 277.12 | WYE | ☑ EXPOSED NEUTRAL - X0 | TANK TYPE: VENTED
TAP VOLTAGES: 4,368 | 4,264 | 4,160 | 4,056 | 3,952 | INSULATING MATERIAL: PAPER
TAP POSITION: E-F | D-F | E-G | D-G | C-G | WINDING INSUATING SYSTEM: OPEN-WOUND
TAP SETTING: E-G 4,160 V | ☑ HIGH SIDE TAP | ☐ LOW SIDE TAP

VISUAL AND MECHANICAL INSPECTION

	Description	NOTES
☑	REASON FOR INSPECTION	ROUTINE
☑	CHECK FOR SIGNS OF OVERHEATING, DISCOLORATION	GOOD
☑	ENCLOSURE (OPENINGS, COVERS, PAINT, ETC)	GOOD
☑	CHECK ALL CONNECTIONS TIGHT	GOOD
☑	IMPROPER TERMINATIONS	GOOD
☑	EQUIPMENT GROUND/GROUND BAR	GOOD
☑	CORE GROUND	GOOD
☑	NEUTRAL BAR	GOOD
☑	PRIMARY SIDE (CABLE OR BUSS)	GOOD

	Description	NOTES
☑	SECONDARY SIDE (CABLE OR BUSS)	GOOD
☑	CLEAN AND INSPECT INSULATORS, SUPPORTS, AND BARRIERS	GOOD
☑	CLEAN CORE, COIL, AND ENCLOSURE (INTERIOR/EXTERIOR)	GOOD
☑	CORE AND COIL BRACING	GOOD
☑	VIBRATION ISOLATATION PADS	GOOD
☑	PROPER CLEARANCE (36 INCHES UNOBSTRUCTED)	GOOD
☐	CONTROL WIRING	NA
☐	COOLING FANS	NA
☐	ALARMS AND INDICATORS	NA

ELECTRICAL TESTS

INSULATION RESISTANCE (Mohm)

MINUTES	PRIMARY TO GROUND	SECONDARY TO GROUND	PRIMARY TO SECONDARY
Test kV	2.5	1	2.5
0.50	752,000	301,000	976,000
1.00	1,054,000	382,000	1,372,000
10.00	2,450,000	615,000	2,870,000
P. I. (10min/1min)	2.32	1.61	2.09

ARRESTERS TESTING (Mohm)

SIDE	TEST VOLTAGE KV / 1 MIN	PHASE A	PHASE B	PHASE C
HIGH	5	4,170	6,110	22,500

WINDING RESISTANCE TEST (mohm)

APPARATUS TEMP. (°C)	24	TEST AMPS	10

H3-H1		H1-H2		H2-H3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
115.08	115.53	115.74	116.19	114.83	115.27
X0-X1		X0-X2		X0-X3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
0.675	0.678	0.706	0.709	0.724	0.727

TRANSFORMER TURN RATIO TEST

TAP	CALC	PHASE A	PHASE B	PHASE C
E-G	15.012	15.005	15.008	15.008
% ERROR		0.044%	0.024%	0.024%

EXTERNAL DOCUMENTS ATTACHED TO REPORT

COMMENTS:

EXCITATION CURRENT A - 17.1 MILLIAMPS; B- 13.5 MILLIAMPS; C - 15.8 MILLAMPS.
CABLE INSULATION RESISTANCE PHASE TO PHASE A-B=120300 MOHMS, B-C=164600 MOHMS, A-C=194900 MOHMS
PHASE TO GROUND A-G=4170 MOHMS, B-G=6110 MOHMS, A-C= 22500 MOHMS

TESTED BY: K. HORST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

COMMENTS:	NAME PLATE CAPACITANCE OF CAPACITORS: A - .5 MICROFARADS; B - . 5 MICROFARADS; C - .5 MICROFARADS CAPACITANCE OF CAPACITORS: A - .5 MICROFARADS: B - .5 MICROFARADS; C - .5 MICROFARADS CAPACITOR RESISTANCE: A - 83.9 MEGAOHMS; B - 84.1 MEGAOHMS; C - 83.7 MEGAOHMS
DEFICIENCIES:	

SWITCHGEAR INSPECTION AND TEST REPORT

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/13/2023 AMBIENT TEMPERATURE 19 °C HUMIDITY 23 % EQPT. LOCATION EAST BLOWER BUILDING

SUBSTATION SUBSTATION 7 POSITION 480V SWITCHGEAR BUS A

SWITCHGEAR NAMEPLATE

MANUFACTURER SQUARE D TYPE ARC RESISTANT SN / SO NO. E-409942 G-801119 MFG DATE 2014

STYLE / CAT # / BUILD NUMBER 30951271-024 SYSTEM VOLTAGE 480 RATED VOLTAGE 600 SERVICE 3 WIRE

BUS AMPACITIES 1600 OVERCURRENT DEVICE TYPE/CAT. MICROLOGIC 6.0A INTERRUPT RATINGS 100KA

NEUTRAL NO Other NA

INSPECTION CHECKLIST / REMARKS

☑ REASON FOR INSPECTION	ROUTINE MAINTENANCE AND TESTING
☑ CLEAN SWITCHGEAR, CUBICLES, BUS, AND INSULATORS	YES
☑ OVERHEATING (CHECK FOR HOT SURFACES, DISCOLORATION)	NO SIGNS OF OVERHEATING
☑ CHECK FOR UNUSED OPENINGS	2 UNUSED CUBUCLES
☑ CHECK ELECTRICAL CONNECTIONS	GOOD
☑ VENTS AND FILTER	VENTS ARE GOOD, NO FILTERS
☑ PROPER CLEARANCE	GOOD
☑ PANEL ID AND ARC FLASH WARNING (PANEL LABEL)	NO ARC FLASH LABELS
☑ INDICATING LIGHTS	GOOD
☑ INTERLOCKS	GOOD
☐ HEATERS	N/A
☑ PANEL SCREWS (MISSING, STRIPPED, ETC)	NO MISSING SCREWS
☑ BARRIER BOARDS AND SHUTTER OPERATION	BARRIER BOARDS IN GOOD SHAPE. NO SHUTTERS INSTALLED

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
500 V	19 °C	0.962

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	849,000	816,738	901,000	866,762	1,073,000	1,032,226
POLE TO FRAME	669,000	643,578	654,000	629,148	598,000	575,276
LINE TO LOAD						

DIELECTRIC WITHSTAND (mA)			
TEST VOLTAGE _____KV			
Phase #1	Phase #2	Phase #3	Neutral
N/A	N/A	N/A	N/A

POTENTIAL XFMRS	INSULATION RESISTANCE (M-OMH)			TURNS RATIO
	HIGH TO LOW	HIGH TO GND	LOW TO GND	
	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) .5	CALCULATED RATIO 4
LEFT	103,500	298,000	294,000	3.998
CENTER	103,500	298,000	294,000	3.997
RIGHT	103,500	298,000	294,000	3.998

BUS BAR RESISTANCE (µ-OHM)				
Ground	NEUTRAL	Phase #1	Phase #2	Phase #3
N/A	N/A	31.3	29.3	29

CONTROL POWER XFMR	INSULATION RESISTANCE (M-OMH)			TURNS RATIO	
	HIGH TO LOW	HIGH TO GND	LOW TO GND		
	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) 1	TEST VOLTAGE (KV) .5	CALCULATED RATIO 4	
	767,000	927,000	1,260,000	PHASE A	3.889
				PHASE B	3.889
				PHASE C	3.889

COMMENTS: SURGE LOGIC FUNCTIONING NORMALLY

DEFICIENCIES:

TESTED BY: E. PENLAND, S. FRY, K. ICKES

SWITCHGEAR INSPECTION AND TEST REPORT

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/13/2023 AMBIENT TEMPERATURE 19 °C HUMIDITY 23 % EQPT. LOCATION EAST BLOWER BUILDING

SUBSTATION SUBSTATION 7 POSITION 480V SWITCHGEAR BUS B

SWITCHGEAR NAMEPLATE

MANUFACTURER SQUARE D TYPE ARC RESISTANT SN / SO NO. E-409943 G-801122 MFG DATE 2014

STYLE / CAT # / BUILD NUMBER 30951271-024 SYSTEM VOLTAGE 480 RATED VOLTAGE 600 SERVICE 4 WIRE

BUS AMPACITIES 1600 OVERCURRENT DEVICE TYPE/CAT. MICROLOGIC 6.0A INTERRUPT RATINGS 100KA

NEUTRAL NO Other NA

INSPECTION CHECKLIST / REMARKS

☑ REASON FOR INSPECTION	ROUTINE MAINTENANCE AND TESTING
☑ CLEAN SWITCHGEAR, CUBICLES, BUS, AND INSULATORS	YES
☑ OVERHEATING (CHECK FOR HOT SURFACES, DISCOLORATION)	NO SIGNS OF OVERHEATING
☑ CHECK FOR UNUSED OPENINGS	2 UNUSED CUBUCLES
☑ CHECK ELECTRICAL CONNECTIONS	GOOD
☑ VENTS AND FILTER	VENTS ARE GOOD, NO FILTERS
☑ PROPER CLEARANCE	GOOD
☑ PANEL ID AND ARC FLASH WARNING (PANEL LABEL)	NO ARC FLASH LABELS
☑ INDICATING LIGHTS	GOOD
☑ INTERLOCKS	GOOD
☐ HEATERS	N/A
☑ PANEL SCREWS (MISSING, STRIPPED, ETC)	NO MISSING SCREWS
☑ BARRIER BOARDS AND SHUTTER OPERATION	BARRIER BOARDS IN GOOD SHAPE. NO SHUTTERS INSTALLED

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
500 V	19 °C	0.962

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1,066,000	1,025,492	1,157,000	1,113,034	1,405,000	1,351,610
POLE TO FRAME	842,000	810,004	859,000	826,358	700,000	673,400
LINE TO LOAD						

DIELECTRIC WITHSTAND (mA)			
TEST VOLTAGE _____KV			
Phase #1	Phase #2	Phase #3	Neutral
N/A	N/A	N/A	N/A

POTENTIAL XFMRS	INSULATION RESISTANCE (M-OMH)			TURNS RATIO
	HIGH TO LOW (TEST VOLTAGE (KV) 1)	HIGH TO GND (TEST VOLTAGE (KV) 1)	LOW TO GND (TEST VOLTAGE (KV) .5)	(CALCULATED RATIO 4)
LEFT	208,000	353,000	294,000	3.997
CENTER	208,000	353,000	294,000	3.998
RIGHT	208,000	353,000	294,000	3.997

BUS BAR RESISTANCE (µ-OHM)				
Ground	NEUTRAL	Phase #1	Phase #2	Phase #3
N/A	N/A	25.2	24	27.4

CONTROL POWER XFMR	INSULATION RESISTANCE (M-OMH)			TURNS RATIO	
	HIGH TO LOW (TEST VOLTAGE (KV) 1)	HIGH TO GND (TEST VOLTAGE (KV) 1)	LOW TO GND (TEST VOLTAGE (KV) .5)	(CALCULATED RATIO 4)	
	2,670,000	1,092,000	1,489,000	PHASE A	3.889
				PHASE B	3.889
				PHASE C	3.889

COMMENTS: SURGE LOGIC FUNCTIONING NORMALLY

DEFICIENCIES:

TESTED BY: E. PENLAND, S. FRY, K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/13/2023 | AMBIENT TEMPERATURE: 16 °C | HUMIDITY: 33 % | ASSET #:
SUBSTATION: SUBSTATION 7 | POSITION: ATS-ADM-1

MANUFACTURER	SQUARE D	SN / SO NO.	085255257302	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	NW 08 H3	SENSOR TAPS	800	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	C1	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	MICROLOGIC 6.0	TRIP UNIT CAT #	N/A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	DIRTY	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	NA
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A		12	NA	
SENSOR TAP	800	SHORT	☑	5	X	800	A =	4,000	A		0.2	OFF	
		INST.	☑	15	X	800	A =	12,000	A		N/A	NA	
		GRD. FLT.	☑	0.4	X	800	A =	320	A		0.3	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A		12	NA	
SENSOR TAP	800	SHORT	☑	5	-	4,000	A				0.2	OFF	
		INST.	☑	15	-	12,000	A					NA	
		GRD. FLT.	☑	0.4	-	320	A				0.3	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	12	2933	NA	NA	28.522 / 28.522	NA / NA	NA / NA	NA
Short Time PU	5	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	8000	NA	NA	0.160 / 0.160	NA / NA	NA / NA	NA
Instant PU	15	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	15000	NA	NA	0.037 / 0.037	NA / NA	NA / NA	NA
GRD Fault PU	0.4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.3	640	NA	NA	0.263 / 0.263	NA / NA	NA / NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	16 °C	0.848

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01
POLE TO FRAME	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01
LINE TO LOAD	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
12.0	11.0	11.4

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/13/2023 | AMBIENT TEMPERATURE: 16 °C | HUMIDITY: 33 % | ASSET #:
SUBSTATION: SUBSTATION 7 | POSITION: ATS-ADM-1A

MANUFACTURER	SQUARE D	SN / SO NO.	085255257301	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	NW 8 H3	SENSOR TAPS	800	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	2C1	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	MICROLOGIC 6.0	TRIP UNIT CAT #	N/A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA
GROUND CONNECTION	☑	GOOD	NA
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A		12	NA	
SENSOR TAP	800	SHORT	☑	5	X	800	A =	4,000	A		0.2	OFF	
		INST.	☑	15	X	800	A =	12,000	A		N/A	NA	
		GRD. FLT.	☑	0.4	X	800	A =	320	A		0.3	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	800	A =	800	A		12	NA	
SENSOR TAP	800	SHORT	☑	5	-	4,000	A				0.2	OFF	
		INST.	☑	15	-	12,000	A					NA	
		GRD. FLT.	☑	0.4	-	320	A				0.3	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	12	2933	NA	NA	29.303 / 29.303	NA / NA	NA / NA	NA
Short Time PU	5	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	8000	NA	NA	0.159 / 0.159	NA / NA	NA / NA	NA
Instant PU	15	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	15000	NA	NA	0.036 / 0.036	NA / NA	NA / NA	NA
GRD Fault PU	0.4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.3	640	NA	NA	0.259 / 0.259	NA / NA	NA / NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	16 °C	0.848

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01
POLE TO FRAME	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01
LINE TO LOAD	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
10.2	10.9	10.4

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/13/2023 | AMBIENT TEMPERATURE: 16 °C | HUMIDITY: 33 % | ASSET #:
SUBSTATION: SUBSTATION 7 | POSITION: ISOLATION BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085255257101	FRAME SIZE 3,200 AMPS	600 V
BREAKER TYPE	NW 32 H3	SENSOR TAPS	3200	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	4B1	ELECTRICALLY OPERATED	(●) YES ( ) NO
TRIP UNIT TYPE	MICROLOGIC 6.0	TRIP UNIT CAT #	N/A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA
GROUND CONNECTION	☑	GOOD	NA
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	3,200	LONG	☑	0.6	X	3,200	A =	1,920	A		4	NA	
SENSOR TAP	3,200	SHORT	☑	4	X	1,920	A =	7,680	A		0.3	OFF	
		INST.	☑	10	X	3,200	A =	32,000	A		N/A	NA	
		GRD. FLT.	☑	0.16	X	3,200	A =	512	A		0.3	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	3,200	LONG	☑	0.6	X	3,200	A =	1,920	A		4	NA	
SENSOR TAP	3,200	SHORT	☑	4	-	7,680	A				0.3	OFF	
		INST.	☑	10	-	32,000	A					NA	
		GRD. FLT.	☑	16	-	512	A				0.3	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.6	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	4	5760	NA	NA	14.888 / 14.888	NA / NA	NA / NA	NA
Short Time PU	4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.3	19840	NA	NA	0.261 / 0.261	NA / NA	NA / NA	NA
Instant PU	10	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	40000	NA	NA	0.036 / 0.036	NA / NA	NA / NA	NA
GRD Fault PU	0.16	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.3	1000	NA	NA	0.262 / 0.262	NA / NA	NA / NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	16 °C	0.848

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01
POLE TO FRAME	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01
LINE TO LOAD	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
12.2	11.1	11.4

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/13/2023 | AMBIENT TEMPERATURE: 16 °C | HUMIDITY: 33 % | ASSET #:
SUBSTATION: SUBSTATION 7 | POSITION: MAIN A

MANUFACTURER	SQUARE D	SN / SO NO.	085255257501	FRAME SIZE 3,200 AMPS	600 V
BREAKER TYPE	NW 32 H3	SENSOR TAPS	3200	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	1A1	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	MICROLOGIC 6.0	TRIP UNIT CAT #	N/A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	DIRTY	C
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	C
GROUND CONNECTION	☑	GOOD	NA
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	3,200	LONG	☑	0.7	X	3,200	A =	2,240	A	4	NA	
SENSOR TAP	3,200	SHORT	☑	4	X	2,240	A =	8,960	A	0.4	OFF	
		INST.	☑	10	X	3,200	A =	32,000	A	N/A	NA	
		GRD. FLT.	☑	0.23	X	3,200	A =	736	A	0.4	OFF	

SETTINGS AS LEFT		FUNCTION		Setting						DELAY	I2T	ADDI INFO
RATING PLUG	3,200	LONG	☑	0.7	X	3,200	A =	2,240	A	4	NA	
SENSOR TAP	3,200	SHORT	☑	4	-	8,960	A			0.4	OFF	
		INST.	☑	10	-	32,000	A				NA	
		GRD. FLT.	☑	0.23	-	736	A			0.4	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.7	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	4	6720	NA	NA	15.263 / 15.263	NA / NA	NA / NA	NA
Short Time PU	4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.4	20480	NA	NA	0.405 / 0.405	NA / NA	NA / NA	NA
Instant PU	10	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	40000	NA	NA	0.036 / 0.036	NA / NA	NA / NA	NA
GRD Fault PU	0.23	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.4	1440	NA	NA	0.398 / 0.398	NA / NA	NA / NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	16 °C	0.848

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01
POLE TO FRAME	2,920,000	2,476,160.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01
LINE TO LOAD	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
11.3	11.6	10.2

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/12/2023 | AMBIENT TEMPERATURE: 16 °C | HUMIDITY: 33 % | ASSET #:
SUBSTATION: SUBSTATION 7 | POSITION: MAIN B

MANUFACTURER	SQUARE D	SN / SO NO.	085255257503	FRAME SIZE 3,200 AMPS	600 V
BREAKER TYPE	NW 32 H3	SENSOR TAPS	3200	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	MAIN B	ELECTRICALLY OPERATED	(●) YES ( ) NO
TRIP UNIT TYPE	MICROLOGIC 6.0	TRIP UNIT CAT #	N/A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	DIRTY	C/L
CONTACT FINGERS	☑	GOOD	C
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	NA
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	3,200	LONG	☑	0.7	X	3,200	A =	2,240	A		4	NA	
SENSOR TAP	3,200	SHORT	☑	4	X	2,240	A =	8,960	A		0.4	OFF	
		INST.	☑	10	X	3,200	A =	32,000	A		N/A	NA	
		GRD. FLT.	☑	0.23	X	3,200	A =	736	A		0.4	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	3,200	LONG	☑	0.7	X	3,200	A =	2,240	A		4	NA	
SENSOR TAP	3,200	SHORT	☑	4	-	8,960	A				0.4	OFF	
		INST.	☑	10	-	32,000	A					NA	
		GRD. FLT.	☑	0.23	-	736	A				0.4	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.7	2240	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	4	6720	NA	NA	15.110 / 15.110	NA / NA	NA / NA	NA
Short Time PU	4	8960	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.4	20480	NA	NA	0.404 / 0.404	NA / NA	NA / NA	NA
Instant PU	10	32000	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	40000	NA	NA	0.036 / 0.036	NA / NA	NA / NA	NA
GRD Fault PU	0.23	720	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.4	1440	NA	NA	0.402 / 0.402	NA / NA	NA / NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	16 °C	0.848

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01
POLE TO FRAME	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01
LINE TO LOAD	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
13.6	16.0	14.3

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/13/2023 | AMBIENT TEMPERATURE: 16 °C | HUMIDITY: 33 % | ASSET #:
SUBSTATION: SUBSTATION 7 | POSITION: MCC-CEB A BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085255257201	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	NW 8 H3	SENSOR TAPS	600	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	2D1	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	MICROLOGIC 6.0	TRIP UNIT CAT #	N/A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA
GROUND CONNECTION	☑	GOOD	L
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	600	LONG	☑	1	X	600	A =	600	A		4	NA	
SENSOR TAP	600	SHORT	☑	6	X	600	A =	3,600	A		0.1	OFF	
		INST.	☑	15	X	600	A =	9,000	A		N/A	NA	
		GRD. FLT.	☑	0.4	X	600	A =	240	A		0.3	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	600	LONG	☑	1	X	600	A =	600	A		4	NA	
SENSOR TAP	600	SHORT	☑	6	-	3,600	A				0.1	OFF	
		INST.	☑	15	-	9,000	A					NA	
		GRD. FLT.	☑	0.4	-	240	A				0.3	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	4	2600	NA	NA	6.748 / 6.748	NA / NA	NA / NA	NA
Short Time PU	6	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.1	6300	NA	NA	0.099 / 0.099	NA / NA	NA / NA	NA
Instant PU	15	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	11250	NA	NA	0.046 / 0.046	NA / NA	NA / NA	NA
GRD Fault PU	0.4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.3	480	NA	NA	0.260 / 0.260	NA / NA	NA / NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	16 °C	0.848

Insulation Resistance	POLE 1 (M-OHM) (P1-P2)		POLE 2 (M-OHM) (P2-P3)		POLE 3 (M-OHM) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01
POLE TO FRAME	3,000,000	2,544,000.01	3,000,000	2,544,000.01	2,730,000	2,315,040.01
LINE TO LOAD	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01

POLE RESISTANCE (µ-OHM)		
POLE 1	POLE 2	POLE 3
11.9	10.9	11.2

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. ICKES

MOLDED CASE CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/12/2023 AMBIENT TEMPERATURE 13 °C HUMIDITY 25 % EQPT. LOCATION

SUBSTATION SUBSTATION 7 POSITION MCC-CEB-A&B

BREAKER IDENTIFICATION	MANUFACTURER	SERIAL NUMBER	TYPE	FRAME RATING (Amps)	FRAME RATING (Volts)	TRIP RATING	INSTANTANEOUS TRIP	ELEMENT TYPE
TIE	SQUARE D	NA	LJ600	600	600	500	1800	THERMAL ADJUSTABLE

INSULATION RESISTANCE (M©) @ 1000 VDC									POLE RESISTANCE (µ©)		
A - B	B - C	C - A	A - GND	B - GND	C - GND	A	B	C			
POLE TO POLE			POLE TO FRAME			LINE TO LOAD			A	B	C
99,600	122,800	130,200	74,700	89,200	96,800	1,019,000	1,189,000	1,723,000	163.90	145.60	191.70

Manual Trip Function ☑	RANGE	MIN TIME	MAX TIME	TRIP TESTS	A	B	C
	AMPS			INSTANTANEOUS TRIP AMPS			
Exercise Breaker ☑	SECONDS			TRIP TIME IN SECONDS @ 300% RATED CURRENT			

BREAKER IDENTIFICATION	MANUFACTURER	SERIAL NUMBER	TYPE	FRAME RATING (Amps)	FRAME RATING (Volts)	TRIP RATING	INSTANTANEOUS TRIP	ELEMENT TYPE
ISOLATION	SQUARE D	NA	LJ600	600	600	500	1800	THERMAL ADJUSTABLE

INSULATION RESISTANCE (M©) @ 1000 VDC									POLE RESISTANCE (µ©)		
A - B	B - C	C - A	A - GND	B - GND	C - GND	A	B	C			
POLE TO POLE			POLE TO FRAME			LINE TO LOAD			A	B	C
75,100	74,700	94,500	84,900	67,700	74,700	1,100,000	1,273,000	1,540,000	186.50	206.30	238.90

Manual Trip Function ☑	RANGE	MIN TIME	MAX TIME	TRIP TESTS	A	B	C
	AMPS			INSTANTANEOUS TRIP AMPS			
Exercise Breaker ☑	SECONDS			TRIP TIME IN SECONDS @ 300% RATED CURRENT			

COMMENTS: UNABLE TO SECONDARY INJECT.

DEFICIENCIES:

TESTED BY: E. PENLAND, S. FRY, K. ICKES

MOTOR CONTROL CENTER INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/12/2023 | AMBIENT TEMPERATURE: 13 °C | HUMIDITY: 25 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 7 | POSITION: MCC-CEB-A&B

NAMEPLATE DATA

MANUFACTURER: SQUARE D | SERIAL NO.: U-52003 | TYPE: 12
CATALOG NO.: 30951271-148 | DRAWING NO.: 80459-641-01 | VOLTAGE CLASS: 600
MAIN BUS RATING: 600 A | MAIN BUS NEUTRAL RATING: NA A | CONDUCTOR: (●) CU ( ) AL
CURRENT WITHSTAND RATING: NA | NUMBER OF SECTIONS: 6 | LISTING: ☑ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER: 0 | MLO: 1 | TYPE: NA | AMPACITY: 600 | MAIN DISCONNECT: 0 | FUSE TYPE: NA | SIZE: NA
TOTAL POSITIONS EQUIPPED: 18 | NO. OF SPARE SPACES: 1 | TOTAL POSITIONS USED: 17

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

TEST VOLTAGE: 1 KVDC | EQUIPMENT TEMPERATURE: 13 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 0.65

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
A BUS	RDG.	81,900	74,400	103,000		102,800	127,500	127,000			
	20°C	53,235	48,360	66,950		66,820	82,875	82,550			
B BUS	RDG.	78,500	62,400	92,200		81,500	98,400	98,500			
	20°C	51,025	40,560	59,930		52,975	63,960	64,025			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS: SOME CONTROL WIRING WAS FOUND LOOSE AND IT WAS CORRECTED.
INSULATION RESISTANCE TESTED WITH CABLE TO SUB 7 CONNECTED.

DEFICIENCIES:

TESTED BY: E. PENLAND, S. FRY, K. ICKES

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/12/2023 AMBIENT TEMPERATURE 13 °C HUMIDITY 25 % EQPT. LOCATION

SUBSTATION SUBSTATION 7 POSITION MCC-CEB-A&B

NAMEPLATE DATA

MANUFACTURER CUTLER-HAMMER SERIAL NO. NA TYPE FREEDOM SERIES 2100

CATALOG NO. MDT03545 DRAWING NO. NA VOLTAGE CLASS 480

PHASE AMPACITY 600 A WITHSTAND RATING 65 KA CONDUCTOR (•) CU ( ) AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
A-SIDE LUGS	SURGE PROT	485	508	643			B-SIDE LUGS	SURGE PROT	495	823	537		
A-SIDE LUGS	CEB-ACU1	311	263	290			B-SIDE LUGS	ATS-UV	248	259	246		
A-SIDE LUGS	CEB-ACCU1	569	838	536			B-SIDE LUGS	ATS-CEB-B	252	275	272		
A-SIDE LUGS	CEB-EF1	939	881	951			B-SIDE LUGS	CEB-P-2	804	971	905		
A-SIDE LUGS	CEB-FCP1	736	727	689			B-SIDE LUGS	CEB-FCP-2	718	696	697		
A-SIDE LUGS	ATS-CEB-A	522	516	494			B-SIDE LUGS	CEB-PPU-1	732	719	739		
A-SIDE LUGS	BATTERY CH	815	799	828			B-SIDE LUGS	CEB-EF-2	778	735	664		
A-SIDE LUGS	10HP SPARE	1137	959	970			B-SIDE LUGS	ISO BREAKE	299	280	269		
A-SIDE LUGS	CEB-P-1	783	839	749									
A-SIDE LUGS	TIE BREAKER	345	341	306			TIE BREAKER	ISO BREAKE	53.2	56.6	50.8		

COMMENTS:

DEFICIENCIES:

TESTED BY: E. PENLAND, S. FRY, K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/13/2023 | AMBIENT TEMPERATURE: 16 °C | HUMIDITY: 33 % | ASSET #:
SUBSTATION: SUBSTATION 7 | POSITION: MCC-CEB-B

MANUFACTURER	SQUARE D	SN / SO NO.	085255257202	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	NW 08 H3	SENSOR TAPS	600	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	D1	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	MICROLOGIC 6	TRIP UNIT CAT #	N/A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	DIRTY	C/L
CONTACT FINGERS	☑	GOOD	C
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	NA
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	600	LONG	☑	1	X	600	A =	600	A		4	NA	
SENSOR TAP	600	SHORT	☑	6	X	600	A =	3,600	A		0.1	OFF	
		INST.	☑	15	X	600	A =	9,000	A			NA	
		GRD. FLT.	☑	0.4	X	600	A =	240	A		3	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	800	LONG	☑	1	X	600	A =	600	A		4	NA	
SENSOR TAP	600	SHORT	☑	6	-	3,600	A				0.1	OFF	
		INST.	☑	15	-	9,000	A					NA	
		GRD. FLT.	☑	0.4	-	240	A				3	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	4	2600	NA	NA	7.030 / 7.030	NA / NA	NA / NA	NA
Short Time PU	6	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.1	6300	NA	NA	0.103 / 0.103	NA / NA	NA / NA	NA
Instant PU	15	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay		11250	NA	NA	0.038 / 0.038	NA / NA	NA / NA	NA
GRD Fault PU	0.4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	3	480	NA	NA	0.261 / 0.261	NA / NA	NA / NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	16 °C	0.848

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01
POLE TO FRAME	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01
LINE TO LOAD	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
11.0	12.0	13.0

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/13/2023 | AMBIENT TEMPERATURE: 16 °C | HUMIDITY: 33 % | ASSET #:
SUBSTATION: SUBSTATION 7 | POSITION: PP-MTB

MANUFACTURER	SQUARE D	SN / SO NO.	085255257402	FRAME SIZE 800 AMPS 600	V
BREAKER TYPE	NW 08 H3	SENSOR TAPS	250	MOUNTING	◉ D.O. ○ B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	A1	ELECTRICALLY OPERATED	○ YES ◉ NO
TRIP UNIT TYPE	MICROLOGIC 6.0	TRIP UNIT CAT #	N/A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA
GROUND CONNECTION	☑	GOOD	NA
TRIP UNIT	☑	NEW	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	250	LONG	☑	1	X	250	A =	250	A		24	NA	
SENSOR TAP	250	SHORT	☑	8	X	250	A =	2,000	A		-0.1	OFF	
		INST.	☑	15	X	250	A =	3,750	A		N/A	NA	
		GRD. FLT.	☑	0.3	X	250	A =	75	A		0.1	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	250	LONG	☑	1	X	250	A =	250	A		24	NA	
SENSOR TAP	250	SHORT	☑	8	-	2,000	A				-0.1	OFF	
		INST.	☑	15	-	3,750	A					NA	
		GRD. FLT.	☑	0.3	-	75	A				0.1	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	1	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	24	1417	NA	NA	23.602 / 23.602	NA / NA	NA / NA	NA
Short Time PU	8	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	-0.1	2875	NA	NA	0.103 / 0.103	NA / NA	NA / NA	NA
Instant PU	15	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	4688	NA	NA	0.037 / 0.037	NA / NA	NA / NA	NA
GRD Fault PU	0.3	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.1	150	NA	NA	0.090 / 0.090	NA / NA	NA / NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	16 °C	0.848

Insulation Resistance	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01
POLE TO FRAME	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01
LINE TO LOAD	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01

POLE RESISTANCE (µ©)		
POLE 1	POLE 2	POLE 3
11.2	10.9	11.6

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/13/2023 | AMBIENT TEMPERATURE: 16 °C | HUMIDITY: 33 % | ASSET #:
SUBSTATION: SUBSTATION 7 | POSITION: TIE

MANUFACTURER	SQUARE D	SN / SO NO.	085255257502	FRAME SIZE 3,200 AMPS 600 V	
BREAKER TYPE	NW 32 H3	SENSOR TAPS	3200	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	3B1	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	MICROLOGIC 6.0	TRIP UNIT CAT #	N/A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	NEW	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA
GROUND CONNECTION	☑	GOOD	NA
TRIP UNIT	☑	NEW	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	3,200	LONG	☑	0.6	X	3,200	A =	1,920	A		4	NA	
SENSOR TAP	3,200	SHORT	☑	4	X	1,920	A =	7,680	A		0.3	OFF	
		INST.	☑	10	X	3,200	A =	32,000	A		N/A	NA	
		GRD. FLT.	☑	0.16	X	3,200	A =	512	A		0.3	OFF	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	3,200	LONG	☑	0.6	X	3,200	A =	1,920	A		4	NA	
SENSOR TAP	3,200	SHORT	☑	4	-	7,680	A				0.3	OFF	
		INST.	☑	10	-	32,000	A					NA	
		GRD. FLT.	☑	0.16	-	512	A				0.3	OFF	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.6	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	4	5760	NA	NA	15.665 / 15.665	NA / NA	NA / NA	NA
Short Time PU	4	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.3	19840	NA	NA	0.262 / 0.262	NA / NA	NA / NA	NA
Instant PU	10	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	40000	NA	NA	0.037 / 0.037	NA / NA	NA / NA	NA
GRD Fault PU	0.16	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.3	1000	NA	NA	0.259 / 0.259	NA / NA	NA / NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	16 °C	0.848

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01
POLE TO FRAME	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01
LINE TO LOAD	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
50.0	62.1	44.5

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/13/2023 | AMBIENT TEMPERATURE: 16 °C | HUMIDITY: 33 % | ASSET #:
SUBSTATION: SUBSTATION 7 | POSITION: UV-1A

MANUFACTURER	SQUARE D	SN / SO NO.	085255257401	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	NW 8 H3	SENSOR TAPS	250	MOUNTING	◉ D.O. ○ B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	2B1	ELECTRICALLY OPERATED	○ YES ◉ NO
TRIP UNIT TYPE	MICROLOGIC 6.0	TRIP UNIT CAT #	N/A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	GOOD	C/L
CONTACT FINGERS	☑	GOOD	C/L
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	NEW	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☐	NA	NA
GROUND CONNECTION	☑	GOOD	NA
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	250	LONG	☑	0.8	X	250	A =	200	A		0.5	NA	
SENSOR TAP	250	SHORT	☑	8	X	200	A =	1,600	A		0.2	OFF	
		INST.	☑	12	X	250	A =	3,000	A		N/A	NA	
		GRD. FLT.	☑	0.3	X	250	A =	75	A		0.1	ON	

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	250	LONG	☑	0.8	X	250	A =	200	A		0.5	NA	
SENSOR TAP	250	SHORT	☑	8	-	1,600	A				0.2	OFF	
		INST.	☑	12	-	3,000	A					NA	
		GRD. FLT.	☑	0.3	-	75	A				0.1	ON	

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.8	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	0.5	1133	NA	NA	0.506 / 0.506	NA / NA	NA / NA	NA
Short Time PU	8	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	2300	NA	NA	0.166 / 0.166	NA / NA	NA / NA	NA
Instant PU	12	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	3750	NA	NA	0.045 / 0.045	NA / NA	NA / NA	NA
GRD Fault PU	0.3	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.1	150	NA	NA	0.272 / 0.272	NA / NA	NA / NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	16 °C	0.848

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01
POLE TO FRAME	3,000,000	2,544,000.01	3,000,000	2,544,000.01	2,390,000	2,026,720
LINE TO LOAD	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
10.3	12.9	11.7

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. ICKES

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/13/2023 | AMBIENT TEMPERATURE: 16 °C | HUMIDITY: 33 % | ASSET #:
SUBSTATION: SUBSTATION 7 | POSITION: UV-1B

MANUFACTURER	SQUARE D	SN / SO NO.	085255257403	FRAME SIZE 800 AMPS 600 V	
BREAKER TYPE	NW 08 H3	SENSOR TAPS	800	MOUNTING	(●) D.O. ( ) B.I.
FUSE CAT. NO.	N/A	CUBICLE CODE	B1	ELECTRICALLY OPERATED	( ) YES (●) NO
TRIP UNIT TYPE	MICROLOGIC 6.0	TRIP UNIT CAT #	N/A	COUNTER BEGINNING	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	DIRTY	C/L
CONTACT FINGERS	☑	GOOD	C
LOADING AND ARCING CONTACTS	☑	GOOD	C
OVERCURRENT DEV. BATTERY	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	NA
TRIP UNIT	☑	GOOD	NA

SETTINGS AS FOUND		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	250	LONG	☑	0.8	X	250	A =	200	A		0.5	NA	
SENSOR TAP	250	SHORT	☑	8	X	200	A =	1,600	A		0.2	OFF	
		INST.	☑	12	X	250	A =	3,000	A		N/A	NA	
		GRD. FLT.	☑	0.3	X	250	A =	75	A		0.1		

SETTINGS AS LEFT		FUNCTION		Setting							DELAY	I2T	ADDI INFO
RATING PLUG	250	LONG	☑	0.8	X	250	A =	200	A		0.5	NA	
SENSOR TAP	250	SHORT	☑	9	-	1,600	A				0.2	OFF	
		INST.	☑	12	-	3,000	A					NA	
		GRD. FLT.	☑	0.3	-	75	A				0.1		

Primary/Secondary Current Performance Tests

Test Criteria	Trip Unit Setting	Test Amps	% of Setting	Performance Tolerance	Pole 1 Found/Left	Pole 2 Found/Left	Pole 3 Found/Left	Targets
LongTime PU	0.8	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Long Time Delay	0.5	1133	NA	NA	0.493 / 0.493	NA / NA	NA / NA	NA
Short Time PU	8	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Short Time Delay	0.2	2300	NA	NA	0.157 / 0.157	NA / NA	NA / NA	NA
Instant PU	12	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
Instant Delay	N/A	3750	NA	NA	0.037 / 0.037	NA / NA	NA / NA	NA
GRD Fault PU	0.3	NA	NA	NA	NA / NA	NA / NA	NA / NA	NA
GRD Fault Delay	0.1	150	NA	NA	0.093 / 0.093	NA / NA	NA / NA	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	16 °C	0.848

Insulation Resistance	POLE 1 (MΩ) (P1-P2)		POLE 2 (MΩ) (P2-P3)		POLE 3 (MΩ) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01
POLE TO FRAME	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01
LINE TO LOAD	3,000,000	2,544,000.01	3,000,000	2,544,000.01	3,000,000	2,544,000.01

POLE RESISTANCE (μΩ)		
POLE 1	POLE 2	POLE 3
11.3	11.8	10.9

COUNTER END: NA

COMMENTS:
DEFICIENCIES:

TESTED BY: K. ICKES

TRANSFORMER MAINTENANCE AND INSPECTION

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/13/2023 | AMBIENT TEMPERATURE: 19 °C | HUMIDITY: 23 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 7 | POSITION: XFMR 1

NAMEPLATE DATA

MANUFACTURER: SQUARE D | YR MFR: 2014 | SERIAL NO.: 30951271-026-01-1
IMPEDANCE: 5.73 % | NUMBER OF FANS: 0 | WEIGHT: 9800 LBS | TYPE: VPI | CLASS: AA / /
KVA: 1,500 / / | WINDING MATERIAL: COPPER | TEMPERATURE RISE: 115 °C | B.I.L. RATING: 10 / 95
PRIMARY V: 13,200 | DELTA | MFR LOCATION: BLAND, VA
SECONDARY V: 480 / 277.12 | WYE | ☑ EXPOSED NEUTRAL - X0 | TANK TYPE: VENTED
TAP VOLTAGES: 13,860 | 13,530 | 13,200 | 12,870 | 12,540 | INSULATING MATERIAL: PAPER
TAP POSITION: E-F | D-F | E-G | D-G | C-G | WINDING INSUATING SYSTEM: OPEN-WOUND
TAP SETTING: E-G 13,200 V | ☑ HIGH SIDE TAP | ☐ LOW SIDE TAP

VISUAL AND MECHANICAL INSPECTION

	Description	NOTES
☑	REASON FOR INSPECTION	ROUTINE
☑	CHECK FOR SIGNS OF OVERHEATING, DISCOLORATION	GOOD
☑	ENCLOSURE (OPENINGS, COVERS, PAINT, ETC)	GOOD
☑	CHECK ALL CONNECTIONS TIGHT	GOOD
☑	IMPROPER TERMINATIONS	GOOD
☑	EQUIPMENT GROUND/GROUND BAR	GOOD
☑	CORE GROUND	GOOD
☑	NEUTRAL BAR	GOOD
☑	PRIMARY SIDE (CABLE OR BUSS)	GOOD

	Description	NOTES
☑	SECONDARY SIDE (CABLE OR BUSS)	GOOD
☑	CLEAN AND INSPECT INSULATORS, SUPPORTS, AND BARRIERS	GOOD
☑	CLEAN CORE, COIL, AND ENCLOSURE (INTERIOR/EXTERIOR)	GOOD
☑	CORE AND COIL BRACING	GOOD
☑	VIBRATION ISOLATATION PADS	GOOD
☑	PROPER CLEARANCE (36 INCHES UNOBSTRUCTED)	GOOD
☐	CONTROL WIRING	NA
☐	COOLING FANS	NA
☐	ALARMS AND INDICATORS	NA

ELECTRICAL TESTS

INSULATION RESISTANCE (Mohm)

MINUTES	PRIMARY TO GROUND	SECONDARY TO GROUND	PRIMARY TO SECONDARY
Test kV	5	1	5
0.50	838,000	68,800	372,000
1.00	1,174,000	92,000	520,000
10.00	1,865,000	345,000	1,588,000
P. I. (10min/1min)	1.59	3.75	3.05

ARRESTERS TESTING (Mohm)

SIDE	TEST VOLTAGE KV / 1 MIN	PHASE A	PHASE B	PHASE C
HIGH	5	197,800	249,000	253,000

WINDING RESISTANCE TEST (mohm)

APPARATUS TEMP. (°C)	19	TEST AMPS	5		
H3-H1		H1-H2		H2-H3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
713.70	730.59	716.45	733.41	713.45	730.34
X0-X1		X0-X2		X0-X3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
0.435	0.445	0.438	0.448	0.436	0.446

TRANSFORMER TURN RATIO TEST

TAP	CALC	PHASE A	PHASE B	PHASE C
E-G	47.633	47.740	47.725	47.740
% ERROR		0.225%	0.194%	0.225%

EXTERNAL DOCUMENTS ATTACHED TO REPORT

COMMENTS: EXCITATION CURRENT A - 1.9 MILLIAMPS; B- 1.5 MILLIAMPS; C - 1.9 MILLAMPS.
CABLE INSULATION RESISTANCE: A-G - 197,800 MEGAOHMS; B-G - 249,000 MEGAOHMS; C-G - 253,000 MEGAOHMS; A-B - 893,000 MEGAOHMS; B-C - 934,000 MEGAOHMS; C-A - 876,000 MEGAOHMS.

TESTED BY: E. PENLAND, S. FRY

7262 Kensington Road
Brighton, MI 48116
317-879-0660

COMMENTS:	CAPACITOR RESISTANCES: A - 137.7 MEGAOHMS; B - 137.8 MEGAOHMS; C - 138.6 MEGAOHMS. NAME PLATE CAPACITANCE OF CAPACITORS: A - 0.25 MICROFARADS; B - 0.25 MICROFARADS; C - 0.25 MICROFARADS. CAPACITANCE OF CAPACITORS: A - 0.252 MICROFARADS; B - 0.250 MICROFARADS; C - 0.250 MICROFARADS.
DEFICIENCIES:	

TRANSFORMER MAINTENANCE AND INSPECTION

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/13/2023 | AMBIENT TEMPERATURE: 19 °C | HUMIDITY: 23 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 7 | POSITION: XFMR 2

NAMEPLATE DATA

MANUFACTURER: SQUARE D | YR MFR: 2014 | SERIAL NO.: 30951271-028-01-1
IMPEDANCE: 5.76 % | NUMBER OF FANS: 0 | WEIGHT: 9800 LBS | TYPE: VPI | CLASS: AA / /
KVA: 1,500 / / | WINDING MATERIAL: COPPER | TEMPERATURE RISE: 115 °C | B.I.L. RATING: 10 / 95
PRIMARY V: 13,200 | DELTA | MFR LOCATION: BLAND, VA
SECONDARY V: 480 / 277.12 | WYE | ☑ EXPOSED NEUTRAL - X0 | TANK TYPE: VENTED
TAP VOLTAGES: 13,860 | 13,530 | 13,200 | 12,870 | 12,540 | INSULATING MATERIAL: PAPER
TAP POSITION: E-F | D-F | E-G | D-G | C-G | WINDING INSUATING SYSTEM: OPEN-WOUND
TAP SETTING: E-G 13,200 V | ☑ HIGH SIDE TAP | ☐ LOW SIDE TAP

VISUAL AND MECHANICAL INSPECTION

	Description	NOTES
☑	REASON FOR INSPECTION	ROUTINE
☑	CHECK FOR SIGNS OF OVERHEATING, DISCOLORATION	GOOD
☑	ENCLOSURE (OPENINGS, COVERS, PAINT, ETC)	GOOD
☑	CHECK ALL CONNECTIONS TIGHT	GOOD
☑	IMPROPER TERMINATIONS	GOOD
☑	EQUIPMENT GROUND/GROUND BAR	GOOD
☑	CORE GROUND	GOOD
☑	NEUTRAL BAR	GOOD
☑	PRIMARY SIDE (CABLE OR BUSS)	GOOD

	Description	NOTES
☑	SECONDARY SIDE (CABLE OR BUSS)	GOOD
☑	CLEAN AND INSPECT INSULATORS, SUPPORTS, AND BARRIERS	GOOD
☑	CLEAN CORE, COIL, AND ENCLOSURE (INTERIOR/EXTERIOR)	GOOD
☑	CORE AND COIL BRACING	GOOD
☑	VIBRATION ISOLATATION PADS	GOOD
☑	PROPER CLEARANCE (36 INCHES UNOBSTRUCTED)	GOOD
☐	CONTROL WIRING	NA
☐	COOLING FANS	NA
☐	ALARMS AND INDICATORS	NA

ELECTRICAL TESTS

INSULATION RESISTANCE (Mohm)

MINUTES	PRIMARY TO GROUND	SECONDARY TO GROUND	PRIMARY TO SECONDARY
Test kV	5	1	5
0.50	888,000	30,400	278,000
1.00	1,253,000	60,100	794,000
10.00	2,650,000	303,000	3,000,000
P. I. (10min/1min)	2.12	5.04	3.78

ARRESTERS TESTING (Mohm)

SIDE	TEST VOLTAGE KV / 1 MIN	PHASE A	PHASE B	PHASE C
HIGH	5	132,000	222,000	139,000

WINDING RESISTANCE TEST (mohm)

APPARATUS TEMP. (°C)	19	TEST AMPS	5		
H3-H1		H1-H2		H2-H3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
710.85	727.67	711.75	728.60	710.30	727.11
X0-X1		X0-X2		X0-X3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
0.434	0.444	0.441	0.451	0.434	0.444

TRANSFORMER TURN RATIO TEST

TAP	CALC	PHASE A	PHASE B	PHASE C
E-G	47.633	47.735	47.725	47.730
% ERROR		0.215%	0.194%	0.204%

EXTERNAL DOCUMENTS ATTACHED TO REPORT

COMMENTS:

EXCITATION CURRENT A - 1.8 MILLIAMPS; B- 1.5 MILLIAMPS; C - 1.8 MILLAMPS.
CABLE INSULATION RESISTANCE: A-G - 132,000 MEGAOHMS; B-G - 222,000 MEGAOHMS; C-G - 139,800 MEGAOHMS; A-B - 1,135,000 MEGAOHMS; B-C - 959,000 MEGAOHMS; C-A - 798,000 MEGAOHMS.

TESTED BY: E. PENLAND, S. FRY

7262 Kensington Road
Brighton, MI 48116
317-879-0660

COMMENTS:	CAPACITOR RESISTANCES: A - 138.5 MEGAOHMS; B - 140.2 MEGAOHMS; C - 140 MEGAOHMS. NAME PLATE CAPACITANCE OF CAPACITORS: A - 0.25 MICROFARADS; B - 0.25 MICROFARADS; C - 0.25 MICROFARADS. CAPACITANCE OF CAPACITORS: A - 0.256 MICROFARADS; B - 0.254 MICROFARADS; C - 0.253 MICROFARADS.
DEFICIENCIES:	

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 2/15/2024 AMBIENT TEMPERATURE 22 °C HUMIDITY 20 % EQPT. LOCATION

SUBSTATION SUBSTATION 8 POSITION

PER MANUFACTURER RECOMMENDATION SEPAM S24 RELAYS WERE TESTED BY VERIFYING METERING AND LOGIC OUTPUT TESTED 50N/51N.

FEEDER SUB 6B 200:5 CTs
A-PHASE - 1 AMP APPLIED - 40 AMPS READ ON RELAY.
B-PHASE - 1 AMP APPLIED - 40 AMPS READ ON RELAY.
C-PHASE - 1 AMP APPLIED - 40 AMPS READ ON RELAY.

50N/51N PICKUP
A-PHASE - 1.771
B PHASE - 1.776
C PHASE - 1.771

FEEDER PAB-E2 200:5 CTs
A-PHASE - 1 AMP APPLIED - 40 AMPS READ ON RELAY.
B-PHASE - 1 AMP APPLIED - 40 AMPS READ ON RELAY.
C-PHASE - 1 AMP APPLIED - 40 AMPS READ ON RELAY.

50N/51N PICKUP
A-PHASE - 1.767
B PHASE - 1.765
C PHASE - 1.759

MAIN B 1200:5 CTs
A-PHASE - 1 AMP APPLIED - 240 AMPS READ ON RELAY.
B-PHASE - 1 AMP APPLIED - 240 AMPS READ ON RELAY.
C-PHASE - 1 AMP APPLIED - 240 AMPS READ ON RELAY.

50N/51N PICKUP
A-PHASE - 0.567
B PHASE - 0.575
C PHASE - 0.554

FEEDER SPARE 200:5 CTs
A-PHASE - 1 AMP APPLIED - 40 AMPS READ ON RELAY.
B-PHASE - 1 AMP APPLIED - 40 AMPS READ ON RELAY.
C-PHASE - 1 AMP APPLIED - 40 AMPS READ ON RELAY.

50N/51N PICKUP
A-PHASE - 1.755
B PHASE - 1.754
C PHASE - 1.757

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 2/15/2024 AMBIENT TEMPERATURE 22 °C HUMIDITY 20 % EQPT. LOCATION

SUBSTATION SUBSTATION 8 POSITION

PER MANUFACTURER RECOMMENDATION SEPAM S24 RELAYS WERE TESTED BY VERIFYING METERING AND LOGIC OUTPUT TESTED 50N/51N.

FEEDER SUB 6A 200:5 CTs
A-PHASE - 1 AMP APPLIED - 40 AMPS READ ON RELAY.
B-PHASE - 1 AMP APPLIED - 40 AMPS READ ON RELAY.
C-PHASE - 1 AMP APPLIED - 40 AMPS READ ON RELAY.

50N/51N PICKUP
A-PHASE - 1.768
B PHASE - 1.779
C PHASE - 1.773

FEEDER PAB-E3 200:5 CTs
A-PHASE - 1 AMP APPLIED - 40 AMPS READ ON RELAY.
B-PHASE - 1 AMP APPLIED - 40 AMPS READ ON RELAY.
C-PHASE - 1 AMP APPLIED - 40 AMPS READ ON RELAY.

50N/51N PICKUP
A-PHASE - 1.768
B PHASE - 1.771
C PHASE - 1.773

MAIN A 1200:5 CTs
A-PHASE - 1 AMP APPLIED - 240 AMPS READ ON RELAY.
B-PHASE - 1 AMP APPLIED - 240 AMPS READ ON RELAY.
C-PHASE - 1 AMP APPLIED - 240 AMPS READ ON RELAY.

50N/51N PICKUP
A-PHASE - 0.566
B PHASE - 0.554
C PHASE - 0.551

FEEDER SPARE 200:5 CTs
A-PHASE - 1 AMP APPLIED - 40 AMPS READ ON RELAY.
B-PHASE - 1 AMP APPLIED - 40 AMPS READ ON RELAY.
C-PHASE - 1 AMP APPLIED - 40 AMPS READ ON RELAY.

50N/51N PICKUP
A-PHASE - 1.748
B PHASE - 1.769
C PHASE - 1.771

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 2/15/2024 AMBIENT TEMPERATURE 22 °C HUMIDITY 20 % EQPT. LOCATION

SUBSTATION SUBSTATION 8 POSITION

PER MANUFACTURER RECOMMENDATION SEPAM S24 RELAYS WERE TESTED BY VERIFYING METERING AND LOGIC OUTPUT TESTED 50N/51N.

FEEDER PAB-E1 200:5 CTs
A-PHASE - 1 AMP APPLIED - 40 AMPS READ ON RELAY.
B-PHASE - 1 AMP APPLIED - 40 AMPS READ ON RELAY.
C-PHASE - 1 AMP APPLIED - 40 AMPS READ ON RELAY.

50N/51N PICKUP
A-PHASE - 1.767
B PHASE - 1.763
C PHASE - 1.765

MEDIUM VOLTAGE SWITCHBOARD INSULATION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/29/2023 | AMBIENT TEMPERATURE: 24 °C | HUMIDITY: 16 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 8 | POSITION: 4160V SWITCHGEAR

NAMEPLATE DATA

MANUFACTURER: SQUARE D | SERIAL NO.: 46006-676-01 | TYPE: NA
CATALOG NO.: E146027 | DRAWING NO.: NA | VOLTAGE CLASS: NA
PHASE AMPACITY: NA A | WITHSTAND RATING: NA KA | CONDUCTOR: ☑ CU ☐ AL

INSTALLED DEVICES

VACUUM BREAKERS: 11 | AIR BREAKERS: 0 | LOADBREAK DISCONNECTS: 0 | NUMBER OF BAYS: 7
VOLTAGE RELAYS: 0 | OVERCURRENT RELAYS: 9 | OTHER PROTECTIVE RELAYS: 2 | AUXILIARY RELAY: 0
PANEL METERS: 6 | KWHR METERS: 0 | VT's: 4 | CT's: 0 | CPT's: 2
Other: NA

Description	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	NA

INSULATION TEST VOLTAGE: 2.5 KVDC | TEST VOLTAGE MULTIPLIER, K1: 1 | K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE: 24 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF = 1.24

INSULATION RESISTANCE TEST RESULTS - MEGOHMS

BUS SECTION TESTED	RANGE MULT.	K2		PHASE A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C
A-BUS	1	1.24	RDG.	739,000	827,000	813,000		1,654,000	1,940,000	1,633,000
			20°C	916,360	1,025,480	1,008,120		2,050,960	2,405,600	2,024,920
B-BUS	1	1.24	RDG.	2,790,000	3,050,000	2,640,000		4,490,000	4,240,000	5,120,000
			20°C	3,459,600	3,782,000	3,273,600		5,567,600	5,257,600	6,348,800
			RDG.							
			20°C							
			RDG.							
			20°C							
			RDG.							
			20°C							

ACTUAL READING | SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: HIGH POTENTIAL TEST DONE AT 14 kVAC PHASE TO GROUND WITH PHASES NOT UNDER TEST GROUNDED: B-BUS:
A-G - 1.8 MILLIAMPS; B-G - 1.6 MILLIAMPS; C-G - 1.6 MILLIAMPS; A-BUS: A-G - 2.0 MILLIAMPS; B-G - 1.9 MILLIAMPS; C-G - 1.7 MILLIAMPS.
B-BUS TESTED 11/29/2023; A-BUS TESTED 12/1/2023.

DEFICIENCIES:

TESTED BY: E. PENLNAD, B. BURGESS, K. ICKES

SWITCHBOARD BUS CONNECTION TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 11/29/2023 AMBIENT TEMPERATURE 24 °C HUMIDITY 16 % EQPT. LOCATION

SUBSTATION SUBSTATION 8 POSITION 4160V SWITCHGEAR

NAMEPLATE DATA

MANUFACTURER SQUARE D SERIAL NO. 46006-676-01 TYPE 1

CATALOG NO. E146027 DRAWING NO. NA VOLTAGE CLASS

PHASE AMPACITY NA A WITHSTAND RATING NA KA CONDUCTOR (•) CU ( ) AL

BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS					BUS SECTION TESTED		RESISTANCE IN MICRO-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
MAIN A	PAB-E1	106	129	111			MAIN B	PAB-E2	129.9	109.7	128.8		
MAIN A	PAB-E3	130	156	171			MAIN B	SUB 6B	135.8	113.3	102.3		
MAIN A	SPARE	140	126	112			MAIN B	SPARE	143.6	147.9	160.7		
MAIN A	SUB 6A	118	101	80			MAIN B	ISOLATION	94.2	80.5	67.3		

COMMENTS: B-BUS TESTED 11/29/2023; A-BUS TESTED 12/1/2023.

DEFICIENCIES:

TESTED BY: E. PENLAND, B. BURGESS, K. ICKES

CONTROL POWER TRANSFORMER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/1/2023 | AMBIENT TEMPERATURE: 24 °C | HUMIDITY: 16 % | EQPT. LOCATION: EAST BLOWER BUILDING
SUBSTATION: SUBSTATION 8 | POSITION: A-BUS CPT

NAMEPLATE DATA

MANUFACTURER: INSTRUMENT TRANSFORME | CATALOG NO.: CPTS3-60-15-4161A | TYPE: CPT | NAMEPLATE RATIO: 34.667 : 1.000
PRIMARY VOLTAGE: 4,160 | SECONDARY VOLTAGE: 120 / 240 | KVA: 15 | CLASS: NA
Other: NA
PRIMARY FUSE: MANUFACTURER: FERRAZ SHAWMUT | TYPE: EJ0-1 C | SIZE: 10E | NO.: 9F60DJD010
SECONDARY FUSE: MANUFACTURER: NA | TYPE: NA | SIZE: NA | NO.: NA

EQUIPMENT TEMPERATURE: 24 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 1.24

IDENTIFICATION: | **SERIAL NUMBER:**

TURNS RATIO TEST

TEST CONNECTIONS	CALCULATED RATIO	MEASURED RATIO	% Error
X_1 X_3	34.6667	34.73	-0.182692
H_1 H_2 X_2 X_4	34.6667	34.73	-0.182692
X_1 X_4	17.3333	17.366	-0.188462

POLARITY: GOOD

INSULATION TESTS

				RDG.	20°C	
PRIMARY - SECONDARY	@ 2.5	KVDC		2,830,000	3,509,200	MEGOHMS
PRIMARY - GROUND	@ 2.5	KVDC		2,750,000	3,410,000	MEGOHMS
SECONDARY - GROUND	@ 1.0	KVDC		3,000,000	3,720,000	MEGOHMS

IDENTIFICATION: | **SERIAL NUMBER:**

TURNS RATIO TEST

TEST CONNECTIONS	CALCULATED RATIO	MEASURED RATIO	% Error
X_1 X_3	34.6667		
H_1 H_2 X_2 X_4	34.6667		
X_1 X_4	17.3333		

POLARITY:

INSULATION TESTS

				RDG.	20°C	
PRIMARY - SECONDARY	@	KVDC				MEGOHMS
PRIMARY - GROUND	@	KVDC				MEGOHMS
SECONDARY - GROUND	@ 1.0	KVDC				MEGOHMS

COMMENTS: SECONDARY IS AN 80A BREAKER
DEFICIENCIES:

TESTED BY: E. PENLAND

VOLTAGE TRANSFORMER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/1/2023 | AMBIENT TEMPERATURE: 24 °C | HUMIDITY: 16 % | EQPT. LOCATION: EAST BLOWER BUILDING
SUBSTATION: SUBSTATION 8 | POSITION: A-BUS VTs

NAMEPLATE DATA

MANUFACTURER: INSTRUMENT TRANSFORMER | CATALOG NO.: PTG3-2-60-422FFGC2 | TYPE: T-0215 | NAMEPLATE RATIO: 35 : 1
PRIMARY VOLTAGE: 4,200 | SECONDARY VOLTAGE: 120 | KVA: 0.75 | CLASS: NA
Other: NA
PRIMARY FUSE: MANUFACTURER: BUSSMANN | TYPE: H.R.C | SIZE: 1E | NO.: ABWNA-1E
SECONDARY FUSE: MANUFACTURER: BUSSMAN | TYPE: BUSS | SIZE: 5A | NO.: BAF-5

EQUIPMENT TEMPERATURE: 24 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 1.24

VT IDENTIFICATION: | **SERIAL NUMBER:** 53897245

TURNS RATIO TEST

CALCULATED TURNS RATIO: 35
MEASURED TURNS RATIO: 34.94
CONNECTIONS: H_1 H_2 X_1 X_2
POLARITY: GOOD | Error: 0.171429 %

INSULATION TEST

				RDG.	20°C	
PRIMARY - SECONDARY	@ 2.5	kVDC		520,000	644,800	MEGOHMS
PRIMARY - GROUND	@ 2.5	kVDC		527,000	653,480	MEGOHMS
SECONDARY - GROUND	@ 1	kVDC		786,000	974,640	MEGOHMS

VT IDENTIFICATION: | **SERIAL NUMBER:** 53897244

TURNS RATIO TEST

CALCULATED TURNS RATIO: 35
MEASURED TURNS RATIO: 34.95
CONNECTIONS: H_1 H_2 X_1 X_2
POLARITY: GOOD | Error: 0.142857 %

INSULATION TEST

				RDG.	20°C	
PRIMARY - SECONDARY	@ 2.5	kVDC		520,000	644,800	MEGOHMS
PRIMARY - GROUND	@ 2.5	kVDC		527,000	653,480	MEGOHMS
SECONDARY - GROUND	@ 1	kVDC		786,000	974,640	MEGOHMS

VT IDENTIFICATION: | **SERIAL NUMBER:**

TURNS RATIO TEST

CALCULATED TURNS RATIO: 35
MEASURED TURNS RATIO:
CONNECTIONS: H_1 H_2 X X
POLARITY: | Error: %

INSULATION TEST

				RDG.	20°C	
PRIMARY - SECONDARY	@	kVDC				MEGOHMS
PRIMARY - GROUND	@	kVDC				MEGOHMS
SECONDARY - GROUND	@	kVDC				MEGOHMS

VT CONNECTION: (●) 1 PHASE ( ) 3 PHASE | PRIMARY: ( ) WYE (●) DELTA | SECONDARY: (●) WYE ( ) DELTA

COMMENTS:
DEFICIENCIES:

TESTED BY: E. PENLAND

CONTROL POWER TRANSFORMER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/29/2023 | AMBIENT TEMPERATURE: 24 °C | HUMIDITY: 16 % | EQPT. LOCATION: EAST BLOWER BUILDING
SUBSTATION: SUBSTATION 8 | POSITION: B-BUS CPT

NAMEPLATE DATA

MANUFACTURER: INSTRUMENT TRANSFORME | CATALOG NO.: CPTS3-60-15-4161A | TYPE: CPT | NAMEPLATE RATIO: 34.667 : 1.000
PRIMARY VOLTAGE: 4,160 | SECONDARY VOLTAGE: 120 / 240 | KVA: 15 | CLASS: NA
Other: NA
PRIMARY FUSE: MANUFACTURER: FERRAZ SHAWMUT | TYPE: EJ0-1 C | SIZE: 10E | NO.: 9F60DJD010
SECONDARY FUSE: MANUFACTURER: NA | TYPE: NA | SIZE: NA | NO.: NA

EQUIPMENT TEMPERATURE: 24 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 1.24

IDENTIFICATION: | **SERIAL NUMBER:**

TURNS RATIO TEST

TEST CONNECTIONS	CALCULATED RATIO	MEASURED RATIO	% Error
X_1 X_3	34.6667	34.687	-0.0586538
H_1 H_2 X_2 X_4	34.6667	34.697	-0.0875
X_1 X_4	17.3333	17.348	-0.0846154

POLARITY: GOOD

INSULATION TESTS

				RDG.	20°C	
PRIMARY - SECONDARY	@ 2.5	KVDC		5,840,000	7,241,600	MEGOHMS
PRIMARY - GROUND	@ 2.5	KVDC		2,490,000	3,087,600	MEGOHMS
SECONDARY - GROUND	@ 1.0	KVDC		1,500,000	1,860,000	MEGOHMS

IDENTIFICATION: | **SERIAL NUMBER:**

TURNS RATIO TEST

TEST CONNECTIONS	CALCULATED RATIO	MEASURED RATIO	% Error
X_1 X_3	34.6667		
H_1 H_2 X_2 X_4	34.6667		
X_1 X_4	17.3333		

POLARITY:

INSULATION TESTS

				RDG.	20°C	
PRIMARY - SECONDARY	@	KVDC				MEGOHMS
PRIMARY - GROUND	@	KVDC				MEGOHMS
SECONDARY - GROUND	@ 1.0	KVDC				MEGOHMS

COMMENTS: SECONDARY IS AN 80A BREAKER
DEFICIENCIES:

TESTED BY: B. BURGESS

VOLTAGE TRANSFORMER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/29/2023 | AMBIENT TEMPERATURE: 24 °C | HUMIDITY: 16 % | EQPT. LOCATION: EAST BLOWER BUILDING
SUBSTATION: SUBSTATION 8 | POSITION: B-BUS VTs

NAMEPLATE DATA

MANUFACTURER: INSTRUMENT TRANSFORMER | CATALOG NO.: PTG3-2-60-422FFGC2 | TYPE: T-0215 | NAMEPLATE RATIO: 35 : 1
PRIMARY VOLTAGE: 4,200 | SECONDARY VOLTAGE: 120 | KVA: 0.75 | CLASS: NA
Other: NA
PRIMARY FUSE: MANUFACTURER: BUSSMANN | TYPE: H.R.C | SIZE: 1E | NO.: ABWNA-1E
SECONDARY FUSE: MANUFACTURER: BUSSMAN | TYPE: BUSS | SIZE: 5A | NO.: BAF-5

EQUIPMENT TEMPERATURE: 24 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 1.24

VT IDENTIFICATION: | **SERIAL NUMBER:** 53897236

TURNS RATIO TEST

CALCULATED TURNS RATIO: 35
MEASURED TURNS RATIO: 34.924
CONNECTIONS: H_1 H_2 X_1 X_2
POLARITY: GOOD | Error: 0.217143 %

INSULATION TEST

				RDG.	20°C	
PRIMARY - SECONDARY	@ 2.5	kVDC		866,000	1,073,840	MEGOHMS
PRIMARY - GROUND	@ 2.5	kVDC		797,000	988,280	MEGOHMS
SECONDARY - GROUND	@ 1	kVDC		1,500,000	1,860,000	MEGOHMS

VT IDENTIFICATION: | **SERIAL NUMBER:** 53897243

TURNS RATIO TEST

CALCULATED TURNS RATIO: 35
MEASURED TURNS RATIO: 34.921
CONNECTIONS: H_1 H_2 X_1 X_2
POLARITY: GOOD | Error: 0.225714 %

INSULATION TEST

				RDG.	20°C	
PRIMARY - SECONDARY	@ 2.5	kVDC		866,000	1,073,840	MEGOHMS
PRIMARY - GROUND	@ 2.5	kVDC		797,000	988,280	MEGOHMS
SECONDARY - GROUND	@ 1	kVDC		1,500,000	1,860,000	MEGOHMS

VT IDENTIFICATION: | **SERIAL NUMBER:**

TURNS RATIO TEST

CALCULATED TURNS RATIO: 35
MEASURED TURNS RATIO:
CONNECTIONS: H_1 H_2 X X
POLARITY: | Error: %

INSULATION TEST

				RDG.	20°C	
PRIMARY - SECONDARY	@	kVDC				MEGOHMS
PRIMARY - GROUND	@	kVDC				MEGOHMS
SECONDARY - GROUND	@	kVDC				MEGOHMS

VT CONNECTION: (●) 1 PHASE ( ) 3 PHASE | PRIMARY: ( ) WYE (●) DELTA | SECONDARY: (●) WYE ( ) DELTA

COMMENTS:
DEFICIENCIES:

TESTED BY: B. BURGESS

VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/1/2023 AMBIENT TEMPERATURE 24 °C HUMIDITY 16 % EQPT. LOCATION

SUBSTATION SUBSTATION 8 POSITION FEEDER SPARE A

MANUFACTURER SQUARE D TYPE VR SERIAL NUMBER 17-80477

MAXIMUM VOLTAGE 4.76 KV OPERATING VOLTAGE 4.16 KV MODEL NO. V5D3153Y000 DATE MANUFACTURED 5/2014

AMPACITY 1200 A INTERRUPTING CAPACITY 40 KA BIL 60 KV CONTROL VOLTAGE 120 VAC WEIGHT 380

TRIP COIL OPERATING VOLTAGE 104 - 127 VDC CLOSE COIL OPERATING VOLTAGE 70 - 140 VAC ELECTRICALLY OPERATED YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C/L
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C/L
AUXILIARY DEVICES	☑	GOOD	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	23 °C	1.15

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	7,500,000	8,625,000	7,500,000	8,625,000	5,990,000	6,888,500
POLE TO FRAME	4,410,000	5,071,500	4,530,000	5,209,500	4,510,000	5,186,500
LINE TO LOAD	7,070,000	8,130,500	6,860,000	7,889,000	6,700,000	7,705,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.20	0.20	0.20
POLE RESISTANCE (½©)	21.4	21.6	19.6

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 14 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	1.0	1.0	1.0

COUNTER READING:
BEG 56
END 60

COMMENTS: E-GAP A - 0.17IN B - 0.17IN C - 0.17IN
DEFICIENCIES:

TESTED BY: K. ICKES

VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 11/29/2023 AMBIENT TEMPERATURE 24 °C HUMIDITY 14 % EQPT. LOCATION

SUBSTATION SUBSTATION 8 POSITION FEEDER SPARE B

MANUFACTURER SQUARE D TYPE VR SERIAL NUMBER 17-80484

MAXIMUM VOLTAGE 4.76 KV OPERATING VOLTAGE 4.16 KV MODEL NO. V5D3153Y000 DATE MANUFACTURED 5/2014

AMPACITY 1200 A INTERRUPTING CAPACITY 40 KA BIL 60 KV CONTROL VOLTAGE 120 VDC WEIGHT 380

TRIP COIL OPERATING VOLTAGE 70 - 140 VDC CLOSE COIL OPERATING VOLTAGE 104 - 127 VAC ELECTRICALLY OPERATED YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C/L
RACKING DEVICES	☑	GOOD	C/L
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C/L
AUXILIARY DEVICES	☑	GOOD	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	23 °C	1.15

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	7,500,000	8,625,000	7,500,000	8,625,000	7,500,000	8,625,000
POLE TO FRAME	6,810,000	7,831,500	7,370,000	8,475,500	7,500,000	8,625,000
LINE TO LOAD	7,500,000	8,625,000	7,500,000	8,625,000	7,500,000	8,625,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.20	0.20	0.20
POLE RESISTANCE (½©)	22.9	22.1	22.3

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 14 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	1.0	1.0	1.0

COUNTER READING:
BEG 63
END 68

COMMENTS: E-GAP : A - 0.2 IN B - 0.2 IN C - 0.2 IN
DEFICIENCIES:

TESTED BY: K. ICKES

VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/1/2023 AMBIENT TEMPERATURE 16 °C HUMIDITY 24 % EQPT. LOCATION

SUBSTATION SUBSTATION 8 POSITION FEEDER SUB 6A

MANUFACTURER SQUARE D TYPE VR SERIAL NUMBER 17-80476

MAXIMUM VOLTAGE 4.76 KV OPERATING VOLTAGE 4.16 KV MODEL NO. V5D3153Y000 DATE MANUFACTURED 5/2014

AMPACITY 1200 A INTERRUPTING CAPACITY 40 KA BIL 60 KV CONTROL VOLTAGE 120 VAC WEIGHT 380

TRIP COIL OPERATING VOLTAGE 104 - 127 VDC CLOSE COIL OPERATING VOLTAGE 70 - 140 VAC ELECTRICALLY OPERATED YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C/L
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C/L
AUXILIARY DEVICES	☑	GOOD	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	23 °C	1.15

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	7,500,000	8,625,000	7,500,000	8,625,000	7,500,000	8,625,000
POLE TO FRAME	4,400,000	5,060,000	4,850,000	5,577,500	5,290,000	6,083,500
LINE TO LOAD	6,130,000	7,049,500	7,500,000	8,625,000	7,500,000	8,625,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.20	0.20	0.20
POLE RESISTANCE (½©)	20.6	20.9	21.3

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 14 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	1.0	1.0	1.0

COUNTER READING:
BEG 71
END 75

COMMENTS: E-GAP A - 0.17IN B - 0.17IN C - 0.17IN
DEFICIENCIES:

TESTED BY: K. ICKES

VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 11/29/2023 AMBIENT TEMPERATURE 25 °C HUMIDITY 14 % EQPT. LOCATION

SUBSTATION SUBSTATION 8 POSITION FEEDER SUB 6B

MANUFACTURER SQUARE D TYPE VR SERIAL NUMBER 17-804-83

MAXIMUM VOLTAGE 4.76 KV OPERATING VOLTAGE 4.16 KV MODEL NO. V5D3153Y000 DATE MANUFACTURED 5/2014

AMPACITY 1200 A INTERRUPTING CAPACITY 40 KA BIL 60 KV CONTROL VOLTAGE 120 VAC WEIGHT 380

TRIP COIL OPERATING VOLTAGE 70 - 140 VDC CLOSE COIL OPERATING VOLTAGE 104 - 127 VAC ELECTRICALLY OPERATED YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C/L
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C/L
AUXILIARY DEVICES	☑	GOOD	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	24 °C	1.2

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	6,100,000	7,320,000	5,970,000	7,164,000	5,950,000	7,140,000
POLE TO FRAME	5,060,000	6,072,000	2,530,000	3,036,000	5,020,000	6,024,000
LINE TO LOAD	5,870,000	7,044,000	6,280,000	7,536,000	6,390,000	7,668,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.20	0.20	0.20
POLE RESISTANCE (½©)	21.0	21.3	21.7

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 14 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	1.0	1.0	1.0

COUNTER READING:
BEG 62
END 66

COMMENTS: E-GAP : A - 0.2 IN B - 0.2 IN C - 0.2 IN
DEFICIENCIES:

TESTED BY: K. ICKES

VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 11/29/2023 AMBIENT TEMPERATURE 24 °C HUMIDITY 14 % EQPT. LOCATION

SUBSTATION SUBSTATION 8 POSITION ISOLATION BREAKER

MANUFACTURER SQUARE D TYPE VR SERIAL NUMBER 17-80480

MAXIMUM VOLTAGE 4.76 KV OPERATING VOLTAGE 4.16 KV MODEL NO. V5D3153Y000 DATE MANUFACTURED 5/2014

AMPACITY 1200 A INTERRUPTING CAPACITY 40 KA BIL 60 KV CONTROL VOLTAGE 120 VAC WEIGHT 380

TRIP COIL OPERATING VOLTAGE 70 - 140 VDC CLOSE COIL OPERATING VOLTAGE 104 - 127 VAC ELECTRICALLY OPERATED YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C/L
RACKING DEVICES	☑	GOOD	C/L
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C/L
AUXILIARY DEVICES	☑	GOOD	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	24 °C	1.2

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	7,500,000	9,000,000	7,500,000	9,000,000	7,500,000	9,000,000
POLE TO FRAME	4,610,000	5,532,000	6,390,000	7,668,000	5,890,000	7,068,000
LINE TO LOAD	6,960,000	8,352,000	7,300,000	8,760,000	7,500,000	9,000,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.20	0.20	0.20
POLE RESISTANCE (½©)	20.2	22.0	20.4

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 14 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	1.0	1.0	1.0

COUNTER READING:

BEG 66

END 69

COMMENTS:

DEFICIENCIES:

TESTED BY: K. ICKES

VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/1/2023 AMBIENT TEMPERATURE 24 °C HUMIDITY 16 % EQPT. LOCATION

SUBSTATION SUBSTATION 8 POSITION MAIN A

MANUFACTURER SQUARE D TYPE VR SERIAL NUMBER 17-80475

MAXIMUM VOLTAGE 4.76 KV OPERATING VOLTAGE 4.16 KV MODEL NO. V5D3153Y000 DATE MANUFACTURED 5/2014

AMPACITY 1200 A INTERRUPTING CAPACITY 40 KA BIL 60 KV CONTROL VOLTAGE 120 VAC WEIGHT 380

TRIP COIL OPERATING VOLTAGE 70 - 140 VDC CLOSE COIL OPERATING VOLTAGE 104 - 127 VAC ELECTRICALLY OPERATED YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C/L
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C/L
AUXILIARY DEVICES	☑	GOOD	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	23 °C	1.15

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	3,840,000	4,416,000	4,350,000	5,002,500	5,230,000	6,014,500
POLE TO FRAME	3,970,000	4,565,500	6,230,000	7,164,500	5,070,000	5,830,500
LINE TO LOAD	4,470,000	5,140,500	7,500,000	8,625,000	7,500,000	8,625,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.20	0.20	0.20
POLE RESISTANCE (½©)	22.1	21.7	23.4

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 14 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	1.0	1.0	1.0

COUNTER READING:
BEG 106
END 111

COMMENTS: E-GAP A - 0.17IN B - 0.17IN C - 0.17IN
DEFICIENCIES:

TESTED BY: K. ICKES

VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 11/29/2023 AMBIENT TEMPERATURE 25 °C HUMIDITY 14 % EQPT. LOCATION

SUBSTATION SUBSTATION 8 POSITION MAIN B

MANUFACTURER SQUARE D TYPE VR SERIAL NUMBER 17-80479

MAXIMUM VOLTAGE 4.76 KV OPERATING VOLTAGE 4.16 KV MODEL NO. V5D3153Y000 DATE MANUFACTURED 5/2014

AMPACITY 1200 A INTERRUPTING CAPACITY 40 KA BIL 60 KV CONTROL VOLTAGE 120 VAC WEIGHT 380

TRIP COIL OPERATING VOLTAGE 104 - 127 VDC CLOSE COIL OPERATING VOLTAGE 70 - 140 VAC ELECTRICALLY OPERATED YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C/L
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C/L
AUXILIARY DEVICES	☑	GOOD	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	23 °C	1.15

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	5,980,000	6,877,000	7,230,000	8,314,500	6,730,000	7,739,500
POLE TO FRAME	2,550,000	2,932,500	2,300,000	2,645,000	2,380,000	2,737,000
LINE TO LOAD	5,140,000	5,911,000	5,120,000	5,888,000	5,520,000	6,348,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.20	0.20	0.20
POLE RESISTANCE (½©)	21.5	22.6	22.5

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 14 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	1.0	1.0	1.0

COUNTER READING:
BEG 191
END 196

COMMENTS: E-GAP : A - 0.2 IN B - 0.2 IN C - 0.2 IN
DEFICIENCIES:

TESTED BY: K. ICKES

MOTOR STARTER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/11/2023 AMBIENT TEMPERATURE 5 °C HUMIDITY 62 % EQPT. LOCATION

SUBSTATION SUBSTATION 8 POSITION PAB E1 STARTER

NAMEPLATE DATA

MANUFACTURER	SCHNEIDER ELECTRIC	SERIAL NO.	141100269	TYPE	HCV
CATALOG NO.	CBD225NB0MN	STARTER SIZE	3	FORM	5HS
SERIES	NA	MAXIMUM VOLTAGE	7,200	INT. RATING	7 KA @ 5 KV
OPERATING VOLTAGE	4160	CONTROL VOLTAGE	120	Other	NA
MOTOR CONTROL CENTER SYSTEM VOLTAGE	480	STARTER IDENTIFICATION			PAB-E1

OVERCURRENT PROTECTION DEVICES

CONTROL POWER FUSE:	MFR.	NA	TYPE	NA	SIZE	NA
MAIN POWER FUSE:	MFR.	FERRAZ SHAWMUT	TYPE	A055D1DSR0-9R	SIZE	NA
OVERLOAD PROTECTION:	MFR.	GE	TYPE	469	TESTED	○ YES ◉ NO

INSTRUMENT TRANSFORMER DATA

CONTROL POWER TRANSFORMER:	MFR.	TRANSFORMER TECH	KVA	0.5	TYPE	CPT36005416	VOLTAGE	4160/120
CURRENT TRANSFORMER:	MFR.	SQUARE D	RATIO	100 :5	TYPE	NA	CAT. NO.	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C/L
SHUTTER	☐	NA	NA
CONTACT FINGERS	☑	GOOD	C/L

Description	INSPECTED	CONDITION	CLEAN/LUBE
MAIN CONTACTS	☑	GOOD	C/L
ARCING CONTACTS	☑	GOOD	C
ARC CHUTES	☐	NA	NA
OPERATING MECHANISM	☑	GOOD	C
CONTACT SEQUENCE	☑	GOOD	NA
GROUND CONNECTIONS	☑	GOOD	NA
AUXILIARY DEVICES	☑	GOOD	NA

INSUL RESISTANCE TEST VOLTAGE 5,000 V **EQUIP TEMPERATURE** 16 °C **TEMP CORRECTION TO 20 °C** 0.848 **BOTTLE INTEGRITY TEST VOLTAGE** 14 KVAC

START	POLE 1 (M©)		POLE 2 (M©)		POLE 3 (M©)	
INSUL. RESISTANCE	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	6,480,000	5,495,040.01	7,210,000	6,114,080.01	7,450,000	6,317,600.01
POLE TO FRAME	1,987,000	1,684,976	1,761,000	1,493,328	1,593,000	1,350,864
LINE TO LOAD	4,890,000	4,146,720.01	5,300,000	4,494,400.01	4,540,000	3,849,920.01

	POLE 1	POLE 2	POLE 3
BOTTLE INTEGRITY (HI-POT) mA	0.1	0.1	0.1
POLE RESISTANCE (µ©)	90.0	81.0	75.0
MAIN FUSES (m©)	2,176.0	2,155.0	2,304.0

COMMENTS:

DEFICIENCIES:

TESTED BY: K. ICKES

VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 11/29/2023 AMBIENT TEMPERATURE 25 °C HUMIDITY 14 % EQPT. LOCATION

SUBSTATION SUBSTATION 8 POSITION PAB E2 FEEDER

MANUFACTURER SQUARE D TYPE VR SERIAL NUMBER 17-80485

MAXIMUM VOLTAGE 4.76 KV OPERATING VOLTAGE 4.16 KV MODEL NO. V5D31537000 DATE MANUFACTURED 5/2014

AMPACITY 1200 A INTERRUPTING CAPACITY 40 KA BIL 60 KV CONTROL VOLTAGE 120 VDC WEIGHT 380

TRIP COIL OPERATING VOLTAGE 70 - 140 VDC CLOSE COIL OPERATING VOLTAGE 104 - 127 VAC ELECTRICALLY OPERATED YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C/L
SHUTTER	☑	GOOD	C/L

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C/L
AUXILIARY DEVICES	☑	GOOD	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	23 °C	1.15

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	6,320,000	7,268,000	5,780,000	6,647,000	6,670,000	7,670,500
POLE TO FRAME	4,420,000	5,083,000	3,720,000	4,278,000	4,760,000	5,474,000
LINE TO LOAD	4,890,000	5,623,500	5,550,000	6,382,500	5,370,000	6,175,500

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.20	0.20	0.20
POLE RESISTANCE (½©)	19.8	21.2	21.3

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 14 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	1.0	1.0	1.0

COUNTER READING:
BEG 67
END 71

COMMENTS: E-GAP : A - 0.2 IN B - 0.2 IN C - 0.2 IN
DEFICIENCIES:

TESTED BY: K. ICKES

MOTOR STARTER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/29/2023 | AMBIENT TEMPERATURE: 23 °C | HUMIDITY: 14 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 8 | POSITION: PAB E2 STARTER

NAMEPLATE DATA

MANUFACTURER	SCHNEIDER	SERIAL NO.	140903073	TYPE	HCV-5HS
CATALOG NO.	CBD225NBOMN	STARTER SIZE	ICS 3-2	FORM	N/A
SERIES	NA	MAXIMUM VOLTAGE	7,200	INT. RATING	7 KA @ 5 KV
OPERATING VOLTAGE	4160	CONTROL VOLTAGE	120	Other	NA
MOTOR CONTROL CENTER SYSTEM VOLTAGE	120	STARTER IDENTIFICATION	PAB-E2		

OVERCURRENT PROTECTION DEVICES

CONTROL POWER FUSE:	MFR.	AMP TRAP	TYPE	NA	SIZE	7A
MAIN POWER FUSE:	MFR.	FERRAZ SHAWMUT	TYPE	A055D1DSR0	SIZE	9R
OVERLOAD PROTECTION:	MFR.	GE	TYPE	469	TESTED	○ YES ◉ NO

INSTRUMENT TRANSFORMER DATA

CONTROL POWER TRANSFORMER:	MFR.	TRANSFORMER TECHNOLOG	KVA	.5	TYPE	CPT36005416	VOLTAGE	4160: 120/240
CURRENT TRANSFORMER:	MFR.	SQUARE D	RATIO	100 :5	TYPE	NA	CAT. NO.	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C/L
SHUTTER	☐	NA	NA
CONTACT FINGERS	☑	GOOD	C/L

Description	INSPECTED	CONDITION	CLEAN/LUBE
MAIN CONTACTS	☑	GOOD	C/L
ARCING CONTACTS	☑	GOOD	C
ARC CHUTES	☐	NA	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☑	GOOD	NA
GROUND CONNECTIONS	☑	GOOD	NA
AUXILIARY DEVICES	☑	GOOD	NA

INSUL RESISTANCE TEST VOLTAGE 5,000 V | **EQUIP TEMPERATURE** 22 °C | **TEMP CORRECTION TO 20 °C** 1.1 | **BOTTLE INTEGRITY TEST VOLTAGE** 14 KVAC

START	POLE 1 (M©)		POLE 2 (M©)		POLE 3 (M©)	
INSUL. RESISTANCE	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,420,000	2,662,000	1,854,000	2,039,400	2,890,000	3,179,000
POLE TO FRAME	1,700,000	1,870,000	1,723,000	1,895,300	1,489,000	1,637,900
LINE TO LOAD	7,500,000	8,250,000	7,500,000	8,250,000	7,500,000	8,250,000

	POLE 1	POLE 2	POLE 3
BOTTLE INTEGRITY (HI-POT) mA	0.1	0.1	0.1
POLE RESISTANCE (µ©)	59.9	63.6	65.3
MAIN FUSES (m©)	2.0	2.0	2.0

COMMENTS: NO ACCESS TO CT TO GET NAMEPLATE DATA
DEFICIENCIES:

TESTED BY: K. ICKES

VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/1/2023 AMBIENT TEMPERATURE 16 °C HUMIDITY 24 % EQPT. LOCATION

SUBSTATION SUBSTATION 8 POSITION PAB E3 FEEDER

MANUFACTURER SQUARE D TYPE VR SERIAL NUMBER 17-80478

MAXIMUM VOLTAGE 4.76 KV OPERATING VOLTAGE 4.16 KV MODEL NO. V5D3153Y000 DATE MANUFACTURED 5/2014

AMPACITY 1200 A INTERRUPTING CAPACITY 40 KA BIL 60 KV CONTROL VOLTAGE 120 VAC WEIGHT 380

TRIP COIL OPERATING VOLTAGE 104 - 127 VDC CLOSE COIL OPERATING VOLTAGE 70 - 140 VAC ELECTRICALLY OPERATED YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C/L
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C/L
AUXILIARY DEVICES	☑	GOOD	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	24 °C	1.2

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	5,720,000	6,864,000	6,440,000	7,728,000	5,770,000	6,924,000
POLE TO FRAME	4,500,000	5,400,000	3,920,000	4,704,000	3,990,000	4,788,000
LINE TO LOAD	5,220,000	6,264,000	5,250,000	6,300,000	5,900,000	7,080,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.20	0.20	0.20
POLE RESISTANCE (½©)	21.1	22.3	22.4

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 14 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	1.0	1.0	1.0

COUNTER READING:
BEG 78
END

COMMENTS: E-GAP A - 0.17IN B - 0.17IN C - 0.17IN
DEFICIENCIES:

TESTED BY: K. ICKES

MOTOR STARTER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/11/2023 AMBIENT TEMPERATURE 4 °C HUMIDITY 62 % EQPT. LOCATION

SUBSTATION SUBSTATION 8 POSITION PAB E3 STARTER

NAMEPLATE DATA

MANUFACTURER	SCHNEIDER ELECTRIC	SERIAL NO.	140903060	TYPE	HCV
CATALOG NO.	CBD225NB0MN	STARTER SIZE	3	FORM	5HS
SERIES	NA	MAXIMUM VOLTAGE	7,200	INT. RATING	7 KA @ 5 KV
OPERATING VOLTAGE	4160	CONTROL VOLTAGE	120	Other	NA
MOTOR CONTROL CENTER SYSTEM VOLTAGE	4160	STARTER IDENTIFICATION		PAB-E3	

OVERCURRENT PROTECTION DEVICES

CONTROL POWER FUSE:	MFR.	BUSSMAN	TYPE	2E	SIZE	2	
MAIN POWER FUSE:	MFR.	FERRAZ SHAWMUT	TYPE	A055D1DSR0-8R	SIZE	8	
OVERLOAD PROTECTION:	MFR.	GE	TYPE	469	TESTED	○ YES	◉ NO

INSTRUMENT TRANSFORMER DATA

CONTROL POWER TRANSFORMER:	MFR.	TRANSFORMER TECH	KVA	0.5		TYPE	CPT36005416	VOLTAGE	4160/120
CURRENT TRANSFORMER:	MFR.	SQUARE D	RATIO	150	:5	TYPE	NA	CAT. NO.	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C/L
SHUTTER	☐	NA	NA
CONTACT FINGERS	☑	GOOD	C/L

Description	INSPECTED	CONDITION	CLEAN/LUBE
MAIN CONTACTS	☑	GOOD	C/L
ARCING CONTACTS	☐	NA	NA
ARC CHUTES	☐	NA	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☑	GOOD	NA
GROUND CONNECTIONS	☑	GOOD	C
AUXILIARY DEVICES	☑	GOOD	NA

INSUL RESISTANCE TEST VOLTAGE 5,000 V **EQUIP TEMPERATURE** 16 °C **TEMP CORRECTION TO 20 °C** 0.848 **BOTTLE INTEGRITY TEST VOLTAGE** 14 KVAC

START	POLE 1 (M©)		POLE 2 (M©)		POLE 3 (M©)	
INSUL. RESISTANCE	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	6,100,000	5,172,800.01	6,600,000	5,596,800.01	5,590,000	4,740,320.01
POLE TO FRAME	1,926,000	1,633,248	1,978,000	1,677,344	1,188,000	1,007,424
LINE TO LOAD	3,170,000	2,688,160.01	5,610,000	4,757,280.01	5,560,000	4,714,880.01

	POLE 1	POLE 2	POLE 3
BOTTLE INTEGRITY (HI-POT) mA	0.1	0.1	0.1
POLE RESISTANCE (µ©)	61.8	58.3	61.2
MAIN FUSES (m©)	400.0	400.0	500.0
CPT FUSES (m©)	300.0	300.0	300.0

COMMENTS:

DEFICIENCIES:

TESTED BY: K. ICKES

VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
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CUSTOMER CITY OF ANN ARBOR PAGE

ADDRESS 49 S. DIXBORO RD.; ANN ARBOR MI 48105 JOB # 230858

OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/1/2023 AMBIENT TEMPERATURE 16 °C HUMIDITY 24 % EQPT. LOCATION

SUBSTATION SUBSTATION 8 POSITION PAB-E1 FEEDER

MANUFACTURER SQUARE D TYPE VR SERIAL NUMBER 17-80482

MAXIMUM VOLTAGE 4.76 KV OPERATING VOLTAGE 4.16 KV MODEL NO. V5D3153Y000 DATE MANUFACTURED 5/2014

AMPACITY 1200 A INTERRUPTING CAPACITY 40 KA BIL 60 KV CONTROL VOLTAGE 120 VAC WEIGHT 380

TRIP COIL OPERATING VOLTAGE 104 - 127 VDC CLOSE COIL OPERATING VOLTAGE 70 - 140 VAC ELECTRICALLY OPERATED YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C/L
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C/L
AUXILIARY DEVICES	☑	GOOD	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	23 °C	1.15

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	7,500,000	8,625,000	6,880,000	7,912,000	7,500,000	8,625,000
POLE TO FRAME	2,870,000	3,300,500	2,930,000	3,369,500	2,780,000	3,197,000
LINE TO LOAD	7,500,000	8,625,000	7,500,000	8,625,000	7,500,000	8,625,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.20	0.20	0.20
POLE RESISTANCE (½©)	21.6	22.1	21.9

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 14 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	1.0	1.0	1.0

COUNTER READING:

BEG 49

END NA

COMMENTS: E-GAP A - 0.17IN B - 0.17IN C - 0.17IN

DEFICIENCIES:

TESTED BY: K. ICKES

LOADBREAK DISCONNECT TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/1/2023 | AMBIENT TEMPERATURE: 24 °C | HUMIDITY: 16 % | EQPT. LOCATION:
SUBSTATION: SUBSTATION 8 | POSITION: PRIMARY SWITCH MAIN A

NAMEPLATE DATA

MANUFACTURER: SQUARE D | TYPE: LOAD CURRENT INT. | SERIAL NO.: 44036-325-51-8A | MFG DATE: 2014
RATED VOLTAGE: 15,000 | SYSTEM VOLTAGE: 13,200 | AMPERES: 600 | INTERRUPTING RATING: 40 KA | B.I.L. RATING: 95 KV
TYPE OPERATING MECHANISM: MANUAL | MOMENTARY FAULT INTERUPTING: 40 KA | MOMENTARY FAULT CLOSING AMPS: 40 KA

FUSE DATA

MANUFACTURER: SQUARE D | TYPE: CURRENT LIMIT | HOLDER: CLIP | MAX. AMPS: 150
REFILL ELEMENT TYPE: NA | SIZE: 150E | CAT. NO.: 175GXSJD150E | TCC NO.: NA | VOLTAGE: 17.5 KV

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTION	☑	GOOD	C
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
INTERLOCKS	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
Contacts	☑	GOOD	C/L
HEATERS	☐	NA	NA
OPERATING MECHANISM	☑	GOOD	C/L
HAZARD WARNING LABELS	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	24 °C	1.2

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	5,770,000	6,924,000	6,040,000	7,248,000	6,220,000	7,464,000
POLE TO FRAME	3,600,000	4,320,000	2,160,000	2,592,000	2,390,000	2,868,000
LINE TO LOAD	3,490,000	4,188,000	3,530,000	4,236,000	4,230,000	5,076,000

POLE RESISTANCE (µ©)			
	POLE 1	POLE 2	POLE 3
AS FOUND	59.8	51.8	55.8
AS LEFT	59.8	51.8	55.8

FUSE TESTING (m©)		
PHASE A	PHASE B	PHASE C
6,458	6,468	6,439

ARRESTERS TESTING (M©)			
TEST VOLTAGE KV / 1 MIN	PHASE A	PHASE B	PHASE C
5	107,900	207,000	157,300

DIELECTRIC WITHSTAND (mA)			
TEST VOLTAGE 27 KVAC	POLE 1	POLE 2	POLE 3
SWITCH CLOSED - POLE TO GND OTHER POLES GROUNDED	0.5	0.5	0.5

COMMENTS: ARRESTER INFO: 12.7 kV MCOV, 15 kV RATED.
PRIMARY CABLE INSULATION RESISTANCES: A-G - 217,000 MEGAOHMS; B-G - 221,000 MEGAOHMS; C-G - 210,000 MEGAOHMS;
A-B - 407,000 MEGAOHMS; B-C - 443,000 MEGAOHMS; C-A - 418,000 MEGAOHMS.

DEFICIENCIES:

TESTED BY: E. PENLAND

LOADBREAK DISCONNECT TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER: CITY OF ANN ARBOR | PAGE:
ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/29/2023 | AMBIENT TEMPERATURE: 24 °C | HUMIDITY: 16 % | EQPT. LOCATION: EAST BLOWER BUILDING
SUBSTATION: SUBSTATION 8 | POSITION: PRIMARY SWITCH MAIN B

NAMEPLATE DATA

MANUFACTURER: SQUARE D | TYPE: LOAD CURRENT INT. | SERIAL NO.: 44036-325-51-8B | MFG DATE: 2014
RATED VOLTAGE: 15,000 | SYSTEM VOLTAGE: 13,200 | AMPERES: 600 | INTERRUPTING RATING: 40 KA | B.I.L. RATING: 95 KV
TYPE OPERATING MECHANISM: MANUAL | MOMENTARY FAULT INTERUPTING: 40 KA | MOMENTARY FAULT CLOSING AMPS: 40 KA

FUSE DATA

MANUFACTURER: SQUARE D | TYPE: CURRENT LIMIT | HOLDER: CLIP | MAX. AMPS: 150
REFILL ELEMENT TYPE: NA | SIZE: 150E | CAT. NO.: 175GXSJD150E | TCC NO.: NA | VOLTAGE: 17.5 KV

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTION	☑	GOOD	C
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
INTERLOCKS	☑	GOOD	NA

Description	INSPECTED	CONDITION	CLEAN/LUBE
Contacts	☑	GOOD	C/L
HEATERS	☐	NA	NA
OPERATING MECHANISM	☑	GOOD	C/L
HAZARD WARNING LABELS	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
2,500 V	24 °C	1.2

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	7,500,000	9,000,000	7,500,000	9,000,000	7,500,000	9,000,000
POLE TO FRAME	2,910,000	3,492,000	3,240,000	3,888,000	3,490,000	4,188,000
LINE TO LOAD	310,000	372,000	3,450,000	4,140,000	3,580,000	4,296,000

POLE RESISTANCE (µ©)			
	POLE 1	POLE 2	POLE 3
AS FOUND	37.6	37.3	34.2
AS LEFT	37.6	37.3	34.2

FUSE TESTING (m©)		
PHASE A	PHASE B	PHASE C
6,287	6,397	6,332

ARRESTERS TESTING (M©)			
TEST VOLTAGE KV / 1 MIN	PHASE A	PHASE B	PHASE C
5	484,000	101,600	407,000

DIELECTRIC WITHSTAND (mA)			
TEST VOLTAGE 27 KVAC	POLE 1	POLE 2	POLE 3
SWITCH CLOSED - POLE TO GND OTHER POLES GROUNDED	0.08	0.08	0.08

COMMENTS: ARRESTER INFO: 12.7 kV MCOV, 15 kV RATED.
PRIMARY CABLE INSULATION RESISTANCES: A-G - 163,500 MEGAOHMS; B-G - 180,500 MEGAOHMS; C-G - 240,000 MEGAOHMS;
A-B - 378,000 MEGAOHMS; B-C - 356,000 MEGAOHMS; C-A - 718,000 MEGAOHMS.

DEFICIENCIES:

TESTED BY: B. BURGESS

VACUUM CIRCUIT BREAKER TEST

7262 Kensington Road
Brighton, MI 48116
317-879-0660

CUSTOMER CITY OF ANN ARBOR PAGE

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OWNER REPRESENTATIVE NICK JAWORSKI TELEPHONE

DATE 12/1/2023 AMBIENT TEMPERATURE 24 °C HUMIDITY 16 % EQPT. LOCATION

SUBSTATION SUBSTATION 8 POSITION TIE

MANUFACTURER SQUARE D TYPE VR SERIAL NUMBER 17-80481

MAXIMUM VOLTAGE 4.76 KV OPERATING VOLTAGE 4.16 KV MODEL NO. V5D3153Y000 DATE MANUFACTURED 5/2014

AMPACITY 1200 A INTERRUPTING CAPACITY 40 KA BIL 60 KV CONTROL VOLTAGE 120 VAC WEIGHT 380

TRIP COIL OPERATING VOLTAGE 104 - 127 VDC CLOSE COIL OPERATING VOLTAGE 70 - 140 VAC ELECTRICALLY OPERATED YES

Description	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	GOOD	C
INSULATING MEMBERS	☑	GOOD	C
MECHANICAL CONNECTIONS	☑	GOOD	C/L
STRUCTURAL MEMBERS	☑	GOOD	C
CUBICLE	☑	GOOD	C
RACKING DEVICES	☑	GOOD	C/L
SHUTTER	☑	GOOD	C

Description	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	GOOD	C/L
VACUUM BOTTLES	☑	GOOD	C
CONTACT EROSION INDICATOR	☑	GOOD	NA
OPERATING MECHANISM	☑	GOOD	C/L
CONTACT SEQUENCE	☑	GOOD	NA
GROUND CONNECTION	☑	GOOD	C/L
AUXILIARY DEVICES	☑	GOOD	NA

TEST VOLTAGE	EQUIPMENT TEMPERATURE	TEMPERATURE CORRECTION FACTOR TO 20 °C
1,000 V	23 °C	1.15

INSULATION RESISTANCE	POLE 1 (M©) (P1-P2)		POLE 2 (M©) (P2-P3)		POLE 3 (M©) (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	6,300,000	7,245,000	6,930,000	7,969,500	7,270,000	8,360,500
POLE TO FRAME	4,710,000	5,416,500	4,920,000	5,658,000	4,860,000	5,589,000
LINE TO LOAD	6,940,000	7,981,000	7,420,000	8,533,000	7,340,000	8,441,000

CONTACT MEASUREMENTS

	POLE 1	POLE 2	POLE 3
CONTACT ERROSION **inch**	0.20	0.18	0.20
POLE RESISTANCE (½©)	22.0	23.0	21.6

DIELECTRIC WITHSTAND / BOTTLE INTEGRITY (HI-POT) mA			
TEST VOLTAGE 14 KVAC	POLE 1 (1-2)	POLE 2 (2-3)	POLE 3 (3-1)
LINE-LOAD (BKR OPEN)	0.1	0.1	0.1
POLE-GROUND (BKR CLOSED)	1.0	1.0	1.0

COUNTER READING:
BEG 79
END 84

COMMENTS: E-GAP A - 0.17IN B - 0.17IN C - 0.17IN
DEFICIENCIES:

TESTED BY: K. ICKES

TRANSFORMER MAINTENANCE AND INSPECTION

7262 Kensington Road
Brighton, MI 48116
317-879-0660

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ADDRESS: 49 S. DIXBORO RD.; ANN ARBOR MI 48105 | JOB #: 230858
OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 12/01/2023 | AMBIENT TEMPERATURE: 24 °C | HUMIDITY: 16 % | EQPT. LOCATION: EAST BLOWER BUILDING
SUBSTATION: SUBSTATION 8 | POSITION: XFMR 1

NAMEPLATE DATA

MANUFACTURER: SQUARE D | YR MFR: 2014 | SERIAL NO.: 30951271-030-1
IMPEDANCE: 5.7 % | NUMBER OF FANS: 0 | WEIGHT: 14300 LBS | TYPE: VPI | CLASS: AA / /
KVA: 2,500 / / | WINDING MATERIAL: COPPER | TEMPERATURE RISE: 115 °C | B.I.L. RATING: 30 / 95
PRIMARY V: 13,200 | DELTA | MFR LOCATION: BLAND, VA
SECONDARY V: 4,160 / 2,401.71 | WYE | ☑ EXPOSED NEUTRAL - X0 | TANK TYPE: VENTED
TAP VOLTAGES: 13,860 | 13,530 | 13,200 | 12,870 | 12,540 | INSULATING MATERIAL: PAPER
TAP POSITION: E-F | D-F | E-G | D-G | C-G | WINDING INSUATING SYSTEM: OPEN-WOUND
TAP SETTING: E-G 13,200 V | ☑ HIGH SIDE TAP | ☐ LOW SIDE TAP

VISUAL AND MECHANICAL INSPECTION

	Description	NOTES
☑	REASON FOR INSPECTION	ROUTINE
☑	CHECK FOR SIGNS OF OVERHEATING, DISCOLORATION	GOOD
☑	ENCLOSURE (OPENINGS, COVERS, PAINT, ETC)	GOOD
☑	CHECK ALL CONNECTIONS TIGHT	GOOD
☑	IMPROPER TERMINATIONS	GOOD
☑	EQUIPMENT GROUND/GROUND BAR	GOOD
☑	CORE GROUND	GOOD
☑	NEUTRAL BAR	GOOD
☑	PRIMARY SIDE (CABLE OR BUSS)	GOOD

	Description	NOTES
☑	SECONDARY SIDE (CABLE OR BUSS)	GOOD
☑	CLEAN AND INSPECT INSULATORS, SUPPORTS, AND BARRIERS	GOOD
☑	CLEAN CORE, COIL, AND ENCLOSURE (INTERIOR/EXTERIOR)	GOOD
☑	CORE AND COIL BRACING	GOOD
☑	VIBRATION ISOLATATION PADS	GOOD
☑	PROPER CLEARANCE (36 INCHES UNOBSTRUCTED)	GOOD
☐	CONTROL WIRING	NA
☐	COOLING FANS	NA
☐	ALARMS AND INDICATORS	NA

ELECTRICAL TESTS

INSULATION RESISTANCE (Mohm)

MINUTES	PRIMARY TO GROUND	SECONDARY TO GROUND	PRIMARY TO SECONDARY
Test kV	5	2.5	5
0.50	11,050	10,590	417,000
1.00	167,000	13,550	692,000
10.00	2,160,000	17,750	2,270,000
P. I. (10min/1min)	12.93	1.31	3.28

WINDING RESISTANCE TEST (mohm)

APPARATUS TEMP. (°C)	24	TEST AMPS	10

H3-H1		H1-H2		H2-H3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
397.96	399.50	399.16	400.70	399.30	400.85
X0-X1		X0-X2		X0-X3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
19.094	19.168	19.325	19.400	19.056	19.130

TRANSFORMER TURN RATIO TEST

TAP	CALC	PHASE A	PHASE B	PHASE C
E-G	5.496	5.503	5.502	5.503
% ERROR		0.126%	0.108%	0.126%

EXTERNAL DOCUMENTS ATTACHED TO REPORT

COMMENTS: EXCITATION CURRENT A -1.2 MILLIAMPS; B- 0.8 MILLIAMPS; C - 1.3 MILLAMPS.
DEFICIENCIES:

TESTED BY: E. PENLAND, B. BURGESS

TRANSFORMER MAINTENANCE AND INSPECTION

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OWNER REPRESENTATIVE: NICK JAWORSKI | TELEPHONE:

DATE: 11/29/2023 | AMBIENT TEMPERATURE: 24 °C | HUMIDITY: 16 % | EQPT. LOCATION: EAST BLOWER BUILDING
SUBSTATION: SUBSTATION 8 | POSITION: XFMR 2

NAMEPLATE DATA

MANUFACTURER: SQUARE D | YR MFR: 2014 | SERIAL NO.: 30951271-032-01-1
IMPEDANCE: 5.68 % | NUMBER OF FANS: 0 | WEIGHT: 14300 LBS | TYPE: VPI | CLASS: AA / /
KVA: 2,500 / / | WINDING MATERIAL: COPPER | TEMPERATURE RISE: 115 °C | B.I.L. RATING: 30 / 95
PRIMARY V: 13,200 | DELTA | MFR LOCATION: BLAND, VA
SECONDARY V: 4,160 / 2,401.71 | WYE | ☑ EXPOSED NEUTRAL - X0 | TANK TYPE: VENTED
TAP VOLTAGES: 13,860 | 13,530 | 13,200 | 12,870 | 12,540 | INSULATING MATERIAL: PAPER
TAP POSITION: E-F | D-F | E-G | D-G | C-G | WINDING INSUATING SYSTEM: OPEN-WOUND
TAP SETTING: E-G 13,200 V | ☑ HIGH SIDE TAP | ☐ LOW SIDE TAP

VISUAL AND MECHANICAL INSPECTION

	Description	NOTES
☑	REASON FOR INSPECTION	ROUTINE
☑	CHECK FOR SIGNS OF OVERHEATING, DISCOLORATION	GOOD
☑	ENCLOSURE (OPENINGS, COVERS, PAINT, ETC)	GOOD
☑	CHECK ALL CONNECTIONS TIGHT	GOOD
☑	IMPROPER TERMINATIONS	GOOD
☑	EQUIPMENT GROUND/GROUND BAR	GOOD
☑	CORE GROUND	GOOD
☑	NEUTRAL BAR	GOOD
☑	PRIMARY SIDE (CABLE OR BUSS)	GOOD

	Description	NOTES
☑	SECONDARY SIDE (CABLE OR BUSS)	GOOD
☑	CLEAN AND INSPECT INSULATORS, SUPPORTS, AND BARRIERS	GOOD
☑	CLEAN CORE, COIL, AND ENCLOSURE (INTERIOR/EXTERIOR)	GOOD
☑	CORE AND COIL BRACING	GOOD
☑	VIBRATION ISOLATATION PADS	GOOD
☑	PROPER CLEARANCE (36 INCHES UNOBSTRUCTED)	GOOD
☐	CONTROL WIRING	NA
☐	COOLING FANS	NA
☐	ALARMS AND INDICATORS	NA

ELECTRICAL TESTS

INSULATION RESISTANCE (Mohm)

MINUTES	PRIMARY TO GROUND	SECONDARY TO GROUND	PRIMARY TO SECONDARY
Test kV	5	2.5	5
0.50	236,000	12,770	288,000
1.00	338,000	16,380	404,000
10.00	838,000	22,800	1,004,000
P. I. (10min/1min)	2.48	1.39	2.48

WINDING RESISTANCE TEST (mohm)

APPARATUS TEMP. (°C)	24	TEST AMPS	10

H3-H1		H1-H2		H2-H3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
400.30	401.85	398.78	400.32	400.56	402.11
X0-X1		X0-X2		X0-X3	
Measured	CORRECTED	Measured	CORRECTED	Measured	CORRECTED
18.733	18.805	19.052	19.126	18.874	18.947

TRANSFORMER TURN RATIO TEST

TAP	CALC	PHASE A	PHASE B	PHASE C
E-G	5.496	5.503	5.502	5.503
% ERROR		0.126%	0.108%	0.133%

EXTERNAL DOCUMENTS ATTACHED TO REPORT

COMMENTS: EXCITATION CURRENT A - 6.2 MILLIAMPS; B- 4.6 MILLIAMPS; C - 6.0 MILLAMPS.
DEFICIENCIES:

TESTED BY: E. PENLAND, B. BURGESS

DEVICE TEST RESULTS

Routine	SEL-351A.FST_LIB	**AFAL**	AL	**Test Date**	2/12/2024
Version	8.3			**Pass/Fail**	PASS

Device Data:

Customer:	City of Ann Arbor Waste Water Treatment		
Job_Number:	230858	SUBSTATION:	13.2 kV Switchgear
Relay_ID:	521B	PHASE_ZONE:	
RELAY_MANF:	SEL	RELAY_TYPE:	SEL-351A
MODEL_STYLE:		IEEE_DEVICE:	MF
IL_IB:		SERIAL_NUMBER:	
FIRMWARE:	SEL-351A-R515-V0-Z105104-D20130620		
NERC_AUDITABLE:	0	MAINT_INTERVAL:	0
PREVIOUS_TESTDATE:		CURRENT_TESTDATE:	
NEXT_TESTDATE:		TESTSET_CALDATE:	
Tested_BY:			

Routine Notes:

Device Settings Used for Testing:

RID$=	"TIE"	TID$=	"TEST SETTING"	CTR=	120
CTRN=	120	PTR=	110.00	PTRS=	110.00
VNOM=	69.29	Z1MAG=	2.14	Z1ANG=	68.86
Z0MAG=	6.38	Z0ANG=	72.47	LL=	4.84
E50P=	1	E50N$=	"N"	E50G=	1
E50Q$=	"N"	E51P=	1	E51N$=	"N"
E51G=	1	E51Q$=	"N"	EHBL2$=	"N"
E32$=	"N"	ELOAD$=	"N"	ESOTF$=	"N"
EVOLT$=	"Y"	E25$=	"Y"	EFLOC$=	"Y"
ELOP$=	"N"	E81$=	"N"	E81R$=	"N"
E79$=	"N"	ESV=	10	EDEM$=	"THM"
s50P1P=	50.00	s67P1D=	0.00	s50PP1P$=	"OFF"
s50G1P=	8.760	s67G1D=	6.00	s51PP=	2.20
s51PC$=	"C3"	s51PTD=	0.40	s51PRS$=	"N"
s51GP=	0.60	s51GC$=	"U1"	s51GTD=	0.86
s51GRS$=	"N"	s27P1P=	62.00	s27P2P$=	"OFF"
s59P1P=	76.00	s59P2P$=	"OFF"	s59N1P$=	"OFF"
s59N2P$=	"OFF"	s59QP$=	"OFF"	s59V1P$=	"OFF"
s27SP=	10.00	s59S1P=	55.00	s59S2P$=	"OFF"
s27PP$=	"OFF"	s59PP$=	"OFF"	s25VLO=	62.00
s25VHI=	76.00	s25RCF=	1.00	s25SF=	0.050
s25ANG1=	15	s25ANG2=	15	SYNCP$=	"VA"
TCLOSD=	3.00	DMTC=	5	PDEMP=	5.00
NDEMP=	1.500	GDEMP=	1.50	QDEMP=	1.50
TDURD=	9.00	CFD=	60.00	s3POD=	1.50
s50LP=	0.25	SV1PU=	0.00	SV1DO=	0.00
SV2PU=	0.00	SV2DO=	0.00	SV3PU=	0.00
SV3DO=	0.00	SV4PU=	0.00	SV4DO=	0.00
SV5PU=	0.00	SV5DO=	0.00	SV6PU=	0.00
SV6DO=	0.00	SV7PU=	0.00	SV7DO=	0.00
SV8PU=	0.00	SV8DO=	0.00	SV9PU=	0.00
SV9DO=	0.00	SV10PU=	0.00	SV10DO=	0.00
TR$=	"50P1 + 51PT + 51GT + 50G1 + 67G1T"				

Device Settings (Continued):

```
TRQUAL=     0             TRSOTF=     0             DTT=        0
ULTR$=      "!(51P + 51G)"s52A$=      "IN101"       CL$=        "CC + LB4"
ULCL$=      "TRIP"        s79RI$=     "TRIP"        s79RIS$=    "52A + 79CY"
s79DTL$=    "OC + !IN102 + LB3"

s79DLS$=    "79LO"        s79SKP=     0             s79STL$=    "TRIP"
s79BRS=     0             s79SEQ=     0             s79CLS=     1
SET1=       0             RST1=       0             SET2=       0
RST2=       0             SET3=       0             RST3=       0
SET4=       0             RST4=       0             SET5=       0
RST5=       0             SET6=       0             RST6=       0
SET7=       0             RST7=       0             SET8=       0
RST8=       0             SET9=       0             RST9=       0
SET10=      0             RST10=      0             SET11=      0
RST11=      0             SET12=      0             RST12=      0
SET13=      0             RST13=      0             SET14=      0
RST14=      0             SET15=      0             RST15=      0
SET16=      0             RST16=      0             s67P1TC=    1
s67P2TC=    1             s67P3TC=    1             s67P4TC=    1
s67N1TC=    1             s67N2TC=    1             s67N3TC=    1
s67N4TC=    1             s67G1TC=    1             s67G2TC=    1
s67G3TC=    1             s67G4TC=    1             s67Q1TC=    1
s67Q2TC=    1             s67Q3TC=    1             s67Q4TC=    1
s51ATC=     1             s51BTC=     1             s51CTC=     1
s51PTC=     1             s51NTC=     1             s51GTC=     1
s51G2TC=    1             s51QTC=     1             HBL2TC=     1
s81RTC$=    "!27B81"      LV1=        0             LV2=        0
LV3=        0             LV4=        0             LV5=        0
LV6=        0             LV7=        0             LV8=        0
LV9=        0             LV10=       0             LV11=       0
LV12=       0             LV13=       0             LV14=       0
LV15=       0             LV16=       0             LV17=       0
LV18=       0             LV19=       0             LV20=       0
LV21=       0             LV22=       0             LV23=       0
LV24=       0             LV25=       0             LV26=       0
LV27=       0             LV28=       0             LV29=       0
LV30=       0             LV31=       0             LV32=       0
SV1$=       "IN101 * IN102 * IN103"

SV2$=       "27A1 + 27B1 + 27C1"

SV3$=       "27A1 * 27B1 * 27C1"

SV4$=       "(27S * !SV2) + (!27S * SV2)"

SV5=        0             SV6=        0             SV7=        0
SV8=        0             SV9=        0             SV10=       0
SV11=       0             SV12=       0             SV13=       0
SV14=       0             SV15=       0             SV16=       0
OUT101$=    "TRIP"        OUT102=     0             OUT103=     0
OUT104=     1             OUT105=     1             OUT106=     0
OUT107$=    "50P1"        ALRMOUT$=   "!(SALARM + HALARM)"

DP1$=       "IN101"       DP2=        0             DP3=        0
DP4=        0             DP5=        0             DP6=        0
```

Device Settings (Continued):

```
DP7=        0             DP8=        0             DP9=        0
DP10=       0             DP11=       0             DP12=       0
DP13=       0             DP14=       0             DP15=       0
DP16=       0             SS1=        1             SS2=        0
SS3=        0             SS4=        0             SS5=        0
SS6=        0             ER$=        "51P + 51G + 51N + 50P1 + 50G1 + 50N1"

FAULT$=     "51P + 51G"   BSYNCH$=    "52A"         CLMON=      0
BKMON$=     "TRIP"        BKCLS$=     "CLOSE"       E32IV=      1
LOPBLK=     0
SALARM$=    "BADPASS + CHGPASS + SETCHG + GRPSW + ACCESSP + PASNVAL "

RSTTRGT=    0             RST_DEM=    0             RST_PDM=    0
RST_BK=     0             RST_HIS=    0             RST_ENE=    0
RST_MML=    0             RST_HAL=    0             RSTDNPE=    0
PMTRIG=     0             TREA1=      0             TREA2=      0
TREA3=      0             TREA4=      0             PTCONN$=    "WYE"
VSCONN$=    "VS"          TGR=        0.00          NFREQ=      60
PHROT$=     "ABC"         DATE_F$=    "MDY"         FP_TO=      15
SCROLD=     2             FPNGD$=     "IG"          METHRES$=   "Y"
LER=        15            PRE=        4             FLTDISP$=   "MAX"
DCLOP$=     "OFF"         DCHIP$=     "OFF"         IN101D=     0.50
IN102D=     0.50          IN103D=     0.50          IN104D=     0.50
IN105D=     0.50          IN106D=     0.50          EBMON$=     "Y"
COSP1=      10000         COSP2=      150           COSP3=      12
KASP1=      1.20          KASP2=      8.00          KASP3=      20.00
ESTRT=      50            ESCLT=      120           MSTRT=      50
MSCLT=      120           EPMU$=      "N"           EVELOCK=    0
DNPSRC$=    "UTC"         BOOPTCC$=   "SET"         BOOPPUL$=   "SET"
IRIGC$=     "NONE"        UTC_OFF=    0.00          DST_BEGM$=  "NA"
P2_EPORT$=  "Y"           P2_PROTO$=  "SEL"         P2_MAXACC=  2
P2_SPEED=   2400          P2_BITS=    8             P2_PARITY$= "N"
P2_STOP=    1             P2_RTSCTS$= "N"           P2_T_OUT=   15
P2_AUTO$=   "N"           P2_FASTOP$= "N"           P3_EPORT$=  "Y"
P3_PROTO$=  "SEL"         P3_MAXACC=  2             P3_SPEED=   2400
P3_BITS=    8             P3_PARITY$= "N"           P3_STOP=    1
P3_RTSCTS$= "N"           P3_T_OUT=   0             P3_AUTO$=   "N"
P3_FASTOP$= "N"           PF_EPORT$=  "Y"           PF_PROTO$=  "SEL"
PF_MAXACC$= "C"           PF_SPEED=   19200         PF_BITS=    8
PF_PARITY$= "N"           PF_STOP=    1             PF_RTSCTS$= "N"
PF_T_OUT=   0             PF_AUTO$=   "N"           PF_FASTOP$= "N"
```

Global Defines:

```
SET_GROUP$="1"      'SET GROUP TO TEST
CONTACT$="107"      'OUTPUT CONTACT TO MASK
SEL_AUTO=1          '0=MANUAL, 1=AUTO MASK, 2=MANUAL W/MESSAGES
SKIP_TST=1          'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1            'NO ERROR MESSAGE IF NO OPERATION
DIR_TEST_VOLTS=30   'TEST VOLTAGE FOR DIRECTIONAL ELEMENTS
NORM_VOLTS=67       'NORM VOLTAGE
NORM_FREQ=60        'NORMAL VOLTAGE FREQUENCY
ZONE_TEST_AMPS=2  'TEST CURRENT FOR LOAD ENCHROACHMENT TESTS
```

Device Test Results for: RELAY STATUS CHECK

N/A

Additional Data:
STA

TIE Date: 02/12/24 Time: 10:41:50.063
TEST SETTING

FID=SEL-351A-R515-V0-Z105104-D20130620 CID=F6EC

SELF TESTS

W=Warn F=Fail

	IA	IB	IC	IN	VA	VB	VC	VS	MOF
OS	-1	-1	-1	-1	-1	-1	-1	-1	-1
OSH	-0	-0	-0	-0					

	15V_PS	5V_REG	3.3V_REG
PS	14.83	4.98	3.31

RAM	ROM	FPGA	EEPROM	FLASH	A/D	USB_BRD	COM_BRD
OK	OK	OK	OK	OK	OK	NA	NA

TEMP	RTC	HMI
31.5	OK	OK

Relay Enabled

=>>

Device Test Results for: RELAY SETTING VERIFICATION

Verify SETTINGS are as specified

(O) PASS

( ) FAIL

By selecting PASS you have determined that SETTINGS
on this device are as specified.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CURRENT\VOLTAGE INJECTION METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
67.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	7.2	7.2	0.1	216.0	215.7	-0.1	PASS
B-N	7.4	7.4	0.1	240.0	239.7	-0.1	PASS
C-N	7.6	7.6	0.0	264.0	263.8	-0.1	PASS

CALCULATED MEGA WATT	MEASURED MEGA WATT	% ERROR	CALCULATED MEGA VAR	MEASURED MEGA VAR	% ERROR	OK?
4.6	4.6	-0.1	2.7	2.7	-0.0	PASS

Device Test Results for: RELAY INPUT VERIFICATION

Verify operation of the RELAY INPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that INPUTS
on this relay essential to proper functioning of
the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RELAY OUTPUT VERIFICATION

Verify operation of the RELAY OUTPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that OUTPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM FUNTIONALITY

Verify functionality of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM is functional.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM PERFORMANCE

Verify PERFORMANCE of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM meets the PERFORMANCE CRITERIA pertinent to the communications technology applied.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CURRENT SIGNAL VALUE VERIFICATION

Verify CURRENT SIGNAL VALUES are provided to the relay

(O) PASS

( ) FAIL

By selecting PASS you have determined that CURRENT SIGNAL VALUES are provided to the protective relay.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: VOLTAGE SIGNAL VALUE VERIFICATION

Verify VOLTAGE SIGNAL VALUES are
provided to the relay

(O) PASS

( ) FAIL

By selecting PASS you have determined that VOLTAGE SIGNAL VALUES are provided to the protective relay.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CONTROL CIRCUITRY VERIFICATIONS

Verify CONTROL CIRCUITRY operations are proven

[x] Verified that each trip coil is able to operate the circuit breaker, interrupting device, or mitigating device.

[x] Verified electrical operation of electromechanical lockout devices.

[x] Verified all paths of the control circuits essential for proper operation of the Remedial Action Scheme (RAS).

[x] Verified all paths of the trip circuits inclusive of all auxiliary relays through the trip coil(s) of the circuit breakers or other interrupting devices.

(O) PASS

( ) FAIL

By selecting PASS you have determined that CONTROL CIRCUITRY operations have been proven.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: ALARMS AND MONITORING VERIFICATION

Verify ALARM and MONITORING signals

[x] Verified that the alarm path conveys alarm signals to a location where corrective action can be initiated.

(O) PASS

( ) FAIL

By selecting PASS you have determined that ALARM and MONITORING signals have been proven.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Device Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
67.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	7.2	7.2	0.1	216.0	215.8	-0.1	PASS
B-N	7.4	7.4	0.1	240.0	239.8	-0.1	PASS
C-N	7.6	7.6	0.0	264.0	263.8	-0.1	PASS

CALCULATED MEGA WATT	MEASURED MEGA WATT	% ERROR	CALCULATED MEGA VAR	MEASURED MEGA VAR	% ERROR	OK?
4.6	4.6	-0.0	2.7	2.7	-0.0	PASS

Device Test Results for: 27P1P PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
61.380	62.000	-1.00	PASS

Device Test Results for: 27P1P THREE PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
61.380	62.000	-1.00	PASS

Device Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	50.500	50.000	1.00	PASS
B-N	50.500	50.000	1.00	PASS
C-N	50.000	50.000	0.00	PASS

Device Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
8.760	8.760	0.00	PASS

Device Test Results for: 67G1D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(SEC)	TIME(CY)	RANGE	OK?
1.20	10.512	0.122	7.33	4.20 TO 7.80	PASS

Device Test Results for: 51PP PHASE TO PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	2.222	2.200	1.00	PASS
B-N	2.222	2.200	1.00	PASS
C-N	2.222	2.200	1.00	PASS

Device Test Results for: 51P PHASE TIME OVERCURRENT CURVE

51P PHASE TIME OVERCURRENT CURVE (PHASE A-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.400	642.50	10.708	10.667	0.39	PASS
3.00	6.600	241.46	4.024	4.000	0.61	PASS
4.00	8.800	129.05	2.151	2.133	0.82	PASS

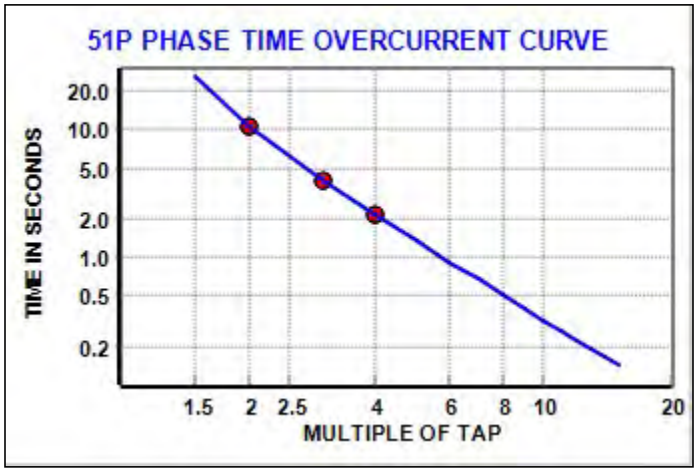
51P PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.400	642.29	10.705	10.667	0.36	PASS
3.00	6.600	241.88	4.031	4.000	0.78	PASS
4.00	8.800	129.01	2.150	2.133	0.79	PASS

51P PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.400	642.55	10.709	10.667	0.40	PASS
3.00	6.600	241.09	4.018	4.000	0.46	PASS
4.00	8.800	128.78	2.146	2.133	0.61	PASS

Graph for Test: 51P PHASE TIME OVERCURRENT CURVE

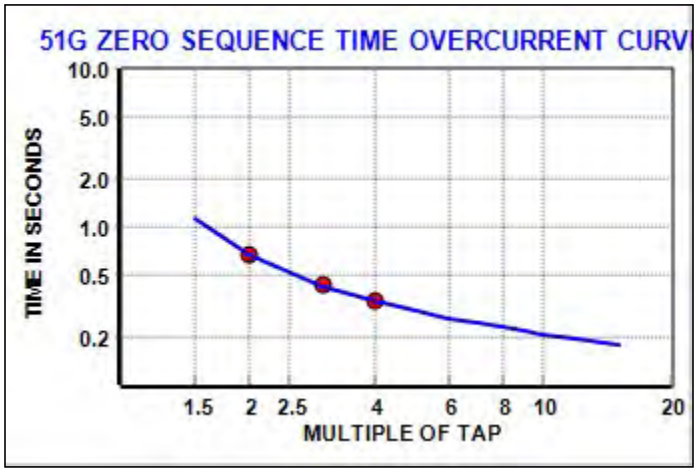


Device Test Results for: 51GP ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.600	0.600	0.00	PASS

Device Test Results for: 51G ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	39.73	0.662	0.660	0.30	PASS
3.00	1.800	25.69	0.428	0.422	1.46	PASS
4.00	2.400	20.16	0.336	0.338	-0.47	PASS



Device Test Results for: 59P1P PHASE OVERVOLTAGE PICKUP

PICKUP	VOLTS	IDEAL	%ERROR	OK?
	76.000	76.000	0.00	PASS

Device Test Results for: 59P1P THREE PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.000	76.000	0.00	PASS

Device Test Results for: 25VLO SOURCE VP SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.000	62.000	-0.00	PASS

Device Test Results for: 25VHI SOURCE VP SYNCHRONIZING PHASE HIGH VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
75.240	76.000	-1.00	PASS

Device Test Results for: 27SP SYNCHRONIZING PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
10.100	10.000	1.00	PASS

Device Test Results for: 59S1P SYNCHRONIZING PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
55.550	55.000	1.00	PASS

Device Test Results for: 25VLO SOURCE VS SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
61.380	62.000	-1.00	PASS

Device Test Results for: 25VHI SOURCE VS SYNCHRONIZING PHASE HIGH VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.000	76.000	-0.00	PASS

Device Test Results for: 25ANG1 SYNCHRONIZING ANGLE 1

LAGGING ANGLE	IDEAL	RANGE	OK?
18.00	15.00	11.00 TO 19.00	PASS

LEADING ANGLE	IDEAL	RANGE	OK?
342.00	345.00	341.00 TO 349.00	PASS

Device Test Results for: 25ANG2 SYNCHRONIZING ANGLE 2

LAGGING ANGLE	IDEAL	RANGE	OK?
17.00	15.00	11.00 TO 19.00	PASS

LEADING ANGLE	IDEAL	RANGE	OK?
341.00	345.00	341.00 TO 349.00	PASS

Device Test Results for: 25SF SYNCHRONIZING SLIP FREQUENCY

DROPOUT HZ	IDEAL	RANGE	OK?
59.980	59.950	59.900 TO 60.000	PASS

Routine	SEL-551.FST_LIB	**AFAL**	AL	**Test Date**	2/13/2024
Version	8.2			**Pass/Fail**	PASS

Device Data:

Customer:	City of Ann Arbor Waste Water Treatment		
Job_Number:	230858	SUBSTATION:	13.2 kV Switchgear
Relay_ID:	52F110	PHASE_ZONE:	
RELAY_MANF:	SEL	RELAY_TYPE:	SEL-551
MODEL_STYLE:		IEEE_DEVICE:	MF
IL_IB:		SERIAL_NUMBER:	
FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408		
NERC_AUDITABLE:	0	MAINT_INTERVAL:	0
PREVIOUS_TESTDATE:		CURRENT_TESTDATE:	
NEXT_TESTDATE:		TESTSET_CALDATE:	
Tested_BY:			

Routine Notes:

Device Settings Used for Testing:

```
RID$=     "52F110"        TID$=     "SPACE 6-BOT"   CTR=      120
CTRN=     120             TDURD=    9.000           s50P1P=   13.0
s50P2P=   1.3             s50P3P$=  "OFF"           s50P4P$=  "OFF"
s50P5P$=  "OFF"           s50P6P$=  "OFF"           s50ABCP$= "OFF"
s51P1P=   0.6             s51P1C$=  "C3"            s51P1TD=  1.00
s51P1RS$= "N"             s51P2P$=  "OFF"           s51P2C$=  "U3"
s51P2TD=  15.00           s51P2RS$= "N"             s50N1P$=  "OFF"
s50N2P$=  "OFF"           s51N1P$=  "OFF"           s51N1C$=  "U4"
s51N1TD=  3.00            s51N1RS$= "N"             s50G1P=   5.4
s50G2P$=  "OFF"           s51G1P=   0.5             s51G1C$=  "U1"
s51G1TD=  0.50            s51G1RS$= "N"             s50Q1P$=  "OFF"
s50Q2P$=  "OFF"           s51Q1P$=  "OFF"           s51Q1C$=  "U3"
s51Q1TD=  15.00           s51Q1RS$= "N"             s51Q2P$=  "OFF"
s51Q2C$=  "U3"            s51Q2TD=  15.00           s51Q2RS$= "N"
s79OI1=   0.000           s79OI2=   600.000         s79OI3=   0.000
s79OI4=   0.000           s79RSD=   1800.000        s79RSLD=  300.000
CFD=      60.000          DMTC=     5               PDEMP=    5.00
NDEMP=    1.50            GDEMP=    1.50            QDEMP=    1.50
SV5PU=    0.000           SV5DO=    0.000           SV6PU=    0.000
SV6DO=    0.000           SV7PU=    0.000           SV7DO=    0.000
SV8PU=    0.000           SV8DO=    0.000           SV9PU=    0.000
SV9DO=    0.000           SV10PU=   0.000           SV10DO=   0.000
SV11PU=   0.000           SV11DO=   0.000           SV12PU=   0.000
SV12DO=   0.000           SV13PU=   0.000           SV13DO=   0.000
SV14PU=   0.000           SV14DO=   0.000           NFREQ=    60
PHROT$=   "ABC"           DATE_F$=  "MDY"
TR$=      "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "

ULTR$=    "!(51P1 + 51G1)"s51P1TC=  1               s51P2TC=  1
s51N1TC=  1               s51G1TC=  1               s51Q1TC=  1
s51Q2TC=  1               s52A$=    "IN1"           CL$=      "LB4"
ULCL$=    "TRIP"          s79RI$=   "TRIP"          s79RIS$=  "IN1"
s79DTL$=  "!LB1 + LB3"    s79DLS$=  "79LO"          s79SKP$=  "50P2 * SH0"
s79STL$=  "TRIP"          s79BRS$=  "(51P1 + 51G1) * (79RS + 79CY)"

s79SEQ=   0               ER1$=     "51P1 + 51G1 + 51N1"

ER2=      0               SV1=      0               SV2=      0
SV3=      0               SV4=      0               SV5=      0
SV6=      0               SV7=      0               SV8=      0
SV9=      0               SV10=     0               SV11=     0
SV12=     0               SV13=     0               SV14=     0
OUT1$=    "TRIP"          OUT2=     0               OUT3=     0
OUT4=     0               DP1$=     "IN1"           DP2$=     "LB2"
DP3=      0               DP4=      0               DP5=      0
DP6=      0               DP7=      0               DP8=      0
```

Global Defines:

```
CONTACT$="4"         'OUTPUT CONTACT TO MASK
SEL_AUTO=1           '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1           'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1             'NO ERROR MESSAGE IF NO OPERATION
```

Device Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

52F110                              Date: 02/13/24    Time: 11:55:04.343
SPACE 6-BOT

FID=SEL-551-R514-Vf-Z002002-D20110408      CID=CCFD

SELF TESTS

W=Warn    F=Fail

       IA       IB       IC       IN       MOF
OS      3        3        3        3        0

       +5V_PS   +5V_REG  -5V_REG  +10V_PS  -10V_PS  VBAT
PS      5.01     5.06    -4.99     9.99    -9.99     3.48

       TEMP     RAM      ROM      CR_RAM   EEPROM
        28.6    OK       OK       OK       OK

 Relay Enabled

=>>
```

Device Test Results for: RELAY SETTING VERIFICATION

```
       Verify SETTINGS are as specified

                   (O) PASS

                   ( ) FAIL


 By selecting PASS you have determined that SETTINGS
 on this device are as specified.

 If selecting FAIL, add an explanation below.

 NOTES:
```

Device Test Results for: CURRENT INJECTION METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	217.0	0.5	PASS
B-N	0.0	0.0	0.0	240.0	240.0	0.0	PASS
C-N	0.0	0.0	0.0	264.0	264.0	0.0	PASS

Device Test Results for: RELAY INPUT VERIFICATION

Verify operation of the RELAY INPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that INPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RELAY OUTPUT VERIFICATION

Verify operation of the RELAY OUTPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that OUTPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM FUNTIONALITY

Verify functionality of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM is functional.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM PERFORMANCE

Verify PERFORMANCE of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM meets the PERFORMANCE CRITERIA pertinent to the communications technology applied.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CURRENT SIGNAL VALUE VERIFICATION

Verify CURRENT SIGNAL VALUES are
provided to the relay

(O) PASS

( ) FAIL

By selecting PASS you have determined that CURRENT
SIGNAL VALUES are provided to the protective relay.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CONTROL CIRCUITRY VERIFICATIONS

Verify CONTROL CIRCUITRY operations are proven

[ ] Verified that each trip coil is able to operate the circuit breaker, interrupting device, or mitigating device.

[x] Verified electrical operation of electromechanical lockout devices.

[x] Verified all paths of the control circuits essential for proper operation of the Remedial Action Scheme (RAS).

[ ] Verified all paths of the trip circuits inclusive of all auxiliary relays through the trip coil(s) of the circuit breakers or other interrupting devices.

(O) PASS

( ) FAIL

By selecting PASS you have determined that CONTROL
CIRCUITRY operations have been proven.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: ALARMS AND MONITORING VERIFICATION

Verify ALARM and MONITORING signals

[x] Verified that the alarm path conveys alarm signals to a location where corrective action can be initiated.

(O) PASS

( ) FAIL

By selecting PASS you have determined that ALARM and MONITORING signals have been proven.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	213.0	-1.4	PASS
B-N	0.0	0.0	0.0	240.0	239.0	-0.4	PASS
C-N	0.0	0.0	0.0	264.0	264.0	0.0	PASS

Device Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	13.000	13.000	0.00	PASS
B-N	13.000	13.000	0.00	PASS
C-N	13.000	13.000	0.00	PASS

Device Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	1.300	1.300	-0.00	PASS
B-N	1.313	1.300	1.00	PASS
C-N	1.300	1.300	-0.00	PASS

Device Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
5.400	5.400	0.00	PASS

Device Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		0.624	0.600	4.00	PASS
B-N		0.606	0.600	1.00	PASS
C-N		0.588	0.600	-2.00	PASS

Device Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

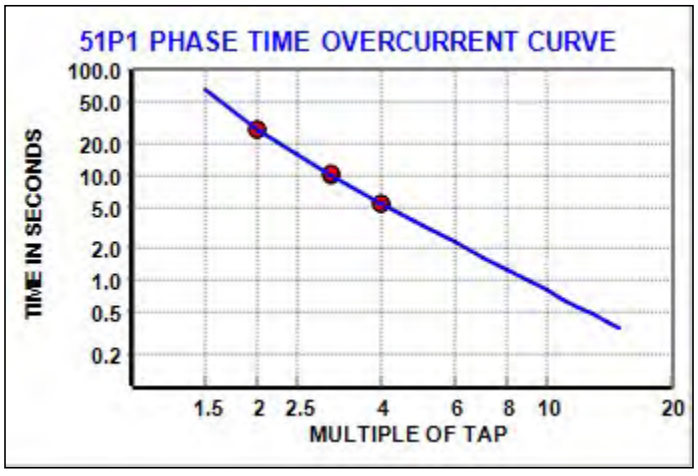
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1629.10	27.152	26.667	1.82	PASS
3.00	1.800	602.42	10.040	10.000	0.40	PASS
4.00	2.400	319.73	5.329	5.333	-0.08	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1624.08	27.068	26.667	1.50	PASS
3.00	1.800	612.06	10.201	10.000	2.01	PASS
4.00	2.400	324.78	5.413	5.333	1.49	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1624.22	27.070	26.667	1.51	PASS
3.00	1.800	607.76	10.129	10.000	1.29	PASS
4.00	2.400	324.33	5.406	5.333	1.35	PASS

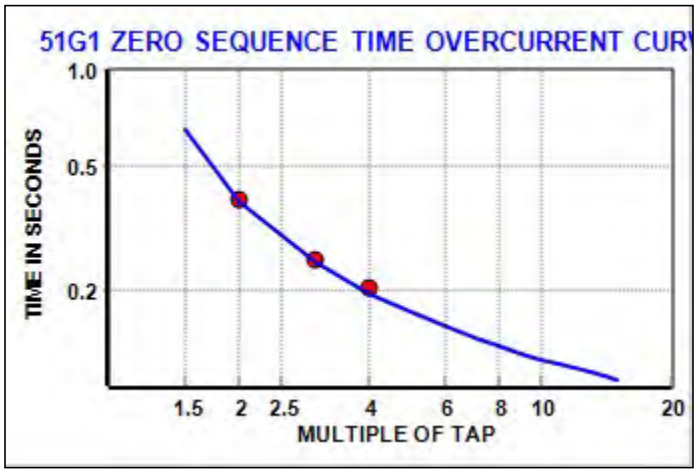


Device Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.510	0.500	2.00	PASS

Device Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.000	23.37	0.390	0.384	1.48	PASS
3.00	1.500	14.96	0.249	0.245	1.60	PASS
4.00	2.000	12.33	0.206	0.196	4.71	PASS



Routine	SEL-551.FST_LIB	**AFAL**	AL	**Test Date**	2/13/2024
Version	8.2			**Pass/Fail**	PASS

Device Data:

Customer:	City of Ann Arbor Waste Water Treatment		
Job_Number:	230858	SUBSTATION:	13.2 kV Switchgear
Relay_ID:	52F19	PHASE_ZONE:	
RELAY_MANF:	SEL	RELAY_TYPE:	SEL-551
MODEL_STYLE:		IEEE_DEVICE:	MF
IL_IB:		SERIAL_NUMBER:	
FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408		
NERC_AUDITABLE:	0	MAINT_INTERVAL:	0
PREVIOUS_TESTDATE:		CURRENT_TESTDATE:	
NEXT_TESTDATE:		TESTSET_CALDATE:	
Tested_BY:			

Routine Notes:

Device Settings Used for Testing:

```
RID$=     "52F19"          TID$=     "SPACE 6-TOP"   CTR=      120
CTRN=     120              TDURD=    9.000           s50P1P=   13.0
s50P2P=   1.3              s50P3P$=  "OFF"           s50P4P$=  "OFF"
s50P5P$=  "OFF"            s50P6P$=  "OFF"           s50ABCP$= "OFF"
s51P1P=   0.6              s51P1C$=  "C3"            s51P1TD=  1.00
s51P1RS$= "N"              s51P2P$=  "OFF"           s51P2C$=  "U3"
s51P2TD=  15.00            s51P2RS$= "N"             s50N1P$=  "OFF"
s50N2P$=  "OFF"            s51N1P$=  "OFF"           s51N1C$=  "U4"
s51N1TD=  3.00             s51N1RS$= "N"             s50G1P=   5.4
s50G2P$=  "OFF"            s51G1P=   0.5             s51G1C$=  "U1"
s51G1TD=  0.50             s51G1RS$= "N"             s50Q1P$=  "OFF"
s50Q2P$=  "OFF"            s51Q1P$=  "OFF"           s51Q1C$=  "U3"
s51Q1TD=  15.00            s51Q1RS$= "N"             s51Q2P$=  "OFF"
s51Q2C$=  "U3"             s51Q2TD=  15.00           s51Q2RS$= "N"
s79OI1=   0.000            s79OI2=   600.000         s79OI3=   0.000
s79OI4=   0.000            s79RSD=   1800.000        s79RSLD=  300.000
CFD=      60.000           DMTC=     5               PDEMP=    5.00
NDEMP=    1.50             GDEMP=    1.50            QDEMP=    1.50
SV5PU=    0.000            SV5DO=    0.000           SV6PU=    0.000
SV6DO=    0.000            SV7PU=    0.000           SV7DO=    0.000
SV8PU=    0.000            SV8DO=    0.000           SV9PU=    0.000
SV9DO=    0.000            SV10PU=   0.000           SV10DO=   0.000
SV11PU=   0.000            SV11DO=   0.000           SV12PU=   0.000
SV12DO=   0.000            SV13PU=   0.000           SV13DO=   0.000
SV14PU=   0.000            SV14DO=   0.000           NFREQ=    60
PHROT$=   "ABC"            DATE_F$=  "MDY"
TR$=      "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "

ULTR$=    "!(51P1 + 51G1)"s51P1TC=  1               s51P2TC=  1
s51N1TC=  1                s51G1TC=  1               s51Q1TC=  1
s51Q2TC=  1                s52A$=    "IN1"           CL$=      "LB4"
ULCL$=    "TRIP"           s79RI$=   "TRIP"          s79RIS$=  "IN1"
s79DTL$=  "!LB1 + LB3"     s79DLS$=  "79LO"          s79SKP$=  "50P2 * SH0"
s79STL$=  "TRIP"           s79BRS$=  "(51P1 + 51G1) * (79RS + 79CY)"

s79SEQ=   0                ER1$=     "51P1 + 51G1 + 51N1"

ER2=      0                SV1=      0               SV2=      0
SV3=      0                SV4=      0               SV5=      0
SV6=      0                SV7=      0               SV8=      0
SV9=      0                SV10=     0               SV11=     0
SV12=     0                SV13=     0               SV14=     0
OUT1$=    "TRIP"           OUT2=     0               OUT3=     0
OUT4=     0                DP1$=     "IN1"           DP2$=     "LB2"
DP3=      0                DP4=      0               DP5=      0
DP6=      0                DP7=      0               DP8=      0
```

Global Defines:

```
CONTACT$="4"         'OUTPUT CONTACT TO MASK
SEL_AUTO=1           '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1           'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1             'NO ERROR MESSAGE IF NO OPERATION
```

Device Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

52F19                              Date: 02/13/24    Time: 11:07:21.028
SPACE 6-TOP

FID=SEL-551-R514-Vf-Z002002-D20110408      CID=CCFD

SELF TESTS

W=Warn    F=Fail

       IA       IB       IC       IN       MOF
OS      3        3        3        3        0

       +5V_PS   +5V_REG  -5V_REG  +10V_PS  -10V_PS  VBAT
PS      4.98     5.01    -4.98     9.90    -9.97     3.48

       TEMP     RAM      ROM      CR_RAM   EEPROM
        30.7    OK       OK       OK       OK

 Relay Enabled

=>>
```

Device Test Results for: RELAY SETTING VERIFICATION

```
       Verify SETTINGS are as specified

                   (O) PASS

                   ( ) FAIL


 By selecting PASS you have determined that SETTINGS
 on this device are as specified.

 If selecting FAIL, add an explanation below.

 NOTES:
```

Device Test Results for: CURRENT INJECTION METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	215.0	-0.5	PASS
B-N	0.0	0.0	0.0	240.0	238.0	-0.8	PASS
C-N	0.0	0.0	0.0	264.0	265.0	0.4	PASS

Device Test Results for: RELAY INPUT VERIFICATION

Verify operation of the RELAY INPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that INPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RELAY OUTPUT VERIFICATION

Verify operation of the RELAY OUTPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that OUTPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM FUNTIONALITY

Verify functionality of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM is functional.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM PERFORMANCE

Verify PERFORMANCE of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM meets the PERFORMANCE CRITERIA pertinent to the communications technology applied.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CURRENT SIGNAL VALUE VERIFICATION

Verify CURRENT SIGNAL VALUES are
provided to the relay

(O) PASS

( ) FAIL

By selecting PASS you have determined that CURRENT
SIGNAL VALUES are provided to the protective relay.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CONTROL CIRCUITRY VERIFICATIONS

Verify CONTROL CIRCUITRY operations are proven

[ ] Verified that each trip coil is able to operate the circuit breaker, interrupting device, or mitigating device.

[x] Verified electrical operation of electromechanical lockout devices.

[x] Verified all paths of the control circuits essential for proper operation of the Remedial Action Scheme (RAS).

[ ] Verified all paths of the trip circuits inclusive of all auxiliary relays through the trip coil(s) of the circuit breakers or other interrupting devices.

(O) PASS

( ) FAIL

By selecting PASS you have determined that CONTROL
CIRCUITRY operations have been proven.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: ALARMS AND MONITORING VERIFICATION

Verify ALARM and MONITORING signals

[x] Verified that the alarm path conveys alarm signals to a location where corrective action can be initiated.

(O) PASS

( ) FAIL

By selecting PASS you have determined that ALARM and MONITORING signals have been proven.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Device Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	218.0	0.9	PASS
B-N	0.0	0.0	0.0	240.0	239.0	-0.4	PASS
C-N	0.0	0.0	0.0	264.0	262.0	-0.8	PASS

Device Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	13.000	13.000	0.00	PASS
B-N	13.000	13.000	0.00	PASS
C-N	13.000	13.000	0.00	PASS

Device Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	1.300	1.300	-0.00	PASS
B-N	1.300	1.300	-0.00	PASS
C-N	1.287	1.300	-1.00	PASS

Device Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.400	5.400	0.00	PASS

Device Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		0.612	0.600	2.00	PASS
B-N		0.600	0.600	0.00	PASS
C-N		0.624	0.600	4.00	PASS

Device Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

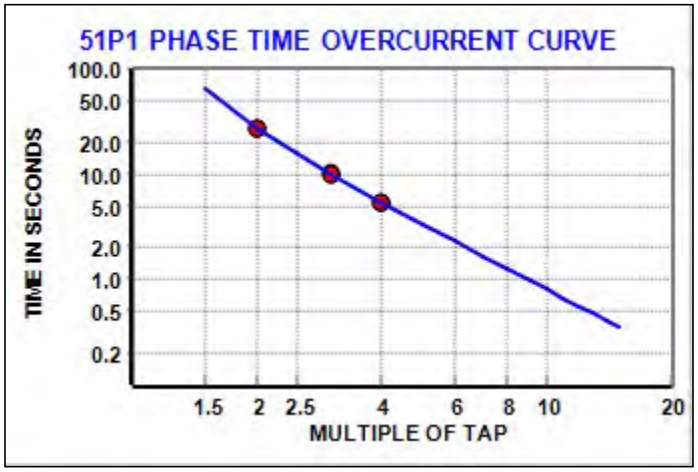
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1628.70	27.145	26.667	1.79	PASS
3.00	1.800	593.01	9.884	10.000	-1.16	PASS
4.00	2.400	320.66	5.344	5.333	0.21	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1646.21	27.437	26.667	2.89	PASS
3.00	1.800	625.81	10.430	10.000	4.30	PASS
4.00	2.400	327.65	5.461	5.333	2.39	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1644.38	27.406	26.667	2.77	PASS
3.00	1.800	597.25	9.954	10.000	-0.46	PASS
4.00	2.400	322.12	5.369	5.333	0.66	PASS

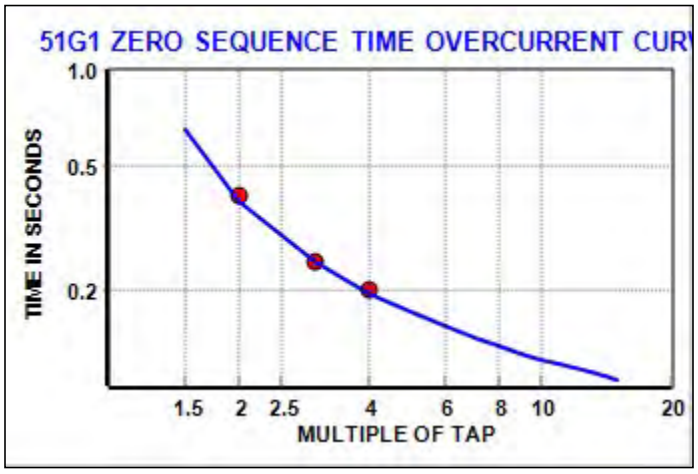


Device Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.515	0.500	3.00	PASS

Device Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.000	23.99	0.400	0.384	4.19	PASS
3.00	1.500	14.80	0.247	0.245	0.50	PASS
4.00	2.000	12.00	0.200	0.196	1.90	PASS



Routine	SEL-551.FST_LIB	**AFAL**	AL	**Test Date**	2/13/2024
Version	8.2			**Pass/Fail**	PASS

Device Data:

Customer:	City of Ann Arbor Waste Water Treatment		
Job_Number:	230858	SUBSTATION:	13.2 kV Switchgear
Relay_ID:	52F1SP	PHASE_ZONE:	
RELAY_MANF:	SEL	RELAY_TYPE:	SEL-551
MODEL_STYLE:		IEEE_DEVICE:	MF
IL_IB:		SERIAL_NUMBER:	
FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408		
NERC_AUDITABLE:	0	MAINT_INTERVAL:	0
PREVIOUS_TESTDATE:		CURRENT_TESTDATE:	
NEXT_TESTDATE:		TESTSET_CALDATE:	
Tested_BY:			

Routine Notes:

Device Settings Used for Testing:

```
RID$=     "FDR-52F1SP"    TID$=     "EBB 52-2A"     CTR=      120
CTRN=     120             TDURD=    9.000           s50P1P=   45.0
s50P2P$=  "OFF"           s50P3P$=  "OFF"           s50P4P$=  "OFF"
s50P5P$=  "OFF"           s50P6P$=  "OFF"           s50ABCP$= "OFF"
s51P1P=   2.0             s51P1C$=  "C3"            s51P1TD=  0.33
s51P1RS$= "N"             s51P2P$=  "OFF"           s51P2C$=  "U3"
s51P2TD=  15.00           s51P2RS$= "N"             s50N1P$=  "OFF"
s50N2P$=  "OFF"           s51N1P$=  "OFF"           s51N1C$=  "U4"
s51N1TD=  3.00            s51N1RS$= "N"             s50G1P=   5.4
s50G2P$=  "OFF"           s51G1P=   0.5             s51G1C$=  "U1"
s51G1TD=  0.50            s51G1RS$= "N"             s50Q1P$=  "OFF"
s50Q2P$=  "OFF"           s51Q1P$=  "OFF"           s51Q1C$=  "U3"
s51Q1TD=  15.00           s51Q1RS$= "N"             s51Q2P$=  "OFF"
s51Q2C$=  "U3"            s51Q2TD=  15.00           s51Q2RS$= "N"
s79OI1=   0.000           s79OI2=   600.000         s79OI3=   0.000
s79OI4=   0.000           s79RSD=   1800.000        s79RSLD=  300.000
CFD=      60.000          DMTC=     5               PDEMP=    5.00
NDEMP=    1.50            GDEMP=    1.50            QDEMP=    1.50
SV5PU=    0.000           SV5DO=    0.000           SV6PU=    0.000
SV6DO=    0.000           SV7PU=    0.000           SV7DO=    0.000
SV8PU=    0.000           SV8DO=    0.000           SV9PU=    0.000
SV9DO=    0.000           SV10PU=   0.000           SV10DO=   0.000
SV11PU=   0.000           SV11DO=   0.000           SV12PU=   0.000
SV12DO=   0.000           SV13PU=   0.000           SV13DO=   0.000
SV14PU=   0.000           SV14DO=   0.000           NFREQ=    60
PHROT$=   "ABC"           DATE_F$=  "MDY"           TR$=      "51P1T + 51G1T + 50P1 + 50G1"
ULTR$=    "!(51P1 + 51G1)"s51P1TC=  1               s51P2TC=  1
s51N1TC=  1               s51G1TC=  1               s51Q1TC=  1
s51Q2TC=  1               s52A$=    "IN1"           CL$=      "LB4"
ULCL$=    "TRIP"          s79RI$=   "TRIP"          s79RIS$=  "IN1"
s79DTL$=  "!LB1 + LB3"    s79DLS$=  "79LO"          s79SKP$=  "50P2 * SH0"
s79STL$=  "TRIP"          s79BRS$=  "(51P1 + 51G1) * (79RS + 79CY)"

s79SEQ=   0               ER1$=     "51P1 + 51G1 + 51N1"

ER2=      0               SV1=      0               SV2=      0
SV3=      0               SV4=      0               SV5=      0
SV6=      0               SV7=      0               SV8=      0
SV9=      0               SV10=     0               SV11=     0
SV12=     0               SV13=     0               SV14=     0
OUT1$=    "TRIP"          OUT2=     0               OUT3=     0
OUT4=     0               DP1$=     "IN1"           DP2=      0
DP3=      0               DP4=      0               DP5=      0
DP6=      0               DP7=      0               DP8=      0
```

Global Defines:

```
CONTACT$="4"        'OUTPUT CONTACT TO MASK
SEL_AUTO=1          '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1          'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1            'NO ERROR MESSAGE IF NO OPERATION
```

Device Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

FDR-52F1SP                          Date: 02/13/24    Time: 10:09:30.155
EBB 52-2A

FID=SEL-551-R514-Vf-Z002002-D20110408      CID=CCFD

SELF TESTS

W=Warn    F=Fail

       IA       IB       IC       IN       MOF
OS      3        3        3        3        0

       +5V_PS   +5V_REG  -5V_REG  +10V_PS  -10V_PS  VBAT
PS      4.98     4.99    -4.98     9.94    -9.97     3.49

       TEMP     RAM      ROM      CR_RAM   EEPROM
        34.9    OK       OK       OK       OK

 Relay Enabled

=>>
```

Device Test Results for: RELAY SETTING VERIFICATION

Verify SETTINGS are as specified

(O) PASS

( ) FAIL

By selecting PASS you have determined that SETTINGS on this device are as specified.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CURRENT INJECTION METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	216.0	0.0	PASS
B-N	0.0	0.0	0.0	240.0	237.0	-1.2	PASS
C-N	0.0	0.0	0.0	264.0	263.0	-0.4	PASS

Device Test Results for: RELAY INPUT VERIFICATION

Verify operation of the RELAY INPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that INPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RELAY OUTPUT VERIFICATION

Verify operation of the RELAY OUTPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that OUTPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM FUNTIONALITY

Verify functionality of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM is functional.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM PERFORMANCE

Verify PERFORMANCE of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM meets the PERFORMANCE CRITERIA pertinent to the communications technology applied.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CURRENT SIGNAL VALUE VERIFICATION

Verify CURRENT SIGNAL VALUES are
provided to the relay

(O) PASS

( ) FAIL

By selecting PASS you have determined that CURRENT
SIGNAL VALUES are provided to the protective relay.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CONTROL CIRCUITRY VERIFICATIONS

Verify CONTROL CIRCUITRY operations are proven

[x] Verified that each trip coil is able to operate the circuit breaker, interrupting device, or mitigating device.

[x] Verified electrical operation of electromechanical lockout devices.

[x] Verified all paths of the control circuits essential for proper operation of the Remedial Action Scheme (RAS).

[x] Verified all paths of the trip circuits inclusive of all auxiliary relays through the trip coil(s) of the circuit breakers or other interrupting devices.

(O) PASS

( ) FAIL

By selecting PASS you have determined that CONTROL
CIRCUITRY operations have been proven.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: ALARMS AND MONITORING VERIFICATION

Verify ALARM and MONITORING signals

[x] Verified that the alarm path conveys alarm signals to a location where corrective action can be initiated.

(O) PASS

( ) FAIL

By selecting PASS you have determined that ALARM and MONITORING signals have been proven.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Device Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	216.0	0.0	PASS
B-N	0.0	0.0	0.0	240.0	240.0	0.0	PASS
C-N	0.0	0.0	0.0	264.0	263.0	-0.4	PASS

Device Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	45.000	45.000	0.00	PASS
B-N	45.000	45.000	0.00	PASS
C-N	45.450	45.000	1.00	PASS

Device Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
5.454	5.400	1.00	PASS

Device Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		2.020	2.000	1.00	PASS
B-N		2.020	2.000	1.00	PASS
C-N		2.000	2.000	0.00	PASS

Device Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

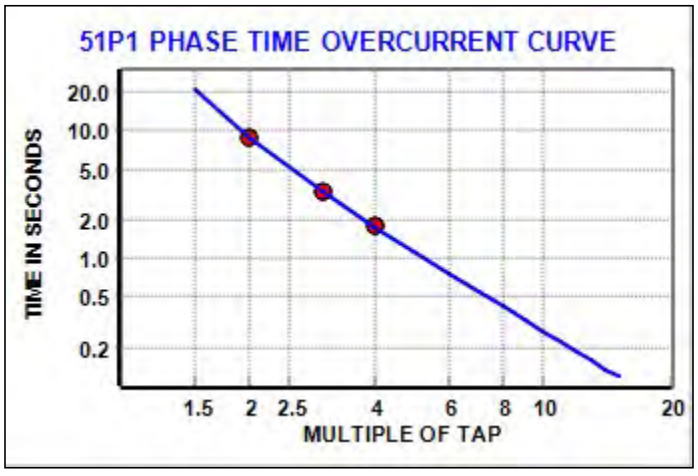
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.000	531.20	8.853	8.800	0.61	PASS
3.00	6.000	199.55	3.326	3.300	0.78	PASS
4.00	8.000	106.97	1.783	1.760	1.30	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.000	525.64	8.761	8.800	-0.45	PASS
3.00	6.000	198.68	3.311	3.300	0.34	PASS
4.00	8.000	106.31	1.772	1.760	0.68	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.000	533.50	8.892	8.800	1.04	PASS
3.00	6.000	200.02	3.334	3.300	1.02	PASS
4.00	8.000	106.77	1.780	1.760	1.11	PASS

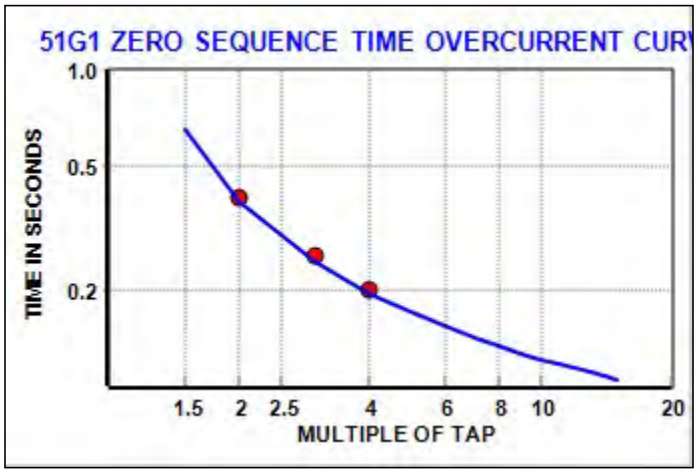


Device Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.490	0.500	-2.00	PASS

Device Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.000	23.66	0.394	0.384	2.76	PASS
3.00	1.500	15.40	0.257	0.245	4.62	PASS
4.00	2.000	12.08	0.201	0.196	2.62	PASS



Routine	SEL-551.FST_LIB	**AFAL**	AL	**Test Date**	2/12/2024
Version	8.2			**Pass/Fail**	PASS

Device Data:

Customer:	City of Ann Arbor Waste Water Treatment		
Job_Number:	230858	SUBSTATION:	13.2 kV Switchgear
Relay_ID:	52F210	PHASE_ZONE:	
RELAY_MANF:	SEL	RELAY_TYPE:	SEL-551
MODEL_STYLE:		IEEE_DEVICE:	MF
IL_IB:		SERIAL_NUMBER:	
FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408		
NERC_AUDITABLE:	0	MAINT_INTERVAL:	0
PREVIOUS_TESTDATE:		CURRENT_TESTDATE:	
NEXT_TESTDATE:		TESTSET_CALDATE:	
Tested_BY:			

Routine Notes:

Device Settings Used for Testing:

```
RID$=     "52F210"        TID$=     "SPACE 10-BOT"  CTR=      120
CTRN=     120             TDURD=    9.000           s50P1P=   13.0
s50P2P=   1.3             s50P3P$=  "OFF"           s50P4P$=  "OFF"
s50P5P$=  "OFF"           s50P6P$=  "OFF"           s50ABCP$= "OFF"
s51P1P=   0.6             s51P1C$=  "C3"            s51P1TD=  1.00
s51P1RS$= "N"             s51P2P$=  "OFF"           s51P2C$=  "U3"
s51P2TD=  15.00           s51P2RS$= "N"             s50N1P$=  "OFF"
s50N2P$=  "OFF"           s51N1P$=  "OFF"           s51N1C$=  "U4"
s51N1TD=  3.00            s51N1RS$= "N"             s50G1P=   5.4
s50G2P$=  "OFF"           s51G1P=   0.5             s51G1C$=  "U1"
s51G1TD=  0.50            s51G1RS$= "N"             s50Q1P$=  "OFF"
s50Q2P$=  "OFF"           s51Q1P$=  "OFF"           s51Q1C$=  "U3"
s51Q1TD=  15.00           s51Q1RS$= "N"             s51Q2P$=  "OFF"
s51Q2C$=  "U3"            s51Q2TD=  15.00           s51Q2RS$= "N"
s79OI1=   0.000           s79OI2=   600.000         s79OI3=   0.000
s79OI4=   0.000           s79RSD=   1800.000        s79RSLD=  300.000
CFD=      60.000          DMTC=     5               PDEMP=    5.00
NDEMP=    1.50            GDEMP=    1.50            QDEMP=    1.50
SV5PU=    0.000           SV5DO=    0.000           SV6PU=    0.000
SV6DO=    0.000           SV7PU=    0.000           SV7DO=    0.000
SV8PU=    0.000           SV8DO=    0.000           SV9PU=    0.000
SV9DO=    0.000           SV10PU=   0.000           SV10DO=   0.000
SV11PU=   0.000           SV11DO=   0.000           SV12PU=   0.000
SV12DO=   0.000           SV13PU=   0.000           SV13DO=   0.000
SV14PU=   0.000           SV14DO=   0.000           NFREQ=    60
PHROT$=   "ABC"           DATE_F$=  "MDY"
TR$=      "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "

ULTR$=    "!(51P1 + 51G1)"s51P1TC=  1               s51P2TC=  1
s51N1TC=  1               s51G1TC=  1               s51Q1TC=  1
s51Q2TC=  1               s52A$=    "IN1"           CL$=      "LB4"
ULCL$=    "TRIP"          s79RI$=   "TRIP"          s79RIS$=  "IN1"
s79DTL$=  "!LB1 + LB3"    s79DLS$=  "79LO"          s79SKP$=  "50P2 * SH0"
s79STL$=  "TRIP"          s79BRS$=  "(51P1 + 51G1) * (79RS + 79CY)"

s79SEQ=   0               ER1$=     "51P1 + 51G1 + 51N1"

ER2=      0               SV1=      0               SV2=      0
SV3=      0               SV4=      0               SV5=      0
SV6=      0               SV7=      0               SV8=      0
SV9=      0               SV10=     0               SV11=     0
SV12=     0               SV13=     0               SV14=     0
OUT1$=    "TRIP"          OUT2=     0               OUT3=     0
OUT4=     0               DP1$=     "IN1"           DP2$=     "LB2"
DP3=      0               DP4=      0               DP5=      0
DP6=      0               DP7=      0               DP8=      0
```

Global Defines:

```
CONTACT$="4"         'OUTPUT CONTACT TO MASK
SEL_AUTO=1           '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1           'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1             'NO ERROR MESSAGE IF NO OPERATION
```

Device Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

52F210                              Date: 02/12/24    Time: 09:06:33.793
SPACE 10-BOT

FID=SEL-551-R514-Vf-Z002002-D20110408      CID=CCFD

SELF TESTS

W=Warn    F=Fail

       IA       IB       IC       IN       MOF
OS      3        3        3        3        0

       +5V_PS   +5V_REG  -5V_REG  +10V_PS  -10V_PS  VBAT
PS      4.98     4.99    -5.12     9.94    -10.02    3.50

       TEMP     RAM      ROM      CR_RAM   EEPROM
        31.7    OK       OK       OK       OK

 Relay Enabled

=>>
```

Device Test Results for: RELAY SETTING VERIFICATION

```
       Verify SETTINGS are as specified

                   (O) PASS

                   ( ) FAIL


 By selecting PASS you have determined that SETTINGS
 on this device are as specified.

 If selecting FAIL, add an explanation below.

 NOTES:
```

Device Test Results for: CURRENT INJECTION METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	212.0	-1.9	PASS
B-N	0.0	0.0	0.0	240.0	240.0	0.0	PASS
C-N	0.0	0.0	0.0	264.0	260.0	-1.5	PASS

Device Test Results for: RELAY INPUT VERIFICATION

Verify operation of the RELAY INPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that INPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RELAY OUTPUT VERIFICATION

Verify operation of the RELAY OUTPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that OUTPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM FUNTIONALITY

Verify functionality of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM is functional.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM PERFORMANCE

Verify PERFORMANCE of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM meets the PERFORMANCE CRITERIA pertinent to the communications technology applied.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CURRENT SIGNAL VALUE VERIFICATION

Verify CURRENT SIGNAL VALUES are
provided to the relay

(O) PASS

( ) FAIL

By selecting PASS you have determined that CURRENT
SIGNAL VALUES are provided to the protective relay.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CONTROL CIRCUITRY VERIFICATIONS

Verify CONTROL CIRCUITRY operations are proven

[ ] Verified that each trip coil is able to operate the circuit breaker, interrupting device, or mitigating device.

[x] Verified electrical operation of electromechanical lockout devices.

[x] Verified all paths of the control circuits essential for proper operation of the Remedial Action Scheme (RAS).

[ ] Verified all paths of the trip circuits inclusive of all auxiliary relays through the trip coil(s) of the circuit breakers or other interrupting devices.

(O) PASS

( ) FAIL

By selecting PASS you have determined that CONTROL
CIRCUITRY operations have been proven.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: ALARMS AND MONITORING VERIFICATION

Verify ALARM and MONITORING signals

[x] Verified that the alarm path conveys alarm signals to a location where corrective action can be initiated.

(O) PASS

( ) FAIL

By selecting PASS you have determined that ALARM and MONITORING signals have been proven.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Device Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	215.0	-0.5	PASS
B-N	0.0	0.0	0.0	240.0	237.0	-1.2	PASS
C-N	0.0	0.0	0.0	264.0	259.0	-1.9	PASS

Device Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	13.130	13.000	1.00	PASS
B-N	13.130	13.000	1.00	PASS
C-N	13.130	13.000	1.00	PASS

Device Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	1.313	1.300	1.00	PASS
B-N	1.326	1.300	2.00	PASS
C-N	1.326	1.300	2.00	PASS

Device Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.454	5.400	1.00	PASS

Device Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		0.618	0.600	3.00	PASS
B-N		0.618	0.600	3.00	PASS
C-N		0.606	0.600	1.00	PASS

Device Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

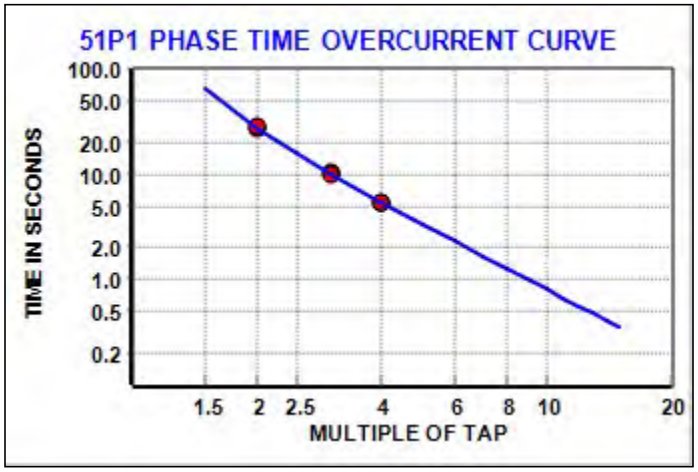
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1673.74	27.896	26.667	4.61	PASS
3.00	1.800	617.26	10.288	10.000	2.88	PASS
4.00	2.400	323.22	5.387	5.333	1.01	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1651.31	27.522	26.667	3.21	PASS
3.00	1.800	617.28	10.288	10.000	2.88	PASS
4.00	2.400	321.35	5.356	5.333	0.42	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1660.08	27.668	26.667	3.76	PASS
3.00	1.800	603.49	10.058	10.000	0.58	PASS
4.00	2.400	322.54	5.376	5.333	0.79	PASS

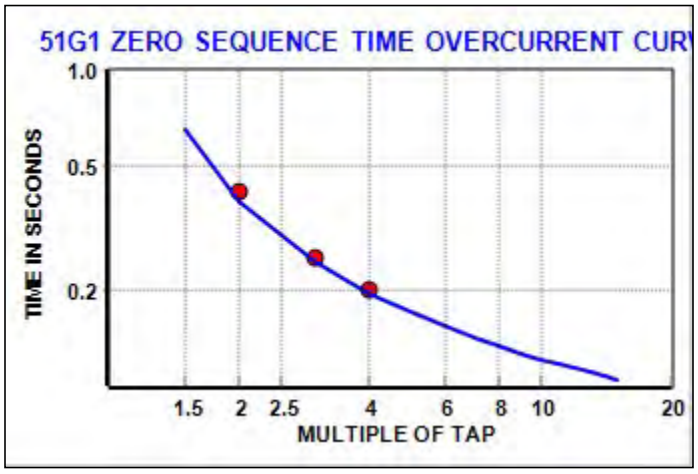


Device Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.515	0.500	3.00	PASS

Device Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE			OK?
2.00	1.000	24.51	0.408	0.340	TO	0.428	PASS
3.00	1.500	15.27	0.254	0.208	TO	0.283	PASS
4.00	2.000	12.00	0.200	0.161	TO	0.231	PASS



Routine	SEL-551.FST_LIB	**AFAL**	AL	**Test Date**	2/12/2024
Version	8.2			**Pass/Fail**	PASS

Device Data:

Customer:	City of Ann Arbor Waste Water Treatment		
Job_Number:	230858	SUBSTATION:	13.2 kV Switchgear
Relay_ID:	52F29	PHASE_ZONE:	
RELAY_MANF:	SEL	RELAY_TYPE:	SEL-551
MODEL_STYLE:		IEEE_DEVICE:	MF
IL_IB:		SERIAL_NUMBER:	
FIRMWARE:	SEL-551-R510-VF-Z002002-D20050523		
NERC_AUDITABLE:	0	MAINT_INTERVAL:	0
PREVIOUS_TESTDATE:		CURRENT_TESTDATE:	
NEXT_TESTDATE:		TESTSET_CALDATE:	
Tested_BY:			

Routine Notes:

Device Settings Used for Testing:

```
RID$=     "52F29"          TID$=     "SPACE 10-TOP"  CTR=      120
CTRN=     120              TDURD=    9.000           s50P1P=   13.0
s50P2P=   1.3              s50P3P$=  "OFF"           s50P4P$=  "OFF"
s50P5P$=  "OFF"            s50P6P$=  "OFF"           s50ABCP$= "OFF"
s51P1P=   0.6              s51P1C$=  "C3"            s51P1TD=  1.00
s51P1RS$= "N"              s51P2P$=  "OFF"           s51P2C$=  "U3"
s51P2TD=  15.00            s51P2RS$= "N"             s50N1P$=  "OFF"
s50N2P$=  "OFF"            s51N1P$=  "OFF"           s51N1C$=  "U4"
s51N1TD=  3.00             s51N1RS$= "N"             s50G1P=   5.4
s50G2P$=  "OFF"            s51G1P=   0.5             s51G1C$=  "U1"
s51G1TD=  0.50             s51G1RS$= "N"             s50Q1P$=  "OFF"
s50Q2P$=  "OFF"            s51Q1P$=  "OFF"           s51Q1C$=  "U3"
s51Q1TD=  15.00            s51Q1RS$= "N"             s51Q2P$=  "OFF"
s51Q2C$=  "U3"             s51Q2TD=  15.00           s51Q2RS$= "N"
s79OI1=   0.000            s79OI2=   600.000         s79OI3=   0.000
s79OI4=   0.000            s79RSD=   1800.000        s79RSLD=  300.000
CFD=      60.000           DMTC=     5               PDEMP=    5.00
NDEMP=    1.50             GDEMP=    1.50            QDEMP=    1.50
SV5PU=    0.000            SV5DO=    0.000           SV6PU=    0.000
SV6DO=    0.000            SV7PU=    0.000           SV7DO=    0.000
SV8PU=    0.000            SV8DO=    0.000           SV9PU=    0.000
SV9DO=    0.000            SV10PU=   0.000           SV10DO=   0.000
SV11PU=   0.000            SV11DO=   0.000           SV12PU=   0.000
SV12DO=   0.000            SV13PU=   0.000           SV13DO=   0.000
SV14PU=   0.000            SV14DO=   0.000           NFREQ=    60
PHROT$=   "ABC"            DATE_F$=  "MDY"
TR$=      "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "

ULTR$=    "!(51P1 + 51G1)"s51P1TC=  1               s51P2TC=  1
s51N1TC=  1                s51G1TC=  1               s51Q1TC=  1
s51Q2TC=  1                s52A$=    "IN1"           CL$=      "LB4"
ULCL$=    "TRIP"           s79RI$=   "TRIP"          s79RIS$=  "IN1"
s79DTL$=  "!LB1 + LB3"     s79DLS$=  "79LO"          s79SKP$=  "50P2 * SH0"
s79STL$=  "TRIP"           s79BRS$=  "(51P1 + 51G1) * (79RS + 79CY)"

s79SEQ=   0                ER1$=     "51P1 + 51G1 + 51N1"

ER2=      0                SV1=      0               SV2=      0
SV3=      0                SV4=      0               SV5=      0
SV6=      0                SV7=      0               SV8=      0
SV9=      0                SV10=     0               SV11=     0
SV12=     0                SV13=     0               SV14=     0
OUT1$=    "TRIP"           OUT2=     0               OUT3=     0
OUT4=     0                DP1$=     "IN1"           DP2$=     "LB2"
DP3=      0                DP4=      0               DP5=      0
DP6=      0                DP7=      0               DP8=      0
```

Global Defines:

```
CONTACT$="4"         'OUTPUT CONTACT TO MASK
SEL_AUTO=1           '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1           'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1             'NO ERROR MESSAGE IF NO OPERATION
```

Device Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

52F29                              Date: 02/12/24    Time: 11:01:27.110
SPACE 10-TOP

FID=SEL-551-R510-Vf-Z002002-D20050523      CID=4895

SELF TESTS

W=Warn    F=Fail

       IA        IB        IC        IN        MOF
OS      2         3         3         3         0

       +5V_PS    +5V_REG   -5V_REG   +10V_PS   -10V_PS   VBAT
PS      4.99      5.03     -5.01      9.94     -10.15     3.33

       TEMP      RAM       ROM       CR_RAM    EEPROM
        31.7     OK        OK        OK        OK

 Relay Enabled

=>>
```

Device Test Results for: RELAY SETTING VERIFICATION

```
       Verify SETTINGS are as specified

                   (O) PASS

                   ( ) FAIL


 By selecting PASS you have determined that SETTINGS
 on this device are as specified.

 If selecting FAIL, add an explanation below.

 NOTES:
```

Device Test Results for: CURRENT INJECTION METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	216.0	0.0	PASS
B-N	0.0	0.0	0.0	240.0	239.0	-0.4	PASS
C-N	0.0	0.0	0.0	264.0	264.0	0.0	PASS

Device Test Results for: RELAY INPUT VERIFICATION

Verify operation of the RELAY INPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that INPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RELAY OUTPUT VERIFICATION

Verify operation of the RELAY OUTPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that OUTPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM FUNTIONALITY

Verify functionality of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM is functional.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM PERFORMANCE

Verify PERFORMANCE of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM meets the PERFORMANCE CRITERIA pertinent to the communications technology applied.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CURRENT SIGNAL VALUE VERIFICATION

Verify CURRENT SIGNAL VALUES are
provided to the relay

(O) PASS

( ) FAIL

By selecting PASS you have determined that CURRENT
SIGNAL VALUES are provided to the protective relay.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CONTROL CIRCUITRY VERIFICATIONS

Verify CONTROL CIRCUITRY operations are proven

[ ] Verified that each trip coil is able to operate the circuit breaker, interrupting device, or mitigating device.

[x] Verified electrical operation of electromechanical lockout devices.

[x] Verified all paths of the control circuits essential for proper operation of the Remedial Action Scheme (RAS).

[ ] Verified all paths of the trip circuits inclusive of all auxiliary relays through the trip coil(s) of the circuit breakers or other interrupting devices.

(O) PASS

( ) FAIL

By selecting PASS you have determined that CONTROL
CIRCUITRY operations have been proven.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: ALARMS AND MONITORING VERIFICATION

Verify ALARM and MONITORING signals

[x] Verified that the alarm path conveys alarm signals to a location where corrective action can be initiated.

(O) PASS

( ) FAIL

By selecting PASS you have determined that ALARM and MONITORING signals have been proven.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Device Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	215.0	-0.5	PASS
B-N	0.0	0.0	0.0	240.0	241.0	0.4	PASS
C-N	0.0	0.0	0.0	264.0	262.0	-0.8	PASS

Device Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	13.000	13.000	0.00	PASS
B-N	13.000	13.000	0.00	PASS
C-N	13.000	13.000	0.00	PASS

Device Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	1.300	1.300	-0.00	PASS
B-N	1.313	1.300	1.00	PASS
C-N	1.300	1.300	-0.00	PASS

Device Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.400	5.400	0.00	PASS

Device Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		0.576	0.600	-4.00	PASS
B-N		0.612	0.600	2.00	PASS
C-N		0.600	0.600	0.00	PASS

Device Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

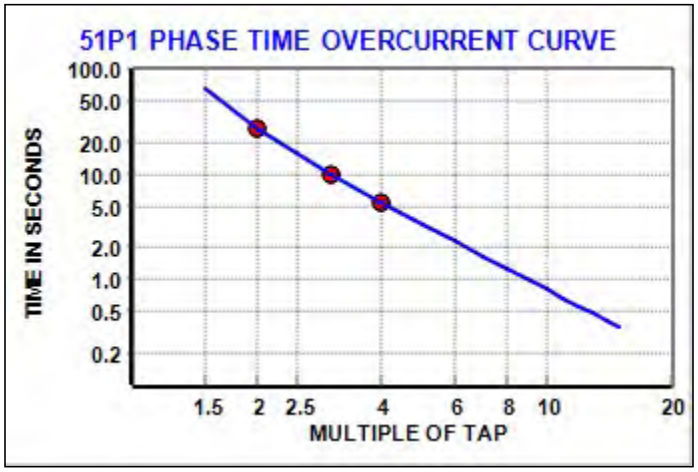
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1624.10	27.068	26.667	1.51	PASS
3.00	1.800	603.68	10.061	10.000	0.61	PASS
4.00	2.400	322.34	5.372	5.333	0.73	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1609.12	26.819	26.667	0.57	PASS
3.00	1.800	596.63	9.944	10.000	-0.56	PASS
4.00	2.400	320.15	5.336	5.333	0.05	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1648.79	27.480	26.667	3.05	PASS
3.00	1.800	603.92	10.065	10.000	0.65	PASS
4.00	2.400	323.61	5.394	5.333	1.13	PASS

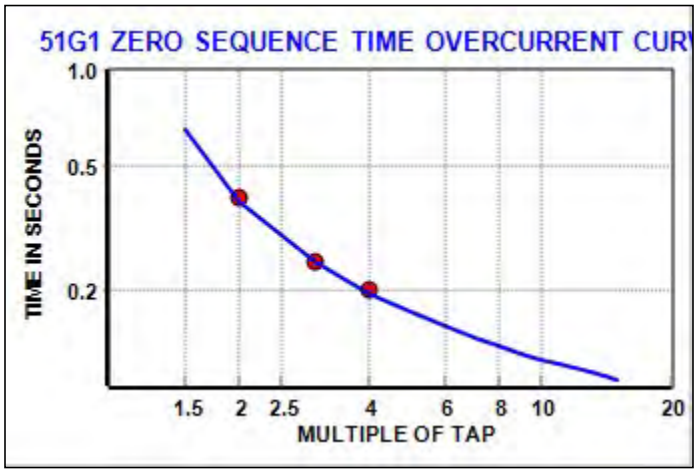


Device Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.475	0.500	-5.00	PASS

Device Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.000	23.46	0.391	0.384	1.87	PASS
3.00	1.500	14.90	0.248	0.245	1.19	PASS
4.00	2.000	12.14	0.202	0.196	3.08	PASS



Routine	SEL-351A.FST_LIB	**AFAL**	AL	**Test Date**	2/13/2024
Version	8.3			**Pass/Fail**	PASS

Device Data:

Customer:	City of Ann Arbor Waste Water Treatment		
Job_Number:	230858	SUBSTATION:	13.2 kV Switchgear
Relay_ID:	52GT1	PHASE_ZONE:	
RELAY_MANF:	SEL	RELAY_TYPE:	SEL-351A
MODEL_STYLE:		IEEE_DEVICE:	MF
IL_IB:		SERIAL_NUMBER:	
FIRMWARE:	SEL-351A-R515-V0-Z105104-D20130620		
NERC_AUDITABLE:	0	MAINT_INTERVAL:	0
PREVIOUS_TESTDATE:		CURRENT_TESTDATE:	
NEXT_TESTDATE:		TESTSET_CALDATE:	
Tested_BY:			

Routine Notes:

Device Settings Used for Testing:

RID$=	"GT 1 MAIN"	TID$=	"TEST SETTING"	CTR=	120
CTRN=	120	PTR=	110.00	PTRS=	110.00
VNOM=	69.29	Z1MAG=	2.14	Z1ANG=	68.86
Z0MAG=	6.38	Z0ANG=	72.47	LL=	4.84
E50P=	1	E50N$=	"N"	E50G=	1
E50Q$=	"N"	E51P=	1	E51N$=	"N"
E51G=	1	E51Q$=	"N"	EHBL2$=	"N"
E32$=	"N"	ELOAD$=	"N"	ESOTF$=	"N"
EVOLT$=	"Y"	E25$=	"Y"	EFLOC$=	"Y"
ELOP$=	"N"	E81$=	"N"	E81R$=	"N"
E79$=	"N"	ESV=	10	EDEM$=	"THM"
s50P1P=	28.66	s67P1D=	0.00	s50PP1P$=	"OFF"
s50G1P=	8.620	s67G1D=	6.00	s51PP=	1.90
s51PC$=	"C3"	s51PTD=	0.37	s51PRS$=	"N"
s51GP=	0.60	s51GC$=	"U1"	s51GTD=	1.09
s51GRS$=	"N"	s27P1P=	62.00	s27P2P$=	"OFF"
s59P1P=	76.00	s59P2P$=	"OFF"	s59N1P$=	"OFF"
s59N2P$=	"OFF"	s59QP$=	"OFF"	s59V1P$=	"OFF"
s27SP=	10.00	s59S1P=	55.00	s59S2P$=	"OFF"
s27PP$=	"OFF"	s59PP$=	"OFF"	s25VLO=	62.00
s25VHI=	76.00	s25RCF=	1.00	s25SF=	0.050
s25ANG1=	15	s25ANG2=	15	SYNCP$=	"VA"
TCLOSD=	3.00	DMTC=	5	PDEMP=	5.00
NDEMP=	1.500	GDEMP=	1.50	QDEMP=	1.50
TDURD=	9.00	CFD=	60.00	s3POD=	1.50
s50LP=	0.25	SV1PU=	0.00	SV1DO=	0.00
SV2PU=	0.00	SV2DO=	0.00	SV3PU=	0.00
SV3DO=	0.00	SV4PU=	0.00	SV4DO=	0.00
SV5PU=	0.00	SV5DO=	0.00	SV6PU=	0.00
SV6DO=	0.00	SV7PU=	0.00	SV7DO=	0.00
SV8PU=	0.00	SV8DO=	0.00	SV9PU=	0.00
SV9DO=	0.00	SV10PU=	0.00	SV10DO=	0.00
TR$=	"50P1 + 51PT + 51GT + 50G1 + 67G1T"				

Device Settings (Continued):

```
TRQUAL=     0             TRSOTF=     0             DTT=        0
ULTR$=      "!(51P + 51G)"s52A$=      "IN101"       CL$=        "CC + LB4"
ULCL$=      "TRIP"        s79RI$=     "TRIP"        s79RIS$=    "52A + 79CY"
s79DTL$=    "OC + !IN102 + LB3"

s79DLS$=    "79LO"        s79SKP=     0             s79STL$=    "TRIP"
s79BRS=     0             s79SEQ=     0             s79CLS=     1
SET1=       0             RST1=       0             SET2=       0
RST2=       0             SET3=       0             RST3=       0
SET4=       0             RST4=       0             SET5=       0
RST5=       0             SET6=       0             RST6=       0
SET7=       0             RST7=       0             SET8=       0
RST8=       0             SET9=       0             RST9=       0
SET10=      0             RST10=      0             SET11=      0
RST11=      0             SET12=      0             RST12=      0
SET13=      0             RST13=      0             SET14=      0
RST14=      0             SET15=      0             RST15=      0
SET16=      0             RST16=      0             s67P1TC=    1
s67P2TC=    1             s67P3TC=    1             s67P4TC=    1
s67N1TC=    1             s67N2TC=    1             s67N3TC=    1
s67N4TC=    1             s67G1TC=    1             s67G2TC=    1
s67G3TC=    1             s67G4TC=    1             s67Q1TC=    1
s67Q2TC=    1             s67Q3TC=    1             s67Q4TC=    1
s51ATC=     1             s51BTC=     1             s51CTC=     1
s51PTC=     1             s51NTC=     1             s51GTC=     1
s51G2TC=    1             s51QTC=     1             HBL2TC=     1
s81RTC$=    "!27B81"      LV1=        0             LV2=        0
LV3=        0             LV4=        0             LV5=        0
LV6=        0             LV7=        0             LV8=        0
LV9=        0             LV10=       0             LV11=       0
LV12=       0             LV13=       0             LV14=       0
LV15=       0             LV16=       0             LV17=       0
LV18=       0             LV19=       0             LV20=       0
LV21=       0             LV22=       0             LV23=       0
LV24=       0             LV25=       0             LV26=       0
LV27=       0             LV28=       0             LV29=       0
LV30=       0             LV31=       0             LV32=       0
SV1=        0             SV2$=       "27A1 + 27B1 + 27C1 + 59A1 + 59B1 + 59C1"

SV3$=       "27A1 * 27B1 * 27C1"

SV4$=       "25A1 + (27S * !SV2)"

SV5$=       "25A1 + (27S * !SV2) + (59S1 * SV3) + (27S * SV3) "

SV6=        0             SV7=        0             SV8=        0
SV9=        0             SV10=       0             SV11=       0
SV12=       0             SV13=       0             SV14=       0
SV15=       0             SV16=       0             OUT101$=    "SV4T"
OUT102$=    "TRIP"        OUT103=     0             OUT104=     0
OUT105$=    "SV4T"        OUT106=     0             OUT107=     0
ALRMOUT$=   "!(SALARM + HALARM)"

DP1$=       "IN101"       DP2=        0             DP3=        0
DP4=        0             DP5=        0             DP6=        0
```

Device Settings (Continued):

```
DP7=        0             DP8=        0             DP9=        0
DP10=       0             DP11=       0             DP12=       0
DP13=       0             DP14=       0             DP15=       0
DP16=       0             SS1=        1             SS2=        0
SS3=        0             SS4=        0             SS5=        0
SS6=        0             ER$=        "51P + 51G + 51N + 50P1 + 50G1 + 50N1"

FAULT$=     "51P + 51G"   BSYNCH$=    "52A"         CLMON=      0
BKMON$=     "TRIP"        BKCLS$=     "CLOSE"       E32IV=      1
LOPBLK=     0
SALARM$=    "BADPASS + CHGPASS + SETCHG + GRPSW + ACCESSP + PASNVAL "

RSTTRGT=    0             RST_DEM=    0             RST_PDM=    0
RST_BK=     0             RST_HIS=    0             RST_ENE=    0
RST_MML=    0             RST_HAL=    0             RSTDNPE=    0
PMTRIG=     0             TREA1=      0             TREA2=      0
TREA3=      0             TREA4=      0             PTCONN$=    "WYE"
VSCONN$=    "VS"          TGR=        0.00          NFREQ=      60
PHROT$=     "ABC"         DATE_F$=    "MDY"         FP_TO=      15
SCROLD=     2             FPNGD$=     "IG"          METHRES$=   "Y"
LER=        15            PRE=        4             FLTDISP$=   "MAX"
DCLOP$=     "OFF"         DCHIP$=     "OFF"         IN101D=     0.50
IN102D=     0.50          IN103D=     0.50          IN104D=     0.50
IN105D=     0.50          IN106D=     0.50          EBMON$=     "Y"
COSP1=      10000         COSP2=      150           COSP3=      12
KASP1=      1.20          KASP2=      8.00          KASP3=      20.00
ESTRT=      50            ESCLT=      120           MSTRT=      50
MSCLT=      120           EPMU$=      "N"           EVELOCK=    0
DNPSRC$=    "UTC"         BOOPTCC$=   "SET"         BOOPPUL$=   "SET"
IRIGC$=     "NONE"        UTC_OFF=    0.00          DST_BEGM$=  "NA"
P2_EPORT$=  "Y"           P2_PROTO$=  "SEL"         P2_MAXACC=  2
P2_SPEED=   2400          P2_BITS=    8             P2_PARITY$= "N"
P2_STOP=    1             P2_RTSCTS$= "N"           P2_T_OUT=   15
P2_AUTO$=   "N"           P2_FASTOP$= "N"           P3_EPORT$=  "Y"
P3_PROTO$=  "SEL"         P3_MAXACC=  2             P3_SPEED=   2400
P3_BITS=    8             P3_PARITY$= "N"           P3_STOP=    1
P3_RTSCTS$= "N"           P3_T_OUT=   0             P3_AUTO$=   "N"
P3_FASTOP$= "N"           PF_EPORT$=  "Y"           PF_PROTO$=  "SEL"
PF_MAXACC$= "C"           PF_SPEED=   19200         PF_BITS=    8
PF_PARITY$= "N"           PF_STOP=    1             PF_RTSCTS$= "N"
PF_T_OUT=   15            PF_AUTO$=   "N"           PF_FASTOP$= "N"
```

Global Defines:

```
SET_GROUP$="1"      'SET GROUP TO TEST
CONTACT$="107"      'OUTPUT CONTACT TO MASK
SEL_AUTO=1          '0=MANUAL, 1=AUTO MASK, 2=MANUAL W/MESSAGES
SKIP_TST=1          'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1            'NO ERROR MESSAGE IF NO OPERATION
DIR_TEST_VOLTS=30   'TEST VOLTAGE FOR DIRECTIONAL ELEMENTS
NORM_VOLTS=67       'NORM VOLTAGE
NORM_FREQ=60        'NORMAL VOLTAGE FREQUENCY
ZONE_TEST_AMPS=2  'TEST CURRENT FOR LOAD ENCHROACHMENT TESTS
```

Device Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

GT 1 MAIN                          Date: 02/13/24    Time: 07:13:22.213
TEST SETTING

FID=SEL-351A-R515-V0-Z105104-D20130620       CID=F6EC

SELF TESTS

W=Warn    F=Fail

      IA      IB      IC      IN      VA      VB      VC      VS      MOF
OS   -0      -0      -0      -0      -1      -0      -1      -1      -0
OSH  -0      -0      -0       0

      15V_PS  5V_REG  3.3V_REG
PS    14.88   5.03    3.31

      RAM     ROM     FPGA    EEPROM  FLASH   A/D     USB_BRD COM_BRD
      OK      OK      OK      OK      OK      OK      NA      NA

      TEMP    RTC     HMI
      30.8    OK      OK


 Relay Enabled

=>>
```

Device Test Results for: RELAY SETTING VERIFICATION

```
       Verify SETTINGS are as specified

                   (O) PASS

                   ( ) FAIL


 By selecting PASS you have determined that SETTINGS
 on this device are as specified.

 If selecting FAIL, add an explanation below.

 NOTES:
```

Device Test Results for: CURRENT\VOLTAGE INJECTION METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
67.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	7.2	7.2	0.0	216.0	215.8	-0.1	PASS
B-N	7.4	7.4	0.1	240.0	239.8	-0.1	PASS
C-N	7.6	7.6	-0.0	264.0	263.7	-0.1	PASS

CALCULATED MEGA WATT	MEASURED MEGA WATT	% ERROR	CALCULATED MEGA VAR	MEASURED MEGA VAR	% ERROR	OK?
4.6	4.6	-0.1	2.7	2.7	-0.0	PASS

Device Test Results for: RELAY INPUT VERIFICATION

Verify operation of the RELAY INPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that INPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RELAY OUTPUT VERIFICATION

Verify operation of the RELAY OUTPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that OUTPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM FUNTIONALITY

Verify functionality of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM is functional.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM PERFORMANCE

Verify PERFORMANCE of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM meets the PERFORMANCE CRITERIA pertinent to the communications technology applied.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CURRENT SIGNAL VALUE VERIFICATION

Verify CURRENT SIGNAL VALUES are provided to the relay

(O) PASS

( ) FAIL

By selecting PASS you have determined that CURRENT SIGNAL VALUES are provided to the protective relay.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: VOLTAGE SIGNAL VALUE VERIFICATION

Verify VOLTAGE SIGNAL VALUES are
provided to the relay

(O) PASS

( ) FAIL

By selecting PASS you have determined that VOLTAGE SIGNAL VALUES are provided to the protective relay.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CONTROL CIRCUITRY VERIFICATIONS

Verify CONTROL CIRCUITRY operations are proven

[x] Verified that each trip coil is able to operate the circuit breaker, interrupting device, or mitigating device.

[x] Verified electrical operation of electromechanical lockout devices.

[x] Verified all paths of the control circuits essential for proper operation of the Remedial Action Scheme (RAS).

[x] Verified all paths of the trip circuits inclusive of all auxiliary relays through the trip coil(s) of the circuit breakers or other interrupting devices.

(O) PASS

( ) FAIL

By selecting PASS you have determined that CONTROL CIRCUITRY operations have been proven.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: ALARMS AND MONITORING VERIFICATION

Verify ALARM and MONITORING signals

[x] Verified that the alarm path conveys alarm signals to a location where corrective action can be initiated.

(O) PASS

( ) FAIL

By selecting PASS you have determined that ALARM and MONITORING signals have been proven.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Device Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
67.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	7.2	7.2	0.0	216.0	215.8	-0.1	PASS
B-N	7.4	7.4	0.1	240.0	239.7	-0.1	PASS
C-N	7.6	7.6	0.0	264.0	263.7	-0.1	PASS

CALCULATED MEGA WATT	MEASURED MEGA WATT	% ERROR	CALCULATED MEGA VAR	MEASURED MEGA VAR	% ERROR	OK?
4.6	4.6	-0.1	2.7	2.7	-0.0	PASS

Device Test Results for: 27P1P PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.000	62.000	0.00	PASS

Device Test Results for: 27P1P THREE PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
61.380	62.000	-1.00	PASS

Device Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	28.947	28.660	1.00	PASS
B-N	28.660	28.660	0.00	PASS
C-N	28.660	28.660	0.00	PASS

Device Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
8.620	8.620	0.00	PASS

Device Test Results for: 67G1D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(SEC)	TIME(CY)	RANGE	OK?
1.20	10.344	0.120	7.19	4.20 TO 7.80	PASS

Device Test Results for: 51PP PHASE TO PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	1.919	1.900	1.00	PASS
B-N	1.919	1.900	1.00	PASS
C-N	1.919	1.900	1.00	PASS

Device Test Results for: 51P PHASE TIME OVERCURRENT CURVE

51P PHASE TIME OVERCURRENT CURVE (PHASE A-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	3.800	594.29	9.905	9.867	0.39	PASS
3.00	5.700	223.30	3.722	3.700	0.59	PASS
4.00	7.600	119.14	1.986	1.973	0.62	PASS

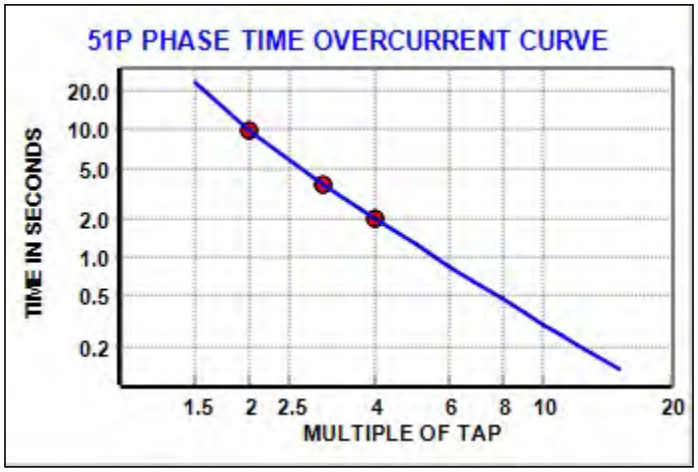
51P PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	3.800	594.36	9.906	9.867	0.40	PASS
3.00	5.700	223.24	3.721	3.700	0.56	PASS
4.00	7.600	119.30	1.988	1.973	0.76	PASS

51P PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	3.800	594.46	9.908	9.867	0.42	PASS
3.00	5.700	223.04	3.717	3.700	0.47	PASS
4.00	7.600	119.51	1.992	1.973	0.94	PASS

Graph for Test: 51P PHASE TIME OVERCURRENT CURVE

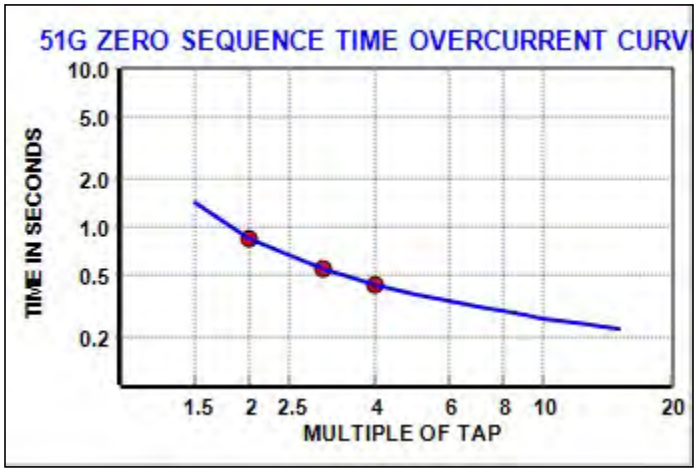


Device Test Results for: 51GP ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.600	0.600	0.00	PASS

Device Test Results for: 51G ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	50.71	0.845	0.837	1.02	PASS
3.00	1.800	32.27	0.538	0.535	0.54	PASS
4.00	2.400	25.88	0.431	0.428	0.81	PASS



Device Test Results for: 59P1P PHASE OVERVOLTAGE PICKUP

PICKUP	VOLTS	IDEAL	%ERROR	OK?
	76.000	76.000	0.00	PASS

Device Test Results for: 59P1P THREE PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.000	76.000	0.00	PASS

Device Test Results for: 25VLO SOURCE VP SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.000	62.000	-0.00	PASS

Device Test Results for: 25VHI SOURCE VP SYNCHRONIZING PHASE HIGH VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
75.240	76.000	-1.00	PASS

Device Test Results for: 27SP SYNCHRONIZING PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
10.200	10.000	2.00	PASS

Device Test Results for: 59S1P SYNCHRONIZING PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
56.100	55.000	2.00	PASS

Device Test Results for: 25VLO SOURCE VS SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.620	62.000	1.00	PASS

Device Test Results for: 25VHI SOURCE VS SYNCHRONIZING PHASE HIGH VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.760	76.000	1.00	PASS

Device Test Results for: 25ANG1 SYNCHRONIZING ANGLE 1

LAGGING ANGLE	IDEAL	RANGE	OK?
14.00	15.00	11.00 TO 19.00	PASS

LEADING ANGLE	IDEAL	RANGE	OK?
344.00	345.00	341.00 TO 349.00	PASS

Device Test Results for: 25ANG2 SYNCHRONIZING ANGLE 2

LAGGING ANGLE	IDEAL	RANGE	OK?
15.00	15.00	11.00 TO 19.00	PASS

LEADING ANGLE	IDEAL	RANGE	OK?
343.00	345.00	341.00 TO 349.00	PASS

Device Test Results for: 25SF SYNCHRONIZING SLIP FREQUENCY

DROPOUT HZ	IDEAL	RANGE	OK?
59.950	59.950	59.900 TO 60.000	PASS

Routine	SEL-351A.FST_LIB	**AFAL**	AL	**Test Date**	2/12/2024
Version	8.3			**Pass/Fail**	PASS

Device Data:

Customer:	City of Ann Arbor Waste Water Treatment		
Job_Number:	230858	SUBSTATION:	13.2 kV Switchgear
Relay_ID:	52GT2	PHASE_ZONE:	
RELAY_MANF:	SEL	RELAY_TYPE:	SEL-351A
MODEL_STYLE:		IEEE_DEVICE:	MF
IL_IB:		SERIAL_NUMBER:	
FIRMWARE:	SEL-351A-R515-V0-Z105104-D20130620		
NERC_AUDITABLE:	0	MAINT_INTERVAL:	0
PREVIOUS_TESTDATE:		CURRENT_TESTDATE:	
NEXT_TESTDATE:		TESTSET_CALDATE:	
Tested_BY:			

Routine Notes:

Device Settings Used for Testing:

RID$=	"GENERATOR MAIN"				
TID$=	"TEST SETTING"	CTR=	120	CTRN=	120
PTR=	110.00	PTRS=	110.00	VNOM=	69.29
Z1MAG=	2.14	Z1ANG=	68.86	Z0MAG=	6.38
Z0ANG=	72.47	LL=	4.84	E50P=	1
E50N$=	"N"	E50G=	1	E50Q$=	"N"
E51P=	2	E51N$=	"N"	E51G=	1
E51Q$=	"N"	EHBL2$=	"N"	E32$=	"N"
ELOAD$=	"N"	ESOTF$=	"N"	EVOLT$=	"Y"
E25$=	"Y"	EFLOC$=	"Y"	ELOP$=	"N"
E81$=	"N"	E81R$=	"N"	E79$=	"N"
ESV=	10	EDEM$=	"THM"	s50P1P=	28.66
s67P1D=	0.00	s50PP1P$=	"OFF"	s50G1P=	8.620
s67G1D=	6.00	s51PP=	1.90	s51PC$=	"C3"
s51PTD=	0.37	s51PRS$=	"N"	s51AP$=	"OFF"
s51AC$=	"U3"	s51ATD=	3.00	s51ARS$=	"N"
s51BP$=	"OFF"	s51BC$=	"U3"	s51BTD=	3.00
s51BRS$=	"N"	s51CP$=	"OFF"	s51CC$=	"U3"
s51CTD=	3.00	s51CRS$=	"N"	s51GP=	0.60
s51GC$=	"U1"	s51GTD=	1.09	s51GRS$=	"N"
s27P1P=	62.00	s27P2P$=	"OFF"	s59P1P=	76.00
s59P2P$=	"OFF"	s59N1P$=	"OFF"	s59N2P$=	"OFF"
s59QP$=	"OFF"	s59V1P$=	"OFF"	s27SP=	10.00
s59S1P=	55.00	s59S2P$=	"OFF"	s27PP$=	"OFF"
s59PP$=	"OFF"	s25VLO=	62.00	s25VHI=	76.00
s25RCF=	1.00	s25SF=	0.050	s25ANG1=	15
s25ANG2=	15	SYNCP$=	"VA"	TCLOSD=	3.00
DMTC=	5	PDEMP=	5.00	NDEMP=	1.500
GDEMP=	1.50	QDEMP=	1.50	TDURD=	9.00
CFD=	60.00	s3POD=	1.50	s50LP=	0.25
SV1PU=	0.00	SV1DO=	0.00	SV2PU=	0.00
SV2DO=	0.00	SV3PU=	0.00	SV3DO=	0.00
SV4PU=	0.00	SV4DO=	0.00	SV5PU=	0.00

Device Settings (Continued):

```
SV5DO=      0.00          SV6PU=      0.00          SV6DO=      0.00
SV7PU=      0.00          SV7DO=      0.00          SV8PU=      0.00
SV8DO=      0.00          SV9PU=      0.00          SV9DO=      0.00
SV10PU=     0.00          SV10DO=     0.00          TR$=        "50P1 + 51PT + 51GT + 50G1
+ 67G1T"
TRQUAL=     0             TRSOTF=     0             DTT=        0
ULTR$=      "!(51P + 51G)"s52A$=      "IN101"       CL$=        "CC + LB4"
ULCL$=      "TRIP"        s79RI$=     "TRIP"        s79RIS$=    "52A + 79CY"
s79DTL$=    "OC + !IN102 + LB3"

s79DLS$=    "79LO"        s79SKP=     0             s79STL$=    "TRIP"
s79BRS=     0             s79SEQ=     0             s79CLS=     1
SET1=       0             RST1=       0             SET2=       0
RST2=       0             SET3=       0             RST3=       0
SET4=       0             RST4=       0             SET5=       0
RST5=       0             SET6=       0             RST6=       0
SET7=       0             RST7=       0             SET8=       0
RST8=       0             SET9=       0             RST9=       0
SET10=      0             RST10=      0             SET11=      0
RST11=      0             SET12=      0             RST12=      0
SET13=      0             RST13=      0             SET14=      0
RST14=      0             SET15=      0             RST15=      0
SET16=      0             RST16=      0             s67P1TC=    1
s67P2TC=    1             s67P3TC=    1             s67P4TC=    1
s67N1TC=    1             s67N2TC=    1             s67N3TC=    1
s67N4TC=    1             s67G1TC=    1             s67G2TC=    1
s67G3TC=    1             s67G4TC=    1             s67Q1TC=    1
s67Q2TC=    1             s67Q3TC=    1             s67Q4TC=    1
s51ATC=     1             s51BTC=     1             s51CTC=     1
s51PTC=     1             s51NTC=     1             s51GTC=     1
s51G2TC=    1             s51QTC=     1             HBL2TC=     1
s81RTC$=    "!27B81"      LV1=        0             LV2=        0
LV3=        0             LV4=        0             LV5=        0
LV6=        0             LV7=        0             LV8=        0
LV9=        0             LV10=       0             LV11=       0
LV12=       0             LV13=       0             LV14=       0
LV15=       0             LV16=       0             LV17=       0
LV18=       0             LV19=       0             LV20=       0
LV21=       0             LV22=       0             LV23=       0
LV24=       0             LV25=       0             LV26=       0
LV27=       0             LV28=       0             LV29=       0
LV30=       0             LV31=       0             LV32=       0
SV1=        0             SV2$=       "27A1 + 27B1 + 27C1 + 59A1 + 59B1 + 59C1"

SV3$=       "27A1 * 27B1 * 27C1"

SV4$=       "25A1 + (27S * !SV2)"

SV5$=       "25A1 + (27S * !SV2) + (59S1 * SV3) + (27S * SV3) "

SV6=        0             SV7=        0             SV8=        0
SV9=        0             SV10=       0             SV11=       0
SV12=       0             SV13=       0             SV14=       0
SV15=       0             SV16=       0             OUT101$=    "TRIP"
OUT102$=    "SV4T"        OUT103=     0             OUT104$=    "SV4T"
```

Device Settings (Continued):

```
OUT105=     0             OUT106=     0             OUT107=     0
ALRMOUT$=   "!(SALARM + HALARM)"

DP1$=       "IN101"       DP2=        0             DP3=        0
DP4=        0             DP5=        0             DP6=        0
DP7=        0             DP8=        0             DP9=        0
DP10=       0             DP11=       0             DP12=       0
DP13=       0             DP14=       0             DP15=       0
DP16=       0             SS1=        1             SS2=        0
SS3=        0             SS4=        0             SS5=        0
SS6=        0             ER$=        "51P + 51G + 51N + 50P1 + 50G1 + 50N1"

FAULT$=     "51P + 51G"   BSYNCH$=    "52A"         CLMON=      0
BKMON$=     "TRIP"        BKCLS$=     "CLOSE"       E32IV=      1
LOPBLK=     0
SALARM$=    "BADPASS + CHGPASS + SETCHG + GRPSW + ACCESSP + PASNVAL "

RSTTRGT=    0             RST_DEM=    0             RST_PDM=    0
RST_BK=     0             RST_HIS=    0             RST_ENE=    0
RST_MML=    0             RST_HAL=    0             RSTDNPE=    0
PMTRIG=     0             TREA1=      0             TREA2=      0
TREA3=      0             TREA4=      0             PTCONN$=    "WYE"
VSCONN$=    "VS"          TGR=        0.00          NFREQ=      60
PHROT$=     "ABC"         DATE_F$=    "MDY"         FP_TO=      15
SCROLD=     2             FPNGD$=     "IG"          METHRES$=   "Y"
LER=        15            PRE=        4             FLTDISP$=   "MAX"
DCLOP$=     "OFF"         DCHIP$=     "OFF"         IN101D=     0.50
IN102D=     0.50          IN103D=     0.50          IN104D=     0.50
IN105D=     0.50          IN106D=     0.50          EBMON$=     "Y"
COSP1=      10000         COSP2=      150           COSP3=      12
KASP1=      1.20          KASP2=      8.00          KASP3=      20.00
ESTRT=      50            ESCLT=      120           MSTRT=      50
MSCLT=      120           EPMU$=      "N"           EVELOCK=    0
DNPSRC$=    "UTC"         BOOPTCC$=   "SET"         BOOPPUL$=   "SET"
IRIGC$=     "NONE"        UTC_OFF=    0.00          DST_BEGM$=  "NA"
P2_EPORT$=  "Y"           P2_PROTO$=  "SEL"         P2_MAXACC=  2
P2_SPEED=   2400          P2_BITS=    8             P2_PARITY$= "N"
P2_STOP=    1             P2_RTSCTS$= "N"           P2_T_OUT=   15
P2_AUTO$=   "N"           P2_FASTOP$= "N"           P3_EPORT$=  "Y"
P3_PROTO$=  "SEL"         P3_MAXACC=  2             P3_SPEED=   2400
P3_BITS=    8             P3_PARITY$= "N"           P3_STOP=    1
P3_RTSCTS$= "N"           P3_T_OUT=   0             P3_AUTO$=   "N"
P3_FASTOP$= "N"           PF_EPORT$=  "Y"           PF_PROTO$=  "SEL"
PF_MAXACC$= "C"           PF_SPEED=   19200         PF_BITS=    8
PF_PARITY$= "N"           PF_STOP=    1             PF_RTSCTS$= "N"
PF_T_OUT=   15            PF_AUTO$=   "N"           PF_FASTOP$= "N"
```

Global Defines:

```
SET_GROUP$="1"      'SET GROUP TO TEST
CONTACT$="107"      'OUTPUT CONTACT TO MASK
SEL_AUTO=1          '0=MANUAL, 1=AUTO MASK, 2=MANUAL W/MESSAGES
SKIP_TST=1          'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1            'NO ERROR MESSAGE IF NO OPERATION
DIR_TEST_VOLTS=30   'TEST VOLTAGE FOR DIRECTIONAL ELEMENTS
NORM_VOLTS=67       'NORM VOLTAGE
NORM_FREQ=60        'NORMAL VOLTAGE FREQUENCY
ZONE_TEST_AMPS=2  'TEST CURRENT FOR LOAD ENCHROACHMENT TESTS
```

Device Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

GENERATOR MAIN                    Date: 02/12/24    Time: 09:11:39.474
TEST SETTING

FID=SEL-351A-R515-V0-Z105104-D20130620       CID=F6EC

SELF TESTS

W=Warn    F=Fail

      IA      IB      IC      IN      VA      VB      VC      VS      MOF
OS   -1      -1      -1      -1      -1      -1      -1      -1      -1
OSH  -0      -0      -0      -1

      15V_PS  5V_REG  3.3V_REG
PS    14.88   4.97    3.24

      RAM     ROM     FPGA    EEPROM  FLASH   A/D     USB_BRD COM_BRD
      OK      OK      OK      OK      OK      OK      NA      NA

      TEMP    RTC     HMI
      33.9    OK      OK


 Relay Enabled

=>>
```

Device Test Results for: RELAY SETTING VERIFICATION

Verify SETTINGS are as specified

(O) PASS

( ) FAIL

By selecting PASS you have determined that SETTINGS on this device are as specified.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CURRENT\VOLTAGE INJECTION METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
67.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	7.2	7.2	0.1	216.0	215.8	-0.1	PASS
B-N	7.4	7.4	0.1	240.0	239.8	-0.1	PASS
C-N	7.6	7.6	0.0	264.0	263.6	-0.1	PASS

CALCULATED MEGA WATT	MEASURED MEGA WATT	% ERROR	CALCULATED MEGA VAR	MEASURED MEGA VAR	% ERROR	OK?
4.6	4.6	-0.1	2.7	2.7	0.1	PASS

Device Test Results for: RELAY INPUT VERIFICATION

Verify operation of the RELAY INPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that INPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RELAY OUTPUT VERIFICATION

Verify operation of the RELAY OUTPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that OUTPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM FUNTIONALITY

Verify functionality of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM is functional.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM PERFORMANCE

Verify PERFORMANCE of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM meets the PERFORMANCE CRITERIA pertinent to the communications technology applied.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CURRENT SIGNAL VALUE VERIFICATION

Verify CURRENT SIGNAL VALUES are
provided to the relay

(O) PASS

( ) FAIL

By selecting PASS you have determined that CURRENT SIGNAL VALUES are provided to the protective relay.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: VOLTAGE SIGNAL VALUE VERIFICATION

Verify VOLTAGE SIGNAL VALUES are
provided to the relay

(O) PASS

( ) FAIL

By selecting PASS you have determined that VOLTAGE SIGNAL VALUES are provided to the protective relay.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CONTROL CIRCUITRY VERIFICATIONS

Verify CONTROL CIRCUITRY operations are proven

[x] Verified that each trip coil is able to operate the circuit breaker, interrupting device, or mitigating device.

[x] Verified electrical operation of electromechanical lockout devices.

[x] Verified all paths of the control circuits essential

(Continued) Device Test Results for: CONTROL CIRCUITRY VERIFICATIONS

for proper operation of the Remedial Action Scheme (RAS).

[x] Verified all paths of the trip circuits inclusive of all auxiliary relays through the trip coil(s) of the circuit breakers or other interrupting devices.

(O) PASS

( ) FAIL

By selecting PASS you have determined that CONTROL CIRCUITRY operations have been proven.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: ALARMS AND MONITORING VERIFICATION

Verify ALARM and MONITORING signals

[x] Verified that the alarm path conveys alarm signals to a location where corrective action can be initiated.

(O) PASS

( ) FAIL

By selecting PASS you have determined that ALARM and MONITORING signals have been proven.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Device Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
67.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	7.2	7.2	0.1	216.0	215.8	-0.1	PASS
B-N	7.4	7.4	0.1	240.0	239.8	-0.1	PASS
C-N	7.6	7.6	0.0	264.0	263.6	-0.1	PASS

CALCULATED MEGA WATT	MEASURED MEGA WATT	% ERROR	CALCULATED MEGA VAR	MEASURED MEGA VAR	% ERROR	OK?
4.6	4.6	-0.1	2.7	2.7	0.1	PASS

Device Test Results for: 27P1P PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
61.380	62.000	-1.00	PASS

Device Test Results for: 27P1P THREE PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
61.380	62.000	-1.00	PASS

Device Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	28.947	28.660	1.00	PASS
B-N	28.947	28.660	1.00	PASS
C-N	28.660	28.660	0.00	PASS

Device Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
8.620	8.620	0.00	PASS

Device Test Results for: 67G1D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(SEC)	TIME(CY)	RANGE	OK?
1.20	10.344	0.127	7.61	4.20 TO 7.80	PASS

Device Test Results for: 51PP PHASE TO PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	1.919	1.900	1.00	PASS
B-N	1.919	1.900	1.00	PASS
C-N	1.919	1.900	1.00	PASS

Device Test Results for: 51P PHASE TIME OVERCURRENT CURVE

51P PHASE TIME OVERCURRENT CURVE (PHASE A-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	3.800	594.28	9.905	9.867	0.38	PASS
3.00	5.700	223.30	3.722	3.700	0.59	PASS

(Continued) Device Test Results for: 51P PHASE TIME OVERCURRENT CURVE

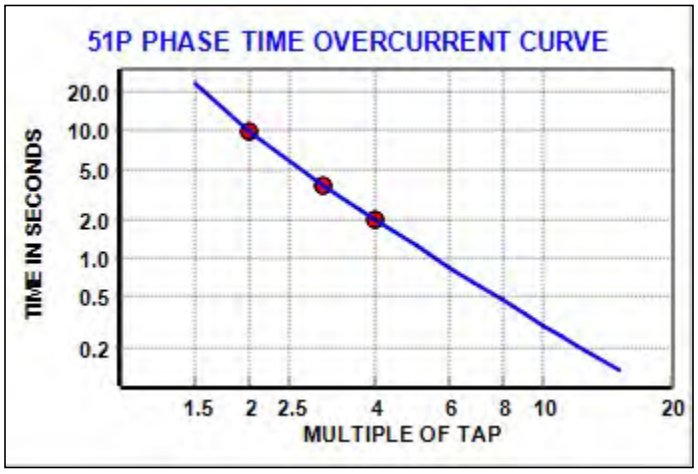
4.00	7.600	119.51	1.992	1.973	0.94	PASS

51P PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	3.800	594.26	9.904	9.867	0.38	PASS
3.00	5.700	223.07	3.718	3.700	0.48	PASS
4.00	7.600	119.33	1.989	1.973	0.79	PASS

51P PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	3.800	594.43	9.907	9.867	0.41	PASS
3.00	5.700	223.36	3.723	3.700	0.61	PASS
4.00	7.600	119.63	1.994	1.973	1.04	PASS



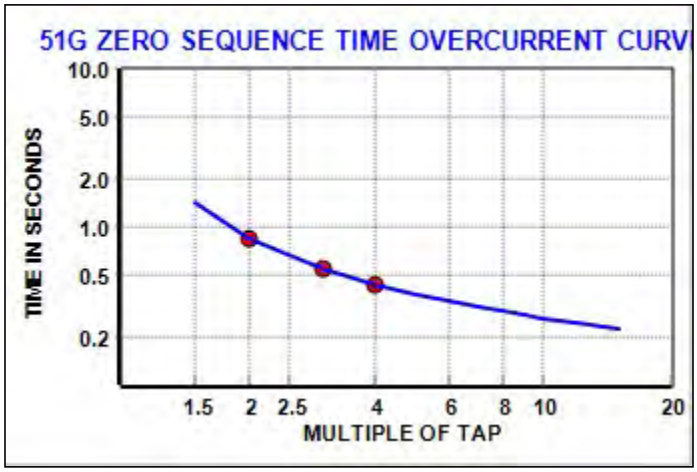
Device Test Results for: 51GP ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
0.606	0.600	1.00	PASS

Device Test Results for: 51G ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	50.24	0.837	0.837	0.08	PASS
3.00	1.800	32.25	0.538	0.535	0.48	PASS
4.00	2.400	25.76	0.429	0.428	0.36	PASS

Graph for Test: 51G ZERO SEQUENCE TIME OVERCURRENT CURVE



Device Test Results for: 59P1P PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.000	76.000	0.00	PASS

Device Test Results for: 59P1P THREE PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.000	76.000	0.00	PASS

Device Test Results for: 25VLO SOURCE VP SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.000	62.000	-0.00	PASS

Device Test Results for: 25VHI SOURCE VP SYNCHRONIZING PHASE HIGH VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
75.240	76.000	-1.00	PASS

Device Test Results for: 27SP SYNCHRONIZING PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
10.200	10.000	2.00	PASS

Device Test Results for: 59S1P SYNCHRONIZING PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
55.550	55.000	1.00	PASS

Device Test Results for: 25VLO SOURCE VS SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.620	62.000	1.00	PASS

Device Test Results for: 25VHI SOURCE VS SYNCHRONIZING PHASE HIGH VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.000	76.000	-0.00	PASS

Device Test Results for: 25ANG1 SYNCHRONIZING ANGLE 1

LAGGING ANGLE	IDEAL	RANGE	OK?
13.00	15.00	11.00 TO 19.00	PASS

LEADING ANGLE	IDEAL	RANGE	OK?
342.00	345.00	341.00 TO 349.00	PASS

Device Test Results for: 25ANG2 SYNCHRONIZING ANGLE 2

LAGGING ANGLE	IDEAL	RANGE	OK?
18.00	15.00	11.00 TO 19.00	PASS

LEADING ANGLE	IDEAL	RANGE	OK?
341.00	345.00	341.00 TO 349.00	PASS

Device Test Results for: 25SF SYNCHRONIZING SLIP FREQUENCY

DROPOUT HZ	IDEAL	RANGE	OK?
59.980	59.950	59.900 TO 60.000	PASS

Routine	SEL-351A.FST_LIB	**AFAL**	AL	**Test Date**	2/13/2024
Version	8.3			**Pass/Fail**	PASS

Device Data:

Customer:	City of Ann Arbor Waste Water Treatment		
Job_Number:	230858	SUBSTATION:	13.2 kV Switchgear
Relay_ID:	52T	PHASE_ZONE:	
RELAY_MANF:	SEL	RELAY_TYPE:	SEL-351A
MODEL_STYLE:		IEEE_DEVICE:	MF
IL_IB:		SERIAL_NUMBER:	
FIRMWARE:	SEL-351A-R515-V0-Z105104-D20130620		
NERC_AUDITABLE:	0	MAINT_INTERVAL:	0
PREVIOUS_TESTDATE:		CURRENT_TESTDATE:	
NEXT_TESTDATE:		TESTSET_CALDATE:	
Tested_BY:			

Routine Notes:

Device Settings Used for Testing:

RID$=	"TIE"	TID$=	"TEST SETTING"	CTR=	120
CTRN=	120	PTR=	110.00	PTRS=	110.00
VNOM=	69.29	Z1MAG=	2.14	Z1ANG=	68.86
Z0MAG=	6.38	Z0ANG=	72.47	LL=	4.84
E50P=	1	E50N$=	"N"	E50G=	1
E50Q$=	"N"	E51P=	1	E51N$=	"N"
E51G=	1	E51Q$=	"N"	EHBL2$=	"N"
E32$=	"N"	ELOAD$=	"N"	ESOTF$=	"N"
EVOLT$=	"Y"	E25$=	"Y"	EFLOC$=	"Y"
ELOP$=	"N"	E81$=	"N"	E81R$=	"N"
E79$=	"N"	ESV=	10	EDEM$=	"THM"
s50P1P=	50.00	s67P1D=	0.00	s50PP1P$=	"OFF"
s50G1P=	8.760	s67G1D=	6.00	s51PP=	2.20
s51PC$=	"C3"	s51PTD=	0.40	s51PRS$=	"N"
s51GP=	0.60	s51GC$=	"U1"	s51GTD=	0.86
s51GRS$=	"N"	s27P1P=	62.00	s27P2P$=	"OFF"
s59P1P=	76.00	s59P2P$=	"OFF"	s59N1P$=	"OFF"
s59N2P$=	"OFF"	s59QP$=	"OFF"	s59V1P$=	"OFF"
s27SP=	10.00	s59S1P=	55.00	s59S2P$=	"OFF"
s27PP$=	"OFF"	s59PP$=	"OFF"	s25VLO=	62.00
s25VHI=	76.00	s25RCF=	1.00	s25SF=	0.050
s25ANG1=	15	s25ANG2=	15	SYNCP$=	"VA"
TCLOSD=	3.00	DMTC=	5	PDEMP=	5.00
NDEMP=	1.500	GDEMP=	1.50	QDEMP=	1.50
TDURD=	9.00	CFD=	60.00	s3POD=	1.50
s50LP=	0.25	SV1PU=	0.00	SV1DO=	0.00
SV2PU=	0.00	SV2DO=	0.00	SV3PU=	0.00
SV3DO=	0.00	SV4PU=	0.00	SV4DO=	0.00
SV5PU=	0.00	SV5DO=	0.00	SV6PU=	0.00
SV6DO=	0.00	SV7PU=	0.00	SV7DO=	0.00
SV8PU=	0.00	SV8DO=	0.00	SV9PU=	0.00
SV9DO=	0.00	SV10PU=	0.00	SV10DO=	0.00
TR$=	"50P1 + 51PT + 51GT + 50G1 + 67G1T"				

Device Settings (Continued):

```
TRQUAL=     0             TRSOTF=     0             DTT=        0
ULTR$=      "!(51P + 51G)"s52A$=      "IN101"       CL$=        "CC + LB4"
ULCL$=      "TRIP"        s79RI$=     "TRIP"        s79RIS$=    "52A + 79CY"
s79DTL$=    "OC + !IN102 + LB3"

s79DLS$=    "79LO"        s79SKP=     0             s79STL$=    "TRIP"
s79BRS=     0             s79SEQ=     0             s79CLS=     1
SET1=       0             RST1=       0             SET2=       0
RST2=       0             SET3=       0             RST3=       0
SET4=       0             RST4=       0             SET5=       0
RST5=       0             SET6=       0             RST6=       0
SET7=       0             RST7=       0             SET8=       0
RST8=       0             SET9=       0             RST9=       0
SET10=      0             RST10=      0             SET11=      0
RST11=      0             SET12=      0             RST12=      0
SET13=      0             RST13=      0             SET14=      0
RST14=      0             SET15=      0             RST15=      0
SET16=      0             RST16=      0             s67P1TC=    1
s67P2TC=    1             s67P3TC=    1             s67P4TC=    1
s67N1TC=    1             s67N2TC=    1             s67N3TC=    1
s67N4TC=    1             s67G1TC=    1             s67G2TC=    1
s67G3TC=    1             s67G4TC=    1             s67Q1TC=    1
s67Q2TC=    1             s67Q3TC=    1             s67Q4TC=    1
s51ATC=     1             s51BTC=     1             s51CTC=     1
s51PTC=     1             s51NTC=     1             s51GTC=     1
s51G2TC=    1             s51QTC=     1             HBL2TC=     1
s81RTC$=    "!27B81"      LV1=        0             LV2=        0
LV3=        0             LV4=        0             LV5=        0
LV6=        0             LV7=        0             LV8=        0
LV9=        0             LV10=       0             LV11=       0
LV12=       0             LV13=       0             LV14=       0
LV15=       0             LV16=       0             LV17=       0
LV18=       0             LV19=       0             LV20=       0
LV21=       0             LV22=       0             LV23=       0
LV24=       0             LV25=       0             LV26=       0
LV27=       0             LV28=       0             LV29=       0
LV30=       0             LV31=       0             LV32=       0
SV1$=       "IN101 * IN102 * IN103"

SV2$=       "27A1 + 27B1 + 27C1"

SV3$=       "27A1 * 27B1 * 27C1"

SV4$=       "25A1 + (27S * !SV2) + (!27S * SV2)"

SV5=        0             SV6=        0             SV7=        0
SV8=        0             SV9=        0             SV10=       0
SV11=       0             SV12=       0             SV13=       0
SV14=       0             SV15=       0             SV16=       0
OUT101$=    "TRIP"        OUT102=     0             OUT103$=    "SV4T"
OUT104=     0             OUT105=     0             OUT106$=    "SV4T"
OUT107$=    "50P1"        ALRMOUT$=   "!(SALARM + HALARM)"

DP1$=       "IN101"       DP2=        0             DP3=        0
DP4=        0             DP5=        0             DP6=        0
```

Device Settings (Continued):

```
DP7=        0             DP8=        0             DP9=        0
DP10=       0             DP11=       0             DP12=       0
DP13=       0             DP14=       0             DP15=       0
DP16=       0             SS1=        1             SS2=        0
SS3=        0             SS4=        0             SS5=        0
SS6=        0             ER$=        "51P + 51G + 51N + 50P1 + 50G1 + 50N1"

FAULT$=     "51P + 51G"   BSYNCH$=    "52A"         CLMON=      0
BKMON$=     "TRIP"        BKCLS$=     "CLOSE"       E32IV=      1
LOPBLK=     0
SALARM$=    "BADPASS + CHGPASS + SETCHG + GRPSW + ACCESSP + PASNVAL "

RSTTRGT=    0             RST_DEM=    0             RST_PDM=    0
RST_BK=     0             RST_HIS=    0             RST_ENE=    0
RST_MML=    0             RST_HAL=    0             RSTDNPE=    0
PMTRIG=     0             TREA1=      0             TREA2=      0
TREA3=      0             TREA4=      0             PTCONN$=    "WYE"
VSCONN$=    "VS"          TGR=        0.00          NFREQ=      60
PHROT$=     "ABC"         DATE_F$=    "MDY"         FP_TO=      15
SCROLD=     2             FPNGD$=     "IG"          METHRES$=   "Y"
LER=        15            PRE=        4             FLTDISP$=   "MAX"
DCLOP$=     "OFF"         DCHIP$=     "OFF"         IN101D=     0.50
IN102D=     0.50          IN103D=     0.50          IN104D=     0.50
IN105D=     0.50          IN106D=     0.50          EBMON$=     "Y"
COSP1=      10000         COSP2=      150           COSP3=      12
KASP1=      1.20          KASP2=      8.00          KASP3=      20.00
ESTRT=      50            ESCLT=      120           MSTRT=      50
MSCLT=      120           EPMU$=      "N"           EVELOCK=    0
DNPSRC$=    "UTC"         BOOPTCC$=   "SET"         BOOPPUL$=   "SET"
IRIGC$=     "NONE"        UTC_OFF=    0.00          DST_BEGM$=  "NA"
P2_EPORT$=  "Y"           P2_PROTO$=  "SEL"         P2_MAXACC=  2
P2_SPEED=   2400          P2_BITS=    8             P2_PARITY$= "N"
P2_STOP=    1             P2_RTSCTS$= "N"           P2_T_OUT=   15
P2_AUTO$=   "N"           P2_FASTOP$= "N"           P3_EPORT$=  "Y"
P3_PROTO$=  "SEL"         P3_MAXACC=  2             P3_SPEED=   2400
P3_BITS=    8             P3_PARITY$= "N"           P3_STOP=    1
P3_RTSCTS$= "N"           P3_T_OUT=   0             P3_AUTO$=   "N"
P3_FASTOP$= "N"           PF_EPORT$=  "Y"           PF_PROTO$=  "SEL"
PF_MAXACC$= "C"           PF_SPEED=   19200         PF_BITS=    8
PF_PARITY$= "N"           PF_STOP=    1             PF_RTSCTS$= "N"
PF_T_OUT=   0             PF_AUTO$=   "N"           PF_FASTOP$= "N"
```

Global Defines:

```
SET_GROUP$="1"      'SET GROUP TO TEST
CONTACT$="107"      'OUTPUT CONTACT TO MASK
SEL_AUTO=1          '0=MANUAL, 1=AUTO MASK, 2=MANUAL W/MESSAGES
SKIP_TST=1          'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1            'NO ERROR MESSAGE IF NO OPERATION
DIR_TEST_VOLTS=30   'TEST VOLTAGE FOR DIRECTIONAL ELEMENTS
NORM_VOLTS=67       'NORM VOLTAGE
NORM_FREQ=60        'NORMAL VOLTAGE FREQUENCY
ZONE_TEST_AMPS=2  'TEST CURRENT FOR LOAD ENCHROACHMENT TESTS
```

Device Test Results for: RELAY STATUS CHECK

N/A

Additional Data:
STA

TIE Date: 02/13/24 Time: 05:53:02.577
TEST SETTING

FID=SEL-351A-R515-V0-Z105104-D20130620 CID=F6EC

SELF TESTS

W=Warn F=Fail

	IA	IB	IC	IN	VA	VB	VC	VS	MOF
OS	-1	-1	-1	-1	-1	-1	-1	-1	-1
OSH	-0	-0	-0	0					

	15V_PS	5V_REG	3.3V_REG
PS	14.90	4.94	3.28

RAM	ROM	FPGA	EEPROM	FLASH	A/D	USB_BRD	COM_BRD
OK	OK	OK	OK	OK	OK	NA	NA

TEMP	RTC	HMI
34.0	OK	OK

Relay Enabled

=>>

Device Test Results for: RELAY SETTING VERIFICATION

Verify SETTINGS are as specified

(O) PASS

( ) FAIL

By selecting PASS you have determined that SETTINGS
on this device are as specified.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CURRENT\VOLTAGE INJECTION METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
67.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	7.2	7.1	-0.2	216.0	215.8	-0.1	PASS
B-N	7.4	7.4	-0.2	240.0	240.0	-0.0	PASS
C-N	7.6	7.6	-0.2	264.0	263.7	-0.1	PASS

CALCULATED MEGA WATT	MEASURED MEGA WATT	% ERROR	CALCULATED MEGA VAR	MEASURED MEGA VAR	% ERROR	OK?
4.6	4.6	-0.3	2.7	2.7	-0.1	PASS

Device Test Results for: RELAY INPUT VERIFICATION

Verify operation of the RELAY INPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that INPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RELAY OUTPUT VERIFICATION

Verify operation of the RELAY OUTPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that OUTPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM FUNTIONALITY

Verify functionality of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM is functional.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM PERFORMANCE

Verify PERFORMANCE of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM meets the PERFORMANCE CRITERIA pertinent to the communications technology applied.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CURRENT SIGNAL VALUE VERIFICATION

Verify CURRENT SIGNAL VALUES are provided to the relay

(O) PASS

( ) FAIL

By selecting PASS you have determined that CURRENT SIGNAL VALUES are provided to the protective relay.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: VOLTAGE SIGNAL VALUE VERIFICATION

Verify VOLTAGE SIGNAL VALUES are
provided to the relay

(O) PASS

( ) FAIL

By selecting PASS you have determined that VOLTAGE SIGNAL VALUES are provided to the protective relay.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CONTROL CIRCUITRY VERIFICATIONS

Verify CONTROL CIRCUITRY operations are proven

[x] Verified that each trip coil is able to operate the circuit breaker, interrupting device, or mitigating device.

[x] Verified electrical operation of electromechanical lockout devices.

[x] Verified all paths of the control circuits essential for proper operation of the Remedial Action Scheme (RAS).

[x] Verified all paths of the trip circuits inclusive of all auxiliary relays through the trip coil(s) of the circuit breakers or other interrupting devices.

(O) PASS

( ) FAIL

By selecting PASS you have determined that CONTROL CIRCUITRY operations have been proven.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: ALARMS AND MONITORING VERIFICATION

Verify ALARM and MONITORING signals

[x] Verified that the alarm path conveys alarm signals to a location where corrective action can be initiated.

(O) PASS

( ) FAIL

By selecting PASS you have determined that ALARM and MONITORING signals have been proven.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Device Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
67.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	7.2	7.1	-0.1	216.0	215.8	-0.1	PASS
B-N	7.4	7.4	-0.1	240.0	240.0	-0.0	PASS
C-N	7.6	7.6	-0.1	264.0	263.7	-0.1	PASS

CALCULATED MEGA WATT	MEASURED MEGA WATT	% ERROR	CALCULATED MEGA VAR	MEASURED MEGA VAR	% ERROR	OK?
4.6	4.6	-0.3	2.7	2.7	-0.1	PASS

Device Test Results for: 27P1P PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.000	62.000	0.00	PASS

Device Test Results for: 27P1P THREE PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.000	62.000	0.00	PASS

Device Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	50.000	50.000	0.00	PASS
B-N	50.000	50.000	0.00	PASS
C-N	50.000	50.000	0.00	PASS

Device Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
8.760	8.760	0.00	PASS

Device Test Results for: 67G1D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(SEC)	TIME(CY)	RANGE	OK?
1.20	10.512	0.120	7.19	4.20 TO 7.80	PASS

Device Test Results for: 51PP PHASE TO PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	2.222	2.200	1.00	PASS
B-N	2.222	2.200	1.00	PASS
C-N	2.222	2.200	1.00	PASS

Device Test Results for: 51P PHASE TIME OVERCURRENT CURVE

51P PHASE TIME OVERCURRENT CURVE (PHASE A-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.400	642.56	10.709	10.667	0.40	PASS
3.00	6.600	241.33	4.022	4.000	0.55	PASS
4.00	8.800	128.87	2.148	2.133	0.68	PASS

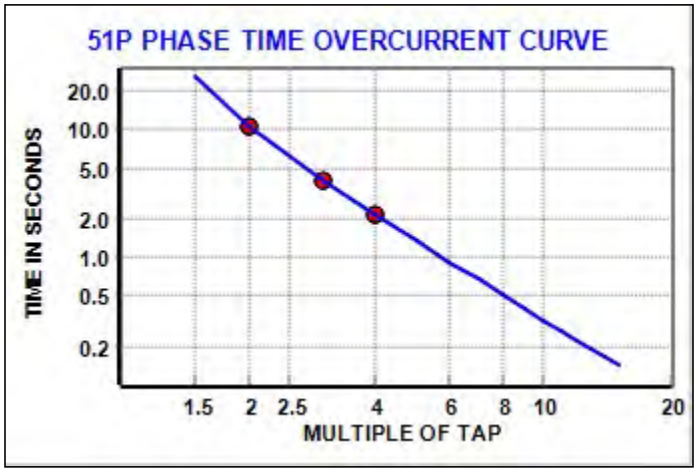
51P PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.400	642.51	10.708	10.667	0.39	PASS
3.00	6.600	241.24	4.021	4.000	0.52	PASS
4.00	8.800	128.76	2.146	2.133	0.59	PASS

51P PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.400	642.40	10.707	10.667	0.38	PASS
3.00	6.600	241.10	4.018	4.000	0.46	PASS
4.00	8.800	128.92	2.149	2.133	0.72	PASS

Graph for Test: 51P PHASE TIME OVERCURRENT CURVE

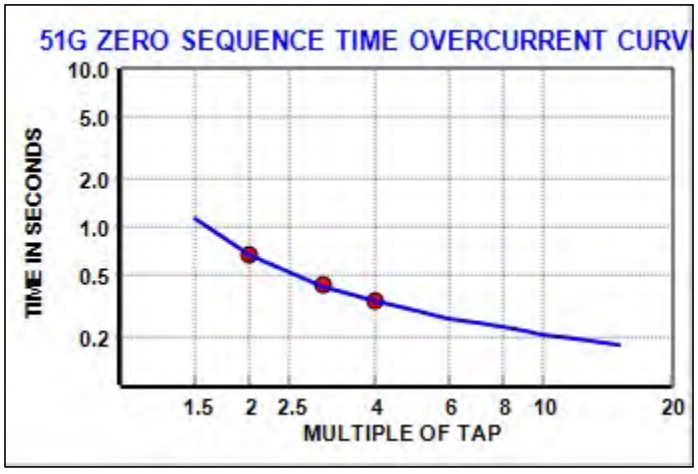


Device Test Results for: 51GP ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.600	0.600	0.00	PASS

Device Test Results for: 51G ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	39.80	0.663	0.660	0.49	PASS
3.00	1.800	25.75	0.429	0.422	1.70	PASS
4.00	2.400	20.69	0.345	0.338	2.17	PASS



Device Test Results for: 59P1P PHASE OVERVOLTAGE PICKUP

PICKUP	VOLTS	IDEAL	%ERROR	OK?
	76.760	76.000	1.00	PASS

Device Test Results for: 59P1P THREE PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.760	76.000	1.00	PASS

Device Test Results for: 25VLO SOURCE VP SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.620	62.000	1.00	PASS

Device Test Results for: 25VHI SOURCE VP SYNCHRONIZING PHASE HIGH VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.000	76.000	-0.00	PASS

Device Test Results for: 27SP SYNCHRONIZING PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
10.000	10.000	0.00	PASS

Device Test Results for: 59S1P SYNCHRONIZING PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
55.550	55.000	1.00	PASS

Device Test Results for: 25VLO SOURCE VS SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.620	62.000	1.00	PASS

Device Test Results for: 25VHI SOURCE VS SYNCHRONIZING PHASE HIGH VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.000	76.000	-0.00	PASS

Device Test Results for: 25ANG1 SYNCHRONIZING ANGLE 1

LAGGING ANGLE	IDEAL	RANGE	OK?
18.00	15.00	11.00 TO 19.00	PASS

LEADING ANGLE	IDEAL	RANGE	OK?
342.00	345.00	341.00 TO 349.00	PASS

Device Test Results for: 25ANG2 SYNCHRONIZING ANGLE 2

LAGGING ANGLE	IDEAL	RANGE	OK?
15.00	15.00	11.00 TO 19.00	PASS

LEADING ANGLE	IDEAL	RANGE	OK?
343.00	345.00	341.00 TO 349.00	PASS

Device Test Results for: 25SF SYNCHRONIZING SLIP FREQUENCY

DROPOUT HZ	IDEAL	RANGE	OK?
59.950	59.950	59.900 TO 60.000	PASS

Routine	SEL-587Z.FST_LIB	**AFAL**	AL	**Test Date**	12/21/2023
Version	8.1			**Pass/Fail**	PASS

Device Data:

Customer:	City of Ann Arbor Waste Water Treatment		
Job_Number:	230858	SUBSTATION:	Generator Switchgear
Relay_ID:	Bus 3 Differential	PHASE_ZONE:	
RELAY_MANF:	SEL	RELAY_TYPE:	SEL-587Z
MODEL_STYLE:		IEEE_DEVICE:	MF
IL_IB:		SERIAL_NUMBER:	
FIRMWARE:	SEL-587Z-R102-V0-Z001001-D20020903		
NERC_AUDITABLE:	0	MAINT_INTERVAL:	0
PREVIOUS_TESTDATE:		CURRENT_TESTDATE:	
NEXT_TESTDATE:		TESTSET_CALDATE:	
Tested_BY:			

Routine Notes:

Device Settings Used for Testing:

RID$=	"BUS 3 587Z"	TID$=	"STATION A"	CTR=	240
TDURD=	9.000	s87A1P=	200	s87A2P=	90
s87B1P=	200	s87B2P=	90	s87C1P=	200
s87C2P=	90	s50P1P$=	"OFF"	s50P2P$=	"OFF"
s50P3P$=	"OFF"	s50A1P$=	"OFF"	s50A2P$=	"OFF"
s50B1P$=	"OFF"	s50B2P$=	"OFF"	s50C1P$=	"OFF"
s50C2P$=	"OFF"	s51PP$=	"OFF"	s51PC$=	"U3"
s51PTD=	15.00	s51PRS$=	"N"	s51AP$=	"OFF"
s51AC$=	"U3"	s51ATD=	15.00	s51ARS$=	"N"
s51BP$=	"OFF"	s51BC$=	"U3"	s51BTD=	15.00
s51BRS$=	"N"	s51CP$=	"OFF"	s51CC$=	"U3"
s51CTD=	15.00	s51CRS$=	"N"	s50G1P$=	"OFF"
s50G2P$=	"OFF"	s51GP$=	"OFF"	s51GC$=	"U3"
s51GTD=	15.00	s51GRS$=	"N"	s50Q1P$=	"OFF"
s50Q2P$=	"OFF"	s51QP$=	"OFF"	s51QC$=	"U3"
s51QTD=	15.00	s51QRS$=	"N"	CFD=	60.000
DMTC=	5	PDEMP=	5.00	GDEMP=	1.50
QDEMP=	1.50	SV5PU=	120.000	SV5DO=	0.000
SV6PU=	15.000	SV6DO=	0.000	SV7PU=	0.000
SV7DO=	0.000	SV8PU=	0.000	SV8DO=	0.000
SV9PU=	0.000	SV9DO=	0.000	SV10PU=	0.000
SV10DO=	0.000	SV11PU=	0.000	SV11DO=	0.000
SV12PU=	0.000	SV12DO=	0.000	SV13PU=	0.000
SV13DO=	0.000	SV14PU=	0.000	SV14DO=	0.000
NFREQ=	60	PHROT$=	"ABC"	DATE_F$=	"MDY"
TR1$=	"87A1 + 87B1 + 87C1"				
TR2=	0	TR3=	0		
ULTR1$=	"!87A2 * !87B2 * !87C2 * !50A2 * !50B2 * !50C2 "				
ULTR2=	1	ULTR3=	1	s51PTC=	1
s51ATC=	1	s51BTC=	1	s51CTC=	1
s51GTC=	1	s51QTC=	1	s52A=	0
CL=	0	ULCL$=	"TRIP1"	ER1$=	"87A1 + 87B1 + 87C1"
ER2$=	"87A2 + 87B2 + 87C2"				
SV1=	0	SV2=	0	SV3=	0
SV4=	0	SV5=	0	SV6=	0
SV7=	0	SV8=	0	SV9=	0
SV10=	0	SV11=	0	SV12=	0
SV13=	0	SV14=	0	OUT1=	0
OUT2=	0	OUT3$=	"TRIP1"	OUT4$=	"TRIP1"
DP1=	0	DP2=	0	DP3=	0
DP4=	0	DP5=	0	DP6=	0
DP7=	0	DP8=	0	P1_PROTO$=	"SEL"
P1_SPEED=	2400	P1_BITS=	8	P1_PARITY$=	"N"
P1_STOP=	1	P1_T_OUT=	15	P1_AUTO$=	"N"
P1_RTSCTS$=	"N"	P1_FASTOP$=	"N"	PF_PROTO$=	"SEL"
PF_SPEED=	19200	PF_BITS=	8	PF_PARITY$=	"N"
PF_STOP=	1	PF_T_OUT=	15	PF_AUTO$=	"N"
PF_RTSCTS$=	"N"	PF_FASTOP$=	"N"		

Global Defines:

```
CONTACT$="1"         'OUTPUT CONTACT TO MASK
SEL_AUTO=1           '0=MANUAL, 1=AUTO MASK, 2=MANUAL W/MESSAGES
SKIP_TST=1           'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1             'NO ERROR MESSAGE IF NO OPERATION
```

Device Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

BUS 3 587Z                          Date: 12/21/2023    Time: 09:50:38.425
STATION A

FID=SEL-587Z-R102-V0-Z001001-D20020903      CID=0C9F

SELF TESTS

W=Warn    F=Fail

       87A      87B      87C      IA       IB       IC       MOF
OS      3        3        2        3        3        3        0

       +5V_PS   +5V_REG  -5V_REG  +10V_PS  -10V_PS  VBAT
PS      4.98     5.01    -4.94     9.94    -9.97     3.48

       TEMP     RAM      ROM      CR_RAM   EEPROM
        27.6    OK       OK       OK       OK

 Relay Enabled

=>>
```

Device Test Results for: RELAY SETTING VERIFICATION

Verify SETTINGS are as specified

(O) PASS

( ) FAIL

By selecting PASS you have determined that SETTINGS on this device are as specified.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RELAY INPUT VERIFICATION

Verify operation of the RELAY INPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that INPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RELAY OUTPUT VERIFICATION

Verify operation of the RELAY OUTPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that OUTPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM FUNTIONALITY

Verify functionality of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM is functional.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM PERFORMANCE

Verify PERFORMANCE of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM meets the PERFORMANCE CRITERIA pertinent to the communications technology applied.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CURRENT SIGNAL VALUE VERIFICATION

Verify CURRENT SIGNAL VALUES are provided to the relay

(O) PASS

( ) FAIL

By selecting PASS you have determined that CURRENT SIGNAL VALUES are provided to the protective relay.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: VOLTAGE SIGNAL VALUE VERIFICATION

Verify VOLTAGE SIGNAL VALUES are
provided to the relay

(O) PASS

( ) FAIL

By selecting PASS you have determined that VOLTAGE
SIGNAL VALUES are provided to the protective relay.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CONTROL CIRCUITRY VERIFICATIONS

Verify CONTROL CIRCUITRY operations are proven

[x] Verified that each trip coil is able to operate the circuit breaker, interrupting device, or mitigating device.

[x] Verified electrical operation of electromechanical lockout devices.

[x] Verified all paths of the control circuits essential for proper operation of the Remedial Action Scheme (RAS).

[x] Verified all paths of the trip circuits inclusive of all auxiliary relays through the trip coil(s) of the circuit breakers or other interrupting devices.

(O) PASS

( ) FAIL

By selecting PASS you have determined that CONTROL
CIRCUITRY operations have been proven.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: ALARMS AND MONITORING VERIFICATION

Verify ALARM and MONITORING signals

[x] Verified that the alarm path conveys alarm signals to a location where corrective action can be initiated.

(O) PASS

( ) FAIL

By selecting PASS you have determined that ALARM and MONITORING signals have been proven.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Device Test Results for: 87A1P PHASE A VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
198.000	200.000	-1.00	PASS

Device Test Results for: 87A2P PHASE A VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
89.100	90.000	-1.00	PASS

Device Test Results for: 87B1P PHASE B VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
198.000	200.000	-1.00	PASS

Device Test Results for: 87B2P PHASE B VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
90.000	90.000	0.00	PASS

Device Test Results for: 87C1P PHASE C VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
198.000	200.000	-1.00	PASS

Device Test Results for: 87C2P PHASE C VOLTAGE DIFFERENTIAL PICKUP

PICKUP	VOLTS	IDEAL	%ERROR	OK?
	90.000	90.000	0.00	PASS

Routine	SEL-300G.FST_LIB	**AFAL**	AL	**Test Date**	12/22/2023
Version				**Pass/Fail**	PASS

Device Data:

Customer:	City of Ann Arbor Waste Water Treatment		
Job_Number:	230858	SUBSTATION:	Generator Switchgear
Relay_ID:	Generator 1	PHASE_ZONE:	
RELAY_MANF:	SEL	RELAY_TYPE:	SEL-300G
MODEL_STYLE:		IEEE_DEVICE:	MF
IL_IB:		SERIAL_NUMBER:	
FIRMWARE:	SEL-300G-R331-V305325XX4XXX-Z303303-D20141017		
NERC_AUDITABLE:	0	MAINT_INTERVAL:	0
PREVIOUS_TESTDATE:		CURRENT_TESTDATE:	
NEXT_TESTDATE:		TESTSET_CALDATE:	
Tested_BY:			

Routine Notes:

Device Settings Used for Testing:

RID$=	"GENERATOR #1"	TID$=	"TERMINAL"	CTR=	40
CTRD=	40	CTRN=	40	PTR=	110.00
PTRN=	110.00	PTRS=	100.00	VNOM=	120.0
INOM=	2.8	PHROT$=	"ABC"	EBUP$=	"V"
E24$=	"N"	E25$=	"Y"	E27$=	"Y"
E32$=	"N"	E40$=	"N"	E46$=	"N"
E50$=	"Y"	E50_87$=	"Y"	E51$=	"Y"
E59$=	"Y"	E64$=	"N"	E78$=	"N"
E81=	6	E81AC$=	"N"	E87$=	"G"
ESV=	3	ESL=	3	EDEM$=	"ROL"
SYNCP$=	"VA"	s25VLO=	62.3	s25VHI=	76.2
s25VDIF=	10.0	s25RCF=	1.000	GENV_$=	"N"
s25SLO=	-0.05	s25SHI=	0.10	COMPA=	0
s25ANG1=	15	s25ANG2=	15	CANGLE=	-3
TCLOSD=	0.150	CFANGL=	30	s27VSP=	10.0
BSYNCH$=	"IN101"	s27P1P=	62.3	s27P2P$=	"OFF"
s27V1P$=	"OFF"	s27PP1$=	"OFF"	s27PP2$=	"OFF"
s50P1P=	3.20	s50P1D=	0.35	s50P2P=	9.20
s50P2D=	0.13	s50N1P=	3.20	s50N1D=	0.35
s50N2P$=	"OFF"	s50G1P=	49.60	s50G1D=	0.20
s50G2P$=	"OFF"	s50H1P=	3.20	s50H1D=	0.35
s50H2PA=	9.20	s50H2PB=	9.20	s50H2PC=	9.20
s50H2D=	0.13	s50Q1P$=	"OFF"	s50Q2P$=	"OFF"
s50R1P=	3.20	s50R1D=	0.35	s50R2P=	9.20
s50R2D=	0.13	s51NP$=	"OFF"	s51GP=	2.10
s51GC$=	"U1"	s51GTD=	2.12	s51GRS$=	"N"
s51GTC=	1	s51VCA=	0	s51VP=	3.50
s51VC$=	"C5"	s51VTD=	0.40	s51VRS$=	"N"
s51VTC$=	"IN101"	s3POD=	0.00	s50LP=	0.25
s52A$=	"IN101"	s59P1P=	76.2	s59P2P$=	"OFF"
s59G1P$=	"OFF"	s59G2P$=	"OFF"	s59QP$=	"OFF"
s59V1P$=	"OFF"	s59PP1$=	"OFF"	s59PP2$=	"OFF"
s64FOPT$=	"NONE"	s27B81P=	50.00	s81D1P=	55.00
s81D1D=	0.20	s81D2P=	65.00	s81D2D=	0.20

Device Settings (Continued):

s81D3P$=	"OFF"	s81D4P$=	"OFF"	s81D5P$=	"OFF"
s81D6P$=	"OFF"	TAP1=	2.80	TAPD=	2.80
U87P=	10.0	O87P=	0.30	SLP1=	25
s87B=	0	HSM$=	"(DRDOPT + HRT) * !RHSM"		
O87P2=	1.25	HSMDOT=	10.00	DMTC=	15
PDEMP=	5.50	NDEMP=	1.00	GDEMP=	1.00
QDEMP=	2.50	INAD$=	"SV2T * 50L"	INADPU=	0.25
INADDO=	0.13	SV1=	0	SV1PU=	0.00
SV1DO=	0.00				
SV2$=	"IN101 * (50P1T + 50P2T + 50N1T + 50G1T + 51VT) "				
SV2PU=	0.00	SV2DO=	1.00	SV3$=	"87U + 87R"
SV3PU=	0.00	SV3DO=	1.00	SET1=	0
RST1=	0	SET2=	0	RST2=	0
SET3=	0	RST3=	0	TDURD=	0.16
TR1$=	"SV2T + SV3T"	ULTR1$=	"TRGTR"	TR2=	0
ULTR2=	0	TR3=	0	ULTR3=	0
TR4=	0	ULTR4=	0	CLEN=	1
CL=	0	ULCL=	1	CLSD=	0.00
ER$=	"SV2 + SV3T + SV4T + SV5T + SV6T + SV7T"				
OUT101$=	"TRIP1"	OUT102$=	"25A1 + (!27P1 * !59P1 * 27VS)"		
OUT103=	0	OUT104=	0	OUT105=	0
OUT106=	0	OUT107=	0	LER=	15
PRE=	4	FP_TO=	15	DATE_F$=	"MDY"
DCLOP$=	"OFF"	DCHIP$=	"OFF"	FNOM=	60
DELTA_Y$=	"Y"	TGR=	3	SS1=	1
SS2=	0	BKMON$=	"TRIP"	COSP1=	10000
COSP2=	150	COSP3=	12	KASP1=	1.2
KASP2=	8.0	KASP3=	20.0	IN101D=	0.50
IN102D=	0.50	IN103D=	0.50	IN104D=	0.50
IN105D=	0.50	IN106D=	0.50	NLB1$=	" "
NLB2$=	" "	NLB3$=	" "	NLB4$=	" "
NLB5$=	" "	NLB6$=	" "	NLB7$=	" "
NLB8$=	" "	NLB9$=	" "	NLB10$=	" "
NLB11$=	" "	NLB12$=	" "	NLB13$=	" "
NLB14$=	" "	NLB15$=	" "	NLB16$=	" "
FP_I$=	"Y"	FP_VPP$=	"Y"	FP_VP$=	"Y"
FP_MW$=	"Y"	FP_FR$=	"Y"	FP_87$=	"Y"
DP1$=	"IN101"	DP1_1$=	"GEN BKR CLOSED"		
DP1_0$=	"GEN BKR OPEN"	DP2$=	"LT2"	DP2_1$=	"PHASEOVERCURRENT"
DP2_0$=	" "	DP3$=	"LT3"	DP3_1$=	"27_FAULT"
DP3_0$=	" "	DP4$=	"LT4"	DP4_1$=	"81U_FAULT"
DP4_0$=	" "	DP5$=	"LT5"	DP5_1$=	"87_DIFF_CUR_FLT"
DP5_0$=	" "	DP6$=	"LT6"	DP6_1$=	"59_FAULT"
DP6_0$=	" "	DP7$=	"LT7"	DP7_1$=	"81O_FAULT"
DP7_0$=	" "	DP8=	0	DP8_1$=	" "
DP8_0$=	" "	DP9=	0	DP9_1$=	" "
DP9_0$=	" "	DP10=	0	DP10_1$=	" "
DP10_0$=	" "	DP11=	0	DP11_1$=	" "
DP11_0$=	" "	DP12=	0	DP12_1$=	" "
DP12_0$=	" "	DP13=	0	DP13_1$=	" "

Device Settings (Continued):

```
DP13_0$=    " "          DP14=       0            DP14_1$=    " "
DP14_0$=    " "          DP15=       0            DP15_1$=    " "
DP15_0$=    " "          DP16=       0            DP16_1$=    " "
DP16_0$=    " "          P1_PROTO$=  "SEL"        P1_SPEED=   2400
P1_BITS=    8            P1_PARITY$= "N"          P1_STOP=    1
P1_T_OUT=   15           P1_AUTO$=   "N"          P1_FASTOP$= "N"
P2_PROTO$=  "SEL"        P2_SPEED=   2400         P2_BITS=    8
P2_PARITY$= "N"          P2_STOP=    1            P2_T_OUT=   0
P2_AUTO$=   "N"          P2_RTSCTS$= "N"          P2_FASTOP$= "N"
P3_PROTO$=  "SEL"        P3_SPEED=   2400         P3_BITS=    8
P3_PARITY$= "N"          P3_STOP=    1            P3_T_OUT=   15
P3_AUTO$=   "N"          P3_RTSCTS$= "N"          P3_FASTOP$= "N"
PF_PROTO$=  "SEL"        PF_SPEED=   19200        PF_BITS=    8
PF_PARITY$= "N"          PF_STOP=    1            PF_T_OUT=   15
PF_AUTO$=   "N"          PF_RTSCTS$= "N"          PF_FASTOP$= "N"
```

Global Defines:

```
BAC$="EDITH"          'BREAKER ACCESS LEVEL TO CHANGE GROUPS
SET_GROUP$="2"        'RELAY SET GROUP TO TEST
CONTACT$="107"        'OUTPUT CONTACT TO MASK
SEL_AUTO=1            '0=MANUAL, 1=AUTO MASK, 2=MANUAL W/MESSAGES
SKIP_TST=0            'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1              'NO ERROR MESSAGE IF NO OPERATION
NORM_FREQ=60          'NORMAL VOLTAGE FREQUENCY
```

Device Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

GENERATOR #1                          Date: 12/22/23   Time: 12:31:45.723
TERMINAL

FID=SEL-300G-R331-V305325XX4XXX-Z303303-D20141017       CID=3A7F

SELF TESTS

W=Warn    F=Fail

       IA      IB      IC      IN      VA      VB      VC      VN      MOF
OS    -1      -2      -3      -2      -1      -4      -2      -3      -2

       IA87    IB87    IC87    VS
OS    -1      -2      -1      0

       +5V_PS  +5V_REG -5V_REG +12V_PS -12V_PS +15V_PS -15V_PS
PS      5.02    4.99   -4.95    12.08  -11.96   14.99  -15.13

       TEMP    RAM     ROM     A/D     CR_RAM  EEPROM  IO_BRD
```

(Continued) Device Test Results for: RELAY STATUS CHECK

```
         37.8    OK       OK       OK       OK       OK       OK

  Relay Enabled

 =>>
```

Device Test Results for: RELAY SETTING VERIFICATION

```
       Verify SETTINGS are as specified

                   (O) PASS

                   ( ) FAIL


  By selecting PASS you have determined that SETTINGS
  on this device are as specified.

  If selecting FAIL, add an explanation below.

  NOTES:
```

Device Test Results for: CURRENT\VOLTAGE INJECTION METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
69.28	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	7.4	7.4	0.1	72.0	72.0	-0.1	PASS
B-N	7.6	7.6	0.1	80.0	80.0	0.0	PASS
C-N	7.8	7.8	-0.0	88.0	88.0	-0.1	PASS

CALCULATED MEGA WATT	MEASURED MEGA WATT	% ERROR	CALCULATED MEGA VAR	MEASURED MEGA VAR	% ERROR	OK?
1.6	1.6	0.1	0.9	0.9	0.2	PASS

Device Test Results for: RELAY INPUT VERIFICATION

Verify operation of the RELAY INPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that INPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RELAY OUTPUT VERIFICATION

Verify operation of the RELAY OUTPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that OUTPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM FUNTIONALITY

Verify functionality of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM is functional.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM PERFORMANCE

Verify PERFORMANCE of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM meets the PERFORMANCE CRITERIA pertinent to the communications technology applied.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CURRENT SIGNAL VALUE VERIFICATION

Verify CURRENT SIGNAL VALUES are provided to the relay

(O) PASS

( ) FAIL

By selecting PASS you have determined that CURRENT SIGNAL VALUES are provided to the protective relay.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: VOLTAGE SIGNAL VALUE VERIFICATION

Verify VOLTAGE SIGNAL VALUES are provided to the relay

(O) PASS

( ) FAIL

By selecting PASS you have determined that VOLTAGE SIGNAL VALUES are provided to the protective relay.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CONTROL CIRCUITRY VERIFICATIONS

Verify CONTROL CIRCUITRY operations are proven

[x] Verified that each trip coil is able to operate the circuit breaker, interrupting device, or mitigating device.

[x] Verified electrical operation of electromechanical lockout devices.

[x] Verified all paths of the control circuits essential

(Continued) Device Test Results for: CONTROL CIRCUITRY VERIFICATIONS

for proper operation of the Remedial Action Scheme (RAS).

[x] Verified all paths of the trip circuits inclusive of all auxiliary relays through the trip coil(s) of the circuit breakers or other interrupting devices.

(O) PASS

( ) FAIL

By selecting PASS you have determined that CONTROL CIRCUITRY operations have been proven.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: AUTOMATIC RECLOSING OPERATIONS

Verify AUTOMATIC RECLOSING operations are proven

[x] Verified that Automatic Reclosing, upon initiation, does not issue a premature closing command to the close circuitry.

[x] Verified that each close coil or actuator is able to operate the circuit breaker or mitigating device.

[x] Verified all paths of the control circuits associated with Automatic Reclosing that are essential for proper operation of the Remedial Action Scheme (RAS).

(O) PASS

( ) FAIL

By selecting PASS you have determined that AUTOMATIC RECLOSING operations have been proven.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: ALARMS AND MONITORING VERIFICATION

Verify ALARM and MONITORING signals

[x] Verified that the alarm path conveys alarm signals to a location where corrective action can be initiated.

(O) PASS

( ) FAIL

By selecting PASS you have determined that ALARM and MONITORING signals have been proven.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Device Test Results for: U87P PHASE A CURRENT DIFFERENTIAL UNRESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	28.000	28.000	0.00	PASS

Device Test Results for: U87P PHASE 87A CURRENT DIFFERENTIAL UNRESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	28.000	28.000	0.00	PASS

Device Test Results for: O87P PHASE A CURRENT DIFFERENTIAL RESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.848	0.840	0.98	PASS

Device Test Results for: O87P PHASE 87A CURRENT DIFFERENTIAL RESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.840	0.840	-0.02	PASS

Device Test Results for: 87 PHASE A CURRENT DIFFERENTIAL SLOPE 1 PERCENTAGE

RESTRAINT CURRENT	OPERATE CURRENT	IDEAL	RANGE	OK?
7.560	5.76	5.88	5.59 TO 6.17	PASS

Device Test Results for: 87 PHASE A CURRENT DIFFERENTIAL SLOPE 2 PERCENTAGE

RESTRAINT CURRENT	OPERATE CURRENT	IDEAL	RANGE			OK?
11.970	8.03	8.19	7.78	TO	8.60	PASS

Device Test Results for: U87P PHASE B CURRENT DIFFERENTIAL UNRESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	28.280	28.000	1.00	PASS

Device Test Results for: U87P PHASE 87B CURRENT DIFFERENTIAL UNRESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	28.000	28.000	0.00	PASS

Device Test Results for: O87P PHASE B CURRENT DIFFERENTIAL RESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.848	0.840	0.98	PASS

Device Test Results for: O87P PHASE 87B CURRENT DIFFERENTIAL RESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.840	0.840	-0.02	PASS

Device Test Results for: 87 PHASE B CURRENT DIFFERENTIAL SLOPE 1 PERCENTAGE

RESTRAINT CURRENT	OPERATE CURRENT	IDEAL	RANGE			OK?
7.560	5.70	5.88	5.59	TO	6.17	PASS

Device Test Results for: 87 PHASE B CURRENT DIFFERENTIAL SLOPE 2 PERCENTAGE

RESTRAINT CURRENT	OPERATE CURRENT	IDEAL	RANGE			OK?
11.970	8.11	8.19	7.78	TO	8.60	PASS

Device Test Results for: U87P PHASE C CURRENT DIFFERENTIAL UNRESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	28.000	28.000	0.00	PASS

Device Test Results for: U87P PHASE 87C CURRENT DIFFERENTIAL UNRESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	28.000	28.000	0.00	PASS

Device Test Results for: O87P PHASE C CURRENT DIFFERENTIAL RESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.840	0.840	-0.02	PASS

Device Test Results for: O87P PHASE 87C CURRENT DIFFERENTIAL RESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.848	0.840	0.98	PASS

Device Test Results for: 87 PHASE C CURRENT DIFFERENTIAL SLOPE 1 PERCENTAGE

RESTRAINT CURRENT	OPERATE CURRENT	IDEAL	RANGE			OK?
7.560	5.76	5.88	5.59	TO	6.17	PASS

Device Test Results for: 87 PHASE C CURRENT DIFFERENTIAL SLOPE 2 PERCENTAGE

RESTRAINT CURRENT	OPERATE CURRENT	IDEAL	RANGE			OK?
11.970	8.11	8.19	7.78	TO	8.60	PASS

Device Test Results for: 50H1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		3.200	3.200	0.00	PASS
B-N		3.232	3.200	1.00	PASS
C-N		3.232	3.200	1.00	PASS

Device Test Results for: 50H1D PHASE OVERCURRENT TIME DELAY

50H1D PHASE OVERCURRENT TIME DELAY (PHASE A-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE			OK?
1.20	3.840	22.57	0.376	0.308	TO	0.392	PASS

50H1D PHASE OVERCURRENT TIME DELAY (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE			OK?
1.20	3.840	22.65	0.378	0.308	TO	0.392	PASS

50H1D PHASE OVERCURRENT TIME DELAY (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE			OK?
1.20	3.840	22.46	0.374	0.308	TO	0.392	PASS

Device Test Results for: 50H2PA PHASE A OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	9.200	9.200	0.00	PASS

Device Test Results for: 50H2D PHASE OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE			OK?
1.20	11.040	9.58	0.160	0.098	TO	0.162	PASS

Device Test Results for: 50R1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	3.200	3.200	0.00	PASS

Device Test Results for: 50R1D ZERO SEQUENCE OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	3.840	22.45	0.374	0.308 TO 0.392	PASS

Device Test Results for: 50R2P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
9.200	9.200	0.00	PASS

Device Test Results for: 50R2D ZERO SEQUENCE OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	11.040	9.52	0.159	0.098 TO 0.162	PASS

Device Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
69.28	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	7.4	7.4	-0.0	72.0	72.0	-0.0	PASS
B-N	7.6	7.6	-0.0	80.0	80.0	-0.0	PASS
C-N	7.8	7.8	-0.0	88.0	88.0	-0.0	PASS

CALCULATED MEGA WATT	MEASURED MEGA WATT	% ERROR	CALCULATED MEGA VAR	MEASURED MEGA VAR	% ERROR	OK?
1.6	1.6	0.1	0.9	0.9	0.2	PASS

Device Test Results for: 27P1P PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
61.677	62.300	-1.00	PASS

Device Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	3.200	3.200	0.00	PASS
B-N	3.200	3.200	0.00	PASS
C-N	3.200	3.200	0.00	PASS

Device Test Results for: 50P1D PHASE OVERCURRENT TIME DELAY

50P1D PHASE OVERCURRENT TIME DELAY (PHASE A-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	3.840	22.53	0.376	0.308 TO 0.392	PASS

50P1D PHASE OVERCURRENT TIME DELAY (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	3.840	22.57	0.376	0.308 TO 0.392	PASS

50P1D PHASE OVERCURRENT TIME DELAY (PHASE C-N)

(Continued) Device Test Results for: 50P1D PHASE OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	3.840	22.54	0.376	0.308 TO 0.392	PASS

Device Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	9.200	9.200	0.00	PASS
B-N	9.292	9.200	1.00	PASS
C-N	9.200	9.200	0.00	PASS

Device Test Results for: 50P2D PHASE OVERCURRENT TIME DELAY

50P2D PHASE OVERCURRENT TIME DELAY (PHASE A-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	11.040	9.65	0.161	0.098 TO 0.162	PASS

50P2D PHASE OVERCURRENT TIME DELAY (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	11.040	9.48	0.158	0.098 TO 0.162	PASS

50P2D PHASE OVERCURRENT TIME DELAY (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	11.040	9.61	0.160	0.098 TO 0.162	PASS

Device Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
49.600	49.600	0.00	PASS

Device Test Results for: 50G1D ZERO SEQUENCE OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	59.520	13.43	0.224	0.165 TO 0.235	PASS

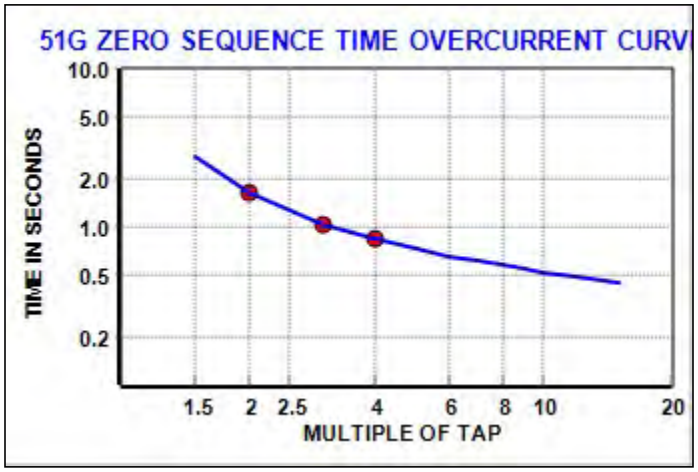
Device Test Results for: 51GP ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
2.100	2.100	-0.00	PASS

Device Test Results for: 51G ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.200	98.05	1.634	1.627	0.42	PASS
3.00	6.300	62.37	1.040	1.040	-0.08	PASS
4.00	8.400	49.84	0.831	0.832	-0.19	PASS

Graph for Test: 51G ZERO SEQUENCE TIME OVERCURRENT CURVE



Device Test Results for: 51VP VOLTAGE RESTRAINED TIME OVERCURRENT PICKUP 100% VNOM

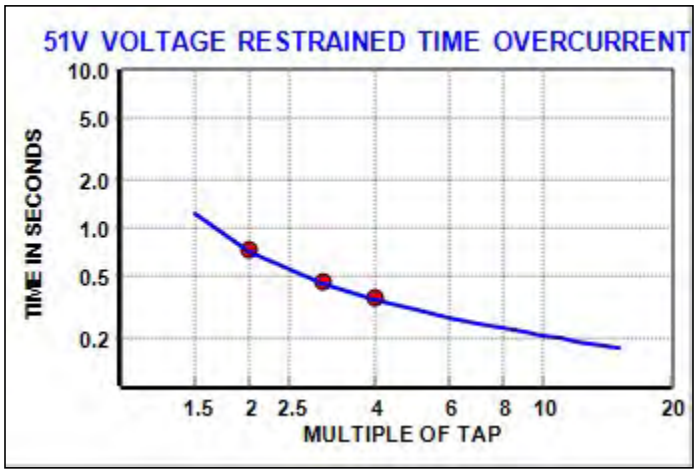
PICKUP CURRENT	IDEAL	%ERROR	OK?
3.500	3.500	0.00	PASS

Device Test Results for: 51VP VOLTAGE RESTRAINED TIME OVERCURRENT PICKUP 75% VNOM

PICKUP CURRENT	IDEAL	%ERROR	OK?
2.651	2.625	0.99	PASS

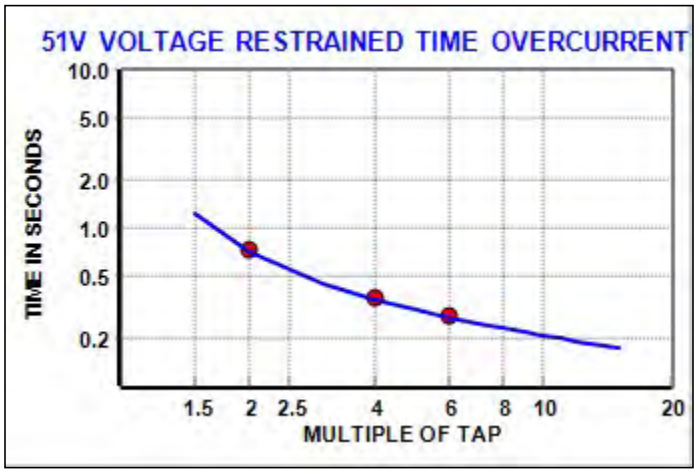
Device Test Results for: 51V VOLTAGE RESTRAINED TIME OVERCURRENT CURVE 100% VNOM

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	7.000	43.14	0.719	0.711	1.07	PASS
3.00	10.500	27.20	0.453	0.445	1.84	PASS
4.00	14.000	21.58	0.360	0.351	2.55	PASS



Device Test Results for: 51V VOLTAGE RESTRAINED TIME OVERCURRENT CURVE 75% VNOM

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	5.250	43.34	0.722	0.711	1.53	PASS
4.00	10.500	21.85	0.364	0.351	3.80	PASS
6.00	15.750	16.62	0.277	0.269	2.91	PASS



Device Test Results for: 59P1P PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.200	76.200	0.00	PASS

Device Test Results for: 27B81P UNDERVOLTAGE FRQEUENCY BLOCK

PICKUP VOLTS	IDEAL	%ERROR	OK?
49.500	50.000	-1.00	PASS

Device Test Results for: 81D1P FRQEUENCY PICKUP

PICKUP HZ	IDEAL	RANGE	OK?
54.990	55.000	54.950 TO 55.050	PASS

Device Test Results for: 81D1D FRQEUENCY TIME DELAY

APPLIED VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
54.800	14.72	0.269	0.200 TO 0.275	PASS

Device Test Results for: 81D2P FRQEUENCY PICKUP

PICKUP HZ	IDEAL	RANGE	OK?
65.000	65.000	64.950 TO 65.050	PASS

Device Test Results for: 81D2D FRQEUENCY TIME DELAY

APPLIED VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
65.200	16.48	0.253	0.200 TO 0.275	PASS

Device Test Results for: 27VSP SYNCHRONIZING PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
10.100	10.000	1.00	PASS

Device Test Results for: 25VLO SOURCE VS SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
61.677	62.300	-1.00	PASS

Device Test Results for: 25VHI SOURCE VS SYNCHRONIZING PHASE HIGH VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.200	76.200	0.00	PASS

Device Test Results for: 25ANG1 SYNCHRONIZING ANGLE 1

LAGGING ANGLE	IDEAL	RANGE	OK?
15.00	15.00	11.00 TO 19.00	PASS

LEADING ANGLE	IDEAL	RANGE	OK?
343.00	345.00	341.00 TO 349.00	PASS

Device Test Results for: 25ANG2 SYNCHRONIZING ANGLE 2

LAGGING ANGLE	IDEAL	RANGE	OK?
14.00	15.00	11.00 TO 19.00	PASS

LEADING ANGLE	IDEAL	RANGE	OK?
344.00	345.00	341.00 TO 349.00	PASS

Device Test Results for: 25SLO MINIMUM SYNCHRONIZING SLIP FREQUENCY

DROPOUT HZ	IDEAL	RANGE	OK?
59.945	59.950	59.900 TO 60.000	PASS

Device Test Results for: 25SHI MAXIMUM SYNCHRONIZING SLIP FREQUENCY

DROPOUT HZ	IDEAL	RANGE	OK?
60.105	60.100	60.050 TO 60.150	PASS

Device Test Results for: 50N1P NEUTRAL OVERCURRENT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
3.200	3.200	0.00	PASS

Device Test Results for: 50N1D NEUTRAL OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	3.840	22.49	0.375	0.308 TO 0.392	PASS

Routine	SEL-300G.FST_LIB	**AFAL**	AL	**Test Date**	12/22/2023
Version	8.4			**Pass/Fail**	PASS

Device Data:

Customer:	City of Ann Arbor Waste Water Treatment		
Job_Number:	230858	SUBSTATION:	Generator Switchgear
Relay_ID:	Generator 2	PHASE_ZONE:	
RELAY_MANF:	SEL	RELAY_TYPE:	SEL-300G
MODEL_STYLE:		IEEE_DEVICE:	MF
IL_IB:		SERIAL_NUMBER:	
FIRMWARE:	SEL-300G-R331-V305325XX4XXX-Z303303-D20141017		
NERC_AUDITABLE:	0	MAINT_INTERVAL:	0
PREVIOUS_TESTDATE:		CURRENT_TESTDATE:	
NEXT_TESTDATE:		TESTSET_CALDATE:	
Tested_BY:			

Routine Notes:

Device Settings Used for Testing:

RID$=	"GENERATOR #2"	TID$=	"TERMINAL"	CTR=	40
CTRD=	40	CTRN=	40	PTR=	110.00
PTRN=	110.00	PTRS=	100.00	VNOM=	120.0
INOM=	2.8	PHROT$=	"ABC"	EBUP$=	"V"
E24$=	"N"	E25$=	"Y"	E27$=	"Y"
E32$=	"N"	E40$=	"N"	E46$=	"N"
E50$=	"Y"	E50_87$=	"Y"	E51$=	"Y"
E59$=	"Y"	E64$=	"N"	E78$=	"N"
E81=	6	E81AC$=	"N"	E87$=	"G"
ESV=	3	ESL=	3	EDEM$=	"ROL"
SYNCP$=	"VA"	s25VLO=	62.3	s25VHI=	76.2
s25VDIF=	10.0	s25RCF=	1.000	GENV_$=	"N"
s25SLO=	-0.05	s25SHI=	0.10	COMPA=	0
s25ANG1=	15	s25ANG2=	15	CANGLE=	-3
TCLOSD=	0.150	CFANGL=	30	s27VSP=	10.0
BSYNCH$=	"IN101"	s27P1P=	62.3	s27P2P$=	"OFF"
s27V1P$=	"OFF"	s27PP1$=	"OFF"	s27PP2$=	"OFF"
s50P1P=	3.20	s50P1D=	0.35	s50P2P=	9.20
s50P2D=	0.13	s50N1P=	3.20	s50N1D=	0.35
s50N2P$=	"OFF"	s50G1P=	49.60	s50G1D=	0.20
s50G2P$=	"OFF"	s50H1P=	3.20	s50H1D=	0.35
s50H2PA=	9.20	s50H2PB=	9.20	s50H2PC=	9.20
s50H2D=	0.13	s50Q1P$=	"OFF"	s50Q2P$=	"OFF"
s50R1P=	3.20	s50R1D=	0.35	s50R2P=	9.20
s50R2D=	0.13	s51NP$=	"OFF"	s51GP=	2.10
s51GC$=	"U1"	s51GTD=	2.12	s51GRS$=	"N"
s51GTC=	1	s51VCA=	0	s51VP=	3.50
s51VC$=	"C5"	s51VTD=	0.40	s51VRS$=	"N"
s51VTC$=	"IN101"	s3POD=	0.00	s50LP=	0.25
s52A$=	"IN101"	s59P1P=	76.2	s59P2P$=	"OFF"
s59G1P$=	"OFF"	s59G2P$=	"OFF"	s59QP$=	"OFF"
s59V1P$=	"OFF"	s59PP1$=	"OFF"	s59PP2$=	"OFF"
s64FOPT$=	"NONE"	s27B81P=	50.00	s81D1P=	55.00
s81D1D=	0.20	s81D2P=	65.00	s81D2D=	0.20

Device Settings (Continued):

s81D3P$=	"OFF"	s81D4P$=	"OFF"	s81D5P$=	"OFF"
s81D6P$=	"OFF"	TAP1=	2.80	TAPD=	2.80
U87P=	10.0	O87P=	0.30	SLP1=	25
s87B=	0	HSM$=	"(DRDOPT + HRT) * !RHSM"		
O87P2=	1.25	HSMDOT=	10.00	DMTC=	15
PDEMP=	5.50	NDEMP=	1.00	GDEMP=	1.00
QDEMP=	2.50	INAD$=	"SV2T * 50L"	INADPU=	0.25
INADDO=	0.13	SV1=	0	SV1PU=	0.00
SV1DO=	0.00				
SV2$=	"IN101 * (50P1T + 50P2T + 50N1T + 50G1T + 51VT) "				
SV2PU=	0.00	SV2DO=	1.00	SV3$=	"87U + 87R"
SV3PU=	0.00	SV3DO=	1.00	SET1=	0
RST1=	0	SET2=	0	RST2=	0
SET3=	0	RST3=	0	TDURD=	0.16
TR1$=	"SV2T + SV3T"	ULTR1$=	"TRGTR"	TR2=	0
ULTR2=	0	TR3=	0	ULTR3=	0
TR4=	0	ULTR4=	0	CLEN=	1
CL=	0	ULCL=	1	CLSD=	0.00
ER$=	"SV2 + SV3T + SV4T + SV5T + SV6T + SV7T"				
OUT101$=	"TRIP1"	OUT102$=	"25A1 + (!27P1 * !59P1 * 27VS)"		
OUT103=	0	OUT104=	0	OUT105=	0
OUT106=	0	OUT107=	0	LER=	15
PRE=	4	FP_TO=	15	DATE_F$=	"MDY"
DCLOP$=	"OFF"	DCHIP$=	"OFF"	FNOM=	60
DELTA_Y$=	"Y"	TGR=	3	SS1=	1
SS2=	0	BKMON$=	"TRIP"	COSP1=	10000
COSP2=	150	COSP3=	12	KASP1=	1.2
KASP2=	8.0	KASP3=	20.0	IN101D=	0.50
IN102D=	0.50	IN103D=	0.50	IN104D=	0.50
IN105D=	0.50	IN106D=	0.50	NLB1$=	" "
NLB2$=	" "	NLB3$=	" "	NLB4$=	" "
NLB5$=	" "	NLB6$=	" "	NLB7$=	" "
NLB8$=	" "	NLB9$=	" "	NLB10$=	" "
NLB11$=	" "	NLB12$=	" "	NLB13$=	" "
NLB14$=	" "	NLB15$=	" "	NLB16$=	" "
FP_I$=	"Y"	FP_VPP$=	"Y"	FP_VP$=	"Y"
FP_MW$=	"Y"	FP_FR$=	"Y"	FP_87$=	"Y"
DP1$=	"IN101"	DP1_1$=	"GEN BKR CLOSED"		
DP1_0$=	"GEN BKR OPEN"	DP2$=	"LT2"	DP2_1$=	"PHASEOVERCURRENT"
DP2_0$=	" "	DP3$=	"LT3"	DP3_1$=	"27_FAULT"
DP3_0$=	" "	DP4$=	"LT4"	DP4_1$=	"81U_FAULT"
DP4_0$=	" "	DP5$=	"LT5"	DP5_1$=	"87_DIFF_CUR_FLT"
DP5_0$=	" "	DP6$=	"LT6"	DP6_1$=	"59_FAULT"
DP6_0$=	" "	DP7$=	"LT7"	DP7_1$=	"81O_FAULT"
DP7_0$=	" "	DP8=	0	DP8_1$=	" "
DP8_0$=	" "	DP9=	0	DP9_1$=	" "
DP9_0$=	" "	DP10=	0	DP10_1$=	" "
DP10_0$=	" "	DP11=	0	DP11_1$=	" "
DP11_0$=	" "	DP12=	0	DP12_1$=	" "
DP12_0$=	" "	DP13=	0	DP13_1$=	" "

Device Settings (Continued):

```
DP13_0$=    " "          DP14=       0            DP14_1$=    " "
DP14_0$=    " "          DP15=       0            DP15_1$=    " "
DP15_0$=    " "          DP16=       0            DP16_1$=    " "
DP16_0$=    " "          P1_PROTO$=  "SEL"        P1_SPEED=   2400
P1_BITS=    8            P1_PARITY$= "N"          P1_STOP=    1
P1_T_OUT=   15           P1_AUTO$=   "N"          P1_FASTOP$= "N"
P2_PROTO$=  "SEL"        P2_SPEED=   2400         P2_BITS=    8
P2_PARITY$= "N"          P2_STOP=    1            P2_T_OUT=   0
P2_AUTO$=   "N"          P2_RTSCTS$= "N"          P2_FASTOP$= "N"
P3_PROTO$=  "SEL"        P3_SPEED=   2400         P3_BITS=    8
P3_PARITY$= "N"          P3_STOP=    1            P3_T_OUT=   15
P3_AUTO$=   "N"          P3_RTSCTS$= "N"          P3_FASTOP$= "N"
PF_PROTO$=  "SEL"        PF_SPEED=   19200        PF_BITS=    8
PF_PARITY$= "N"          PF_STOP=    1            PF_T_OUT=   15
PF_AUTO$=   "N"          PF_RTSCTS$= "N"          PF_FASTOP$= "N"
```

Global Defines:

```
BAC$="EDITH"          'BREAKER ACCESS LEVEL TO CHANGE GROUPS
SET_GROUP$="2"        'RELAY SET GROUP TO TEST
CONTACT$="107"        'OUTPUT CONTACT TO MASK
SEL_AUTO=1            '0=MANUAL, 1=AUTO MASK, 2=MANUAL W/MESSAGES
SKIP_TST=0            'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1              'NO ERROR MESSAGE IF NO OPERATION
NORM_FREQ=60          'NORMAL VOLTAGE FREQUENCY
```

Device Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

GENERATOR #2                          Date: 12/21/23   Time: 13:36:16.483
TERMINAL

FID=SEL-300G-R331-V305325XX4XXX-Z303303-D20141017       CID=3A7F

SELF TESTS

W=Warn    F=Fail

       IA      IB      IC      IN      VA      VB      VC      VN      MOF
OS     0       1       2       1       2       1       0      -1       0

       IA87    IB87    IC87    VS
OS     1       0       1       0

       +5V_PS  +5V_REG -5V_REG +12V_PS -12V_PS +15V_PS -15V_PS
PS      5.02    4.96   -4.98    12.11  -11.85   15.01  -15.06

       TEMP    RAM     ROM     A/D     CR_RAM  EEPROM  IO_BRD
```

(Continued) Device Test Results for: RELAY STATUS CHECK

```
         37.0    OK       OK       OK       OK       OK       OK

  Relay Enabled

 =>>
```

Device Test Results for: RELAY SETTING VERIFICATION

```
       Verify SETTINGS are as specified

                   (O) PASS

                   ( ) FAIL


  By selecting PASS you have determined that SETTINGS
  on this device are as specified.

  If selecting FAIL, add an explanation below.

  NOTES:
```

Device Test Results for: CURRENT\VOLTAGE INJECTION METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
69.28	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	7.4	7.4	-0.0	72.0	72.0	-0.1	PASS
B-N	7.6	7.6	0.1	80.0	79.9	-0.1	PASS
C-N	7.8	7.8	0.1	88.0	88.0	-0.0	PASS

CALCULATED MEGA WATT	MEASURED MEGA WATT	% ERROR	CALCULATED MEGA VAR	MEASURED MEGA VAR	% ERROR	OK?
1.6	1.6	0.1	0.9	0.9	-0.1	PASS

Device Test Results for: RELAY INPUT VERIFICATION

Verify operation of the RELAY INPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that INPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RELAY OUTPUT VERIFICATION

Verify operation of the RELAY OUTPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that OUTPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM FUNTIONALITY

Verify functionality of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM is functional.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM PERFORMANCE

Verify PERFORMANCE of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM meets the PERFORMANCE CRITERIA pertinent to the communications technology applied.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CURRENT SIGNAL VALUE VERIFICATION

Verify CURRENT SIGNAL VALUES are
provided to the relay

(O) PASS

( ) FAIL

By selecting PASS you have determined that CURRENT SIGNAL VALUES are provided to the protective relay.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: VOLTAGE SIGNAL VALUE VERIFICATION

Verify VOLTAGE SIGNAL VALUES are
provided to the relay

(O) PASS

( ) FAIL

By selecting PASS you have determined that VOLTAGE SIGNAL VALUES are provided to the protective relay.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CONTROL CIRCUITRY VERIFICATIONS

Verify CONTROL CIRCUITRY operations are proven

[x] Verified that each trip coil is able to operate the circuit breaker, interrupting device, or mitigating device.

[x] Verified electrical operation of electromechanical lockout devices.

[x] Verified all paths of the control circuits essential

(Continued) Device Test Results for: CONTROL CIRCUITRY VERIFICATIONS

for proper operation of the Remedial Action Scheme (RAS).

[x] Verified all paths of the trip circuits inclusive of all auxiliary relays through the trip coil(s) of the circuit breakers or other interrupting devices.

(O) PASS

( ) FAIL

By selecting PASS you have determined that CONTROL CIRCUITRY operations have been proven.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: AUTOMATIC RECLOSING OPERATIONS

Verify AUTOMATIC RECLOSING operations are proven

[ ] Verified that Automatic Reclosing, upon initiation, does not issue a premature closing command to the close circuitry.

[x] Verified that each close coil or actuator is able to operate the circuit breaker or mitigating device.

[x] Verified all paths of the control circuits associated with Automatic Reclosing that are essential for proper operation of the Remedial Action Scheme (RAS).

(O) PASS

( ) FAIL

By selecting PASS you have determined that AUTOMATIC RECLOSING operations have been proven.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: ALARMS AND MONITORING VERIFICATION

Verify ALARM and MONITORING signals

[x] Verified that the alarm path conveys alarm signals to a location where corrective action can be initiated.

(O) PASS

( ) FAIL

By selecting PASS you have determined that ALARM and MONITORING signals have been proven.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Device Test Results for: U87P PHASE A CURRENT DIFFERENTIAL UNRESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	28.280	28.000	1.00	PASS

Device Test Results for: U87P PHASE 87A CURRENT DIFFERENTIAL UNRESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	28.000	28.000	0.00	PASS

Device Test Results for: O87P PHASE A CURRENT DIFFERENTIAL RESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.848	0.840	0.98	PASS

Device Test Results for: O87P PHASE 87A CURRENT DIFFERENTIAL RESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.848	0.840	0.98	PASS

Device Test Results for: 87 PHASE A CURRENT DIFFERENTIAL SLOPE 1 PERCENTAGE

RESTRAINT CURRENT	OPERATE CURRENT	IDEAL	RANGE	OK?
7.560	6.17	5.88	5.59 TO 6.17	PASS

Device Test Results for: 87 PHASE A CURRENT DIFFERENTIAL SLOPE 2 PERCENTAGE

RESTRAINT CURRENT	OPERATE CURRENT	IDEAL	RANGE			OK?
11.970	7.94	8.19	7.78	TO	8.60	PASS

Device Test Results for: U87P PHASE B CURRENT DIFFERENTIAL UNRESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	28.280	28.000	1.00	PASS

Device Test Results for: U87P PHASE 87B CURRENT DIFFERENTIAL UNRESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	28.280	28.000	1.00	PASS

Device Test Results for: O87P PHASE B CURRENT DIFFERENTIAL RESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.848	0.840	0.98	PASS

Device Test Results for: O87P PHASE 87B CURRENT DIFFERENTIAL RESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.848	0.840	0.98	PASS

Device Test Results for: 87 PHASE B CURRENT DIFFERENTIAL SLOPE 1 PERCENTAGE

RESTRAINT CURRENT	OPERATE CURRENT	IDEAL	RANGE			OK?
7.560	5.76	5.88	5.59	TO	6.17	PASS

Device Test Results for: 87 PHASE B CURRENT DIFFERENTIAL SLOPE 2 PERCENTAGE

RESTRAINT CURRENT	OPERATE CURRENT	IDEAL	RANGE			OK?
11.970	7.94	8.19	7.78	TO	8.60	PASS

Device Test Results for: U87P PHASE C CURRENT DIFFERENTIAL UNRESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	28.280	28.000	1.00	PASS

Device Test Results for: U87P PHASE 87C CURRENT DIFFERENTIAL UNRESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	28.280	28.000	1.00	PASS

Device Test Results for: O87P PHASE C CURRENT DIFFERENTIAL RESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.848	0.840	0.98	PASS

Device Test Results for: O87P PHASE 87C CURRENT DIFFERENTIAL RESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.848	0.840	0.98	PASS

Device Test Results for: 87 PHASE C CURRENT DIFFERENTIAL SLOPE 1 PERCENTAGE

RESTRAINT CURRENT	OPERATE CURRENT	IDEAL	RANGE			OK?
7.560	6.00	5.88	5.59	TO	6.17	PASS

Device Test Results for: 87 PHASE C CURRENT DIFFERENTIAL SLOPE 2 PERCENTAGE

RESTRAINT CURRENT	OPERATE CURRENT	IDEAL	RANGE			OK?
11.970	8.11	8.19	7.78	TO	8.60	PASS

Device Test Results for: 50H1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		3.232	3.200	1.00	PASS
B-N		3.232	3.200	1.00	PASS
C-N		3.232	3.200	1.00	PASS

Device Test Results for: 50H1D PHASE OVERCURRENT TIME DELAY

50H1D PHASE OVERCURRENT TIME DELAY (PHASE A-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE			OK?
1.20	3.840	22.49	0.375	0.308	TO	0.392	PASS

50H1D PHASE OVERCURRENT TIME DELAY (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE			OK?
1.20	3.840	22.42	0.374	0.308	TO	0.392	PASS

50H1D PHASE OVERCURRENT TIME DELAY (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE			OK?
1.20	3.840	22.51	0.375	0.308	TO	0.392	PASS

Device Test Results for: 50H2PA PHASE A OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	9.292	9.200	1.00	PASS

Device Test Results for: 50H2D PHASE OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE			OK?
1.20	11.040	9.47	0.158	0.098	TO	0.162	PASS

Device Test Results for: 50R1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	3.200	3.200	0.00	PASS

Device Test Results for: 50R1D ZERO SEQUENCE OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	3.840	22.43	0.374	0.308 TO 0.392	PASS

Device Test Results for: 50R2P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
9.200	9.200	0.00	PASS

Device Test Results for: 50R2D ZERO SEQUENCE OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	11.040	9.59	0.160	0.098 TO 0.162	PASS

Device Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
69.28	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	7.4	7.4	-0.0	72.0	71.9	-0.1	PASS
B-N	7.6	7.6	0.1	80.0	79.9	-0.1	PASS
C-N	7.8	7.8	-0.0	88.0	88.0	-0.1	PASS

CALCULATED MEGA WATT	MEASURED MEGA WATT	% ERROR	CALCULATED MEGA VAR	MEASURED MEGA VAR	% ERROR	OK?
1.6	1.6	0.1	0.9	0.9	-0.0	PASS

Device Test Results for: 27P1P PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
61.677	62.300	-1.00	PASS

Device Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	3.232	3.200	1.00	PASS
B-N	3.232	3.200	1.00	PASS
C-N	3.200	3.200	0.00	PASS

Device Test Results for: 50P1D PHASE OVERCURRENT TIME DELAY

50P1D PHASE OVERCURRENT TIME DELAY (PHASE A-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	3.840	22.60	0.377	0.308 TO 0.392	PASS

50P1D PHASE OVERCURRENT TIME DELAY (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	3.840	22.60	0.377	0.308 TO 0.392	PASS

50P1D PHASE OVERCURRENT TIME DELAY (PHASE C-N)

(Continued) Device Test Results for: 50P1D PHASE OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	3.840	22.57	0.376	0.308 TO 0.392	PASS

Device Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	9.292	9.200	1.00	PASS
B-N	9.292	9.200	1.00	PASS
C-N	9.200	9.200	0.00	PASS

Device Test Results for: 50P2D PHASE OVERCURRENT TIME DELAY

50P2D PHASE OVERCURRENT TIME DELAY (PHASE A-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	11.040	9.50	0.158	0.098 TO 0.162	PASS

50P2D PHASE OVERCURRENT TIME DELAY (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	11.040	9.48	0.158	0.098 TO 0.162	PASS

50P2D PHASE OVERCURRENT TIME DELAY (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	11.040	9.62	0.160	0.098 TO 0.162	PASS

Device Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
50.096	49.600	1.00	PASS

Device Test Results for: 50G1D ZERO SEQUENCE OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	59.520	13.44	0.224	0.165 TO 0.235	PASS

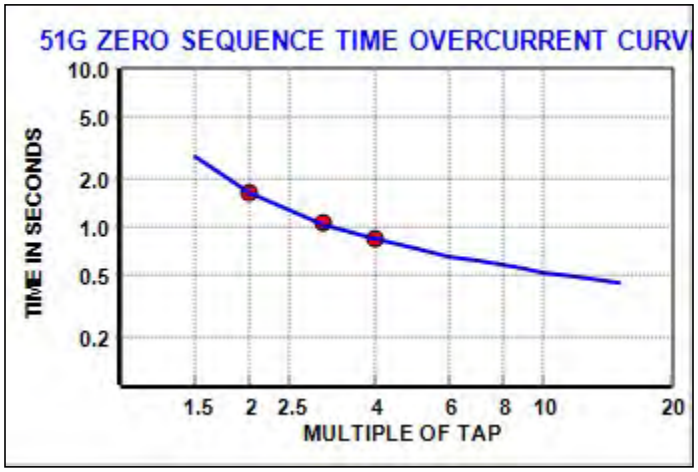
Device Test Results for: 51GP ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
2.100	2.100	-0.00	PASS

Device Test Results for: 51G ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.200	97.98	1.633	1.627	0.35	PASS
3.00	6.300	62.69	1.045	1.040	0.43	PASS
4.00	8.400	49.82	0.830	0.832	-0.22	PASS

Graph for Test: 51G ZERO SEQUENCE TIME OVERCURRENT CURVE



Device Test Results for: 51VP VOLTAGE RESTRAINED TIME OVERCURRENT PICKUP 100% VNOM

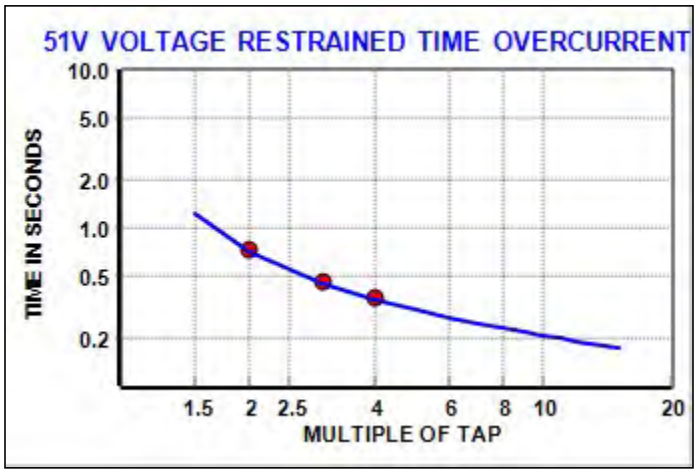
PICKUP	CURRENT	IDEAL	%ERROR	OK?
	3.500	3.500	0.00	PASS

Device Test Results for: 51VP VOLTAGE RESTRAINED TIME OVERCURRENT PICKUP 75% VNOM

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	2.651	2.625	0.99	PASS

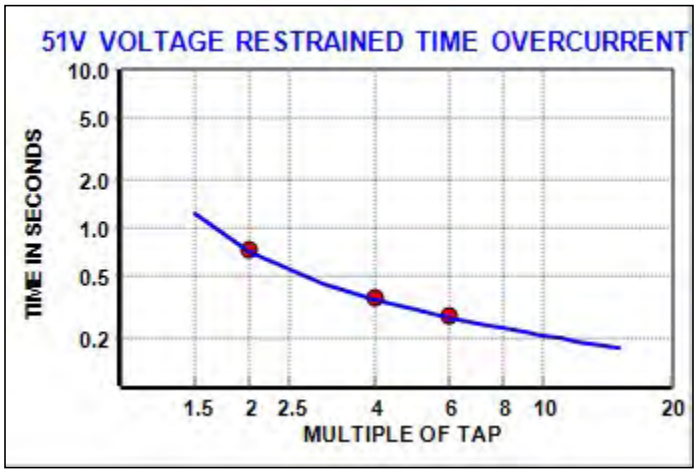
Device Test Results for: 51V VOLTAGE RESTRAINED TIME OVERCURRENT CURVE 100% VNOM

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	7.000	43.31	0.722	0.711	1.46	PASS
3.00	10.500	27.10	0.452	0.445	1.46	PASS
4.00	14.000	21.82	0.364	0.351	3.66	PASS



Device Test Results for: 51V VOLTAGE RESTRAINED TIME OVERCURRENT CURVE 75% VNOM

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	5.250	43.52	0.725	0.711	1.95	PASS
4.00	10.500	21.49	0.358	0.351	2.12	PASS
6.00	15.750	16.51	0.275	0.269	2.24	PASS



Device Test Results for: 59P1P PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.200	76.200	0.00	PASS

Device Test Results for: 27B81P UNDERVOLTAGE FRQEUENCY BLOCK

PICKUP VOLTS	IDEAL	%ERROR	OK?
49.500	50.000	-1.00	PASS

Device Test Results for: 81D1P FRQEUENCY PICKUP

PICKUP HZ	IDEAL	RANGE	OK?
54.990	55.000	54.950 TO 55.050	PASS

Device Test Results for: 81D1D FRQEUENCY TIME DELAY

APPLIED VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
54.800	14.62	0.267	0.200 TO 0.275	PASS

Device Test Results for: 81D2P FRQEUENCY PICKUP

PICKUP HZ	IDEAL	RANGE	OK?
65.000	65.000	64.950 TO 65.050	PASS

Device Test Results for: 81D2D FRQEUENCY TIME DELAY

APPLIED VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
65.200	16.74	0.257	0.200 TO 0.275	PASS

Device Test Results for: 27VSP SYNCHRONIZING PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
10.000	10.000	0.00	PASS

Device Test Results for: 25VLO SOURCE VS SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
61.677	62.300	-1.00	PASS

Device Test Results for: 25VHI SOURCE VS SYNCHRONIZING PHASE HIGH VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.200	76.200	0.00	PASS

Device Test Results for: 25ANG1 SYNCHRONIZING ANGLE 1

LAGGING ANGLE	IDEAL	RANGE	OK?
18.00	15.00	11.00 TO 19.00	PASS

LEADING ANGLE	IDEAL	RANGE	OK?
341.00	345.00	341.00 TO 349.00	PASS

Device Test Results for: 25ANG2 SYNCHRONIZING ANGLE 2

LAGGING ANGLE	IDEAL	RANGE	OK?
13.00	15.00	11.00 TO 19.00	PASS

LEADING ANGLE	IDEAL	RANGE	OK?
344.00	345.00	341.00 TO 349.00	PASS

Device Test Results for: 25SLO MINIMUM SYNCHRONIZING SLIP FREQUENCY

DROPOUT HZ	IDEAL	RANGE	OK?
59.985	59.950	59.900 TO 60.000	PASS

Device Test Results for: 25SHI MAXIMUM SYNCHRONIZING SLIP FREQUENCY

DROPOUT HZ	IDEAL	RANGE	OK?
60.085	60.100	60.050 TO 60.150	PASS

Device Test Results for: 50N1P NEUTRAL OVERCURRENT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
3.232	3.200	1.00	PASS

Device Test Results for: 50N1D NEUTRAL OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	3.840	22.44	0.374	0.308 TO 0.392	PASS

Routine Version	SEL-551.FST_LIB	**AFAL**	AL	**Test Date**	12/21/2023
				Pass/Fail	PASS

Device Data:

Customer:	City of Ann Arbor Waste Water Treatment		
Job_Number:	230858	SUBSTATION:	Generator Switchgear
Relay_ID:	Load Bank SEL-551	PHASE_ZONE:	
RELAY_MANF:	SEL	RELAY_TYPE:	SEL-551
MODEL_STYLE:	0551003X551X	IEEE_DEVICE:	MF
IL_IB:		SERIAL_NUMBER:	1132620133
FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408		
NERC_AUDITABLE:	0	MAINT_INTERVAL:	0
PREVIOUS_TESTDATE:	3/2/2020	CURRENT_TESTDATE:	12/21/2023
NEXT_TESTDATE:	12/21/2026	TESTSET_CALDATE:	2/15/2023
Tested_BY:	Edward Penland		

Routine Notes:

Device Settings Used for Testing:

```
RID$=     "GEN LOADBANK"  TID$=     "LOAD BANK"     CTR=      40
CTRN=     40              TDURD=    9.000           s50P1P=   5.2
s50P2P$=  "OFF"           s50P3P$=  "OFF"           s50P4P$=  "OFF"
s50P5P$=  "OFF"           s50P6P$=  "OFF"           s50ABCP$= "OFF"
s51P1P=   2.8             s51P1C$=  "U1"            s51P1TD=  0.50
s51P1RS$= "N"             s51P2P$=  "OFF"           s51P2C$=  "U3"
s51P2TD=  15.00           s51P2RS$= "N"             s50N1P$=  "OFF"
s50N2P$=  "OFF"           s51N1P$=  "OFF"           s51N1C$=  "U4"
s51N1TD=  3.00            s51N1RS$= "N"             s50G1P=   12.5
s50G2P$=  "OFF"           s51G1P=   1.5             s51G1C$=  "U1"
s51G1TD=  1.49            s51G1RS$= "N"             s50Q1P$=  "OFF"
s50Q2P$=  "OFF"           s51Q1P$=  "OFF"           s51Q1C$=  "U3"
s51Q1TD=  15.00           s51Q1RS$= "N"             s51Q2P$=  "OFF"
s51Q2C$=  "U3"            s51Q2TD=  15.00           s51Q2RS$= "N"
s79OI1=   0.000           s79OI2=   600.000         s79OI3=   0.000
s79OI4=   0.000           s79RSD=   1800.000        s79RSLD=  300.000
CFD=      60.000          DMTC=     5               PDEMP=    5.00
NDEMP=    1.50            GDEMP=    1.50            QDEMP=    1.50
SV5PU=    0.000           SV5DO=    0.000           SV6PU=    0.000
SV6DO=    0.000           SV7PU=    0.000           SV7DO=    0.000
SV8PU=    0.000           SV8DO=    0.000           SV9PU=    0.000
SV9DO=    0.000           SV10PU=   0.000           SV10DO=   0.000
SV11PU=   0.000           SV11DO=   0.000           SV12PU=   0.000
SV12DO=   0.000           SV13PU=   0.000           SV13DO=   0.000
SV14PU=   0.000           SV14DO=   0.000           NFREQ=    60
PHROT$=   "ABC"           DATE_F$=  "MDY"           TR$=      "51P1T + 51G1T + 50P1 + 50G1"
ULTR$=    "!(51P1 + 51G1)"s51P1TC=  1               s51P2TC=  1
s51N1TC=  1               s51G1TC=  1               s51Q1TC=  1
s51Q2TC=  1               s52A$=    "IN1"           CL$=      "LB4"
ULCL$=    "TRIP"          s79RI$=   "TRIP"          s79RIS$=  "IN1"
s79DTL$=  "!LB1 + LB3"    s79DLS$=  "79LO"          s79SKP$=  "50P2 * SH0"
s79STL$=  "TRIP"          s79BRS$=  "(51P1 + 51G1) * (79RS + 79CY)"

s79SEQ=   0               ER1$=     "51P1 + 51G1 + 51N1"

ER2=      0               SV1=      0               SV2=      0
SV3=      0               SV4=      0               SV5=      0
SV6=      0               SV7=      0               SV8=      0
SV9=      0               SV10=     0               SV11=     0
SV12=     0               SV13=     0               SV14=     0
OUT1$=    "TRIP"          OUT2=     0               OUT3=     0
OUT4=     0               DP1$=     "IN1"           DP2=      0
DP3=      0               DP4=      0               DP5=      0
DP6=      0               DP7=      0               DP8=      0
```

Global Defines:

```
CONTACT$="4"        'OUTPUT CONTACT TO MASK
SEL_AUTO=1          '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1          'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1            'NO ERROR MESSAGE IF NO OPERATION
```

Device Test Results for: RELAY STATUS CHECK

N/A

Additional Data:
STA

GEN LOADBANK Date: 12/21/23 Time: 08:34:14.014
LOAD BANK

FID=SEL-551-R514-Vf-Z002002-D20110408 CID=CCFD

SELF TESTS

W=Warn F=Fail

	IA	IB	IC	IN	MOF
OS	3	3	3	3	0

	+5V_PS	+5V_REG	-5V_REG	+10V_PS	-10V_PS	VBAT
PS	4.99	5.01	-4.98	9.97	-10.02	3.48

TEMP	RAM	ROM	CR_RAM	EEPROM
32.8	OK	OK	OK	OK

Relay Enabled

=>>

Device Test Results for: RELAY SETTING VERIFICATION

Verify SETTINGS are as specified

(O) PASS

( ) FAIL

By selecting PASS you have determined that SETTINGS
on this device are as specified.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CURRENT INJECTION METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	72.0	72.0	0.0	PASS
B-N	0.0	0.0	0.0	80.0	79.0	-1.2	PASS
C-N	0.0	0.0	0.0	88.0	88.0	0.0	PASS

Device Test Results for: RELAY INPUT VERIFICATION

Verify operation of the RELAY INPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that INPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RELAY OUTPUT VERIFICATION

Verify operation of the RELAY OUTPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that OUTPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM FUNTIONALITY

Verify functionality of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM is functional.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM PERFORMANCE

Verify PERFORMANCE of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM meets the PERFORMANCE CRITERIA pertinent to the communications technology applied.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CURRENT SIGNAL VALUE VERIFICATION

Verify CURRENT SIGNAL VALUES are
provided to the relay

(O) PASS

( ) FAIL

By selecting PASS you have determined that CURRENT
SIGNAL VALUES are provided to the protective relay.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CONTROL CIRCUITRY VERIFICATIONS

Verify CONTROL CIRCUITRY operations are proven

[x] Verified that each trip coil is able to operate the circuit breaker, interrupting device, or mitigating device.

[x] Verified electrical operation of electromechanical lockout devices.

[x] Verified all paths of the control circuits essential for proper operation of the Remedial Action Scheme (RAS).

[x] Verified all paths of the trip circuits inclusive of all auxiliary relays through the trip coil(s) of the circuit breakers or other interrupting devices.

(O) PASS

( ) FAIL

By selecting PASS you have determined that CONTROL
CIRCUITRY operations have been proven.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Device Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	72.0	72.0	0.0	PASS
B-N	0.0	0.0	0.0	80.0	80.0	0.0	PASS
C-N	0.0	0.0	0.0	88.0	88.0	0.0	PASS

Device Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	5.200	5.200	-0.00	PASS
B-N	5.200	5.200	-0.00	PASS
C-N	5.200	5.200	-0.00	PASS

Device Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
12.500	12.500	0.00	PASS

Device Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	2.828	2.800	1.00	PASS
B-N	2.800	2.800	0.00	PASS
C-N	2.828	2.800	1.00	PASS

Device Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	5.600	23.50	0.392	0.384	2.03	PASS
3.00	8.400	14.94	0.249	0.245	1.48	PASS
4.00	11.200	12.22	0.204	0.196	3.79	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

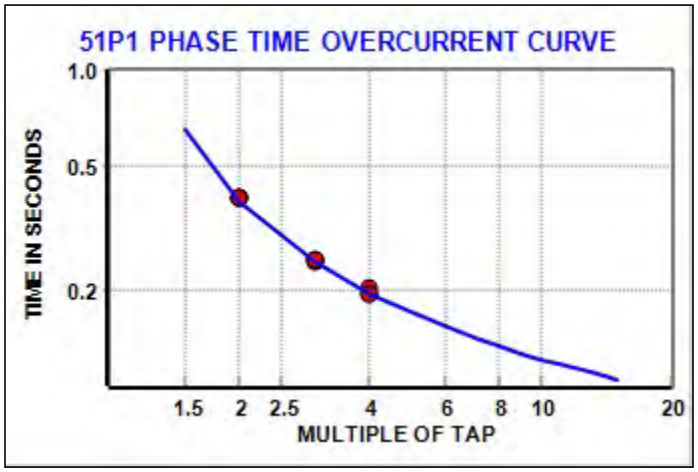
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	5.600	23.54	0.392	0.384	2.21	PASS
3.00	8.400	14.75	0.246	0.245	0.17	PASS
4.00	11.200	11.75	0.196	0.196	-0.18	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	5.600	23.58	0.393	0.384	2.40	PASS

(Continued) Device Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

3.00	8.400	14.95	0.249	0.245	1.56	PASS
4.00	11.200	11.76	0.196	0.196	-0.13	PASS

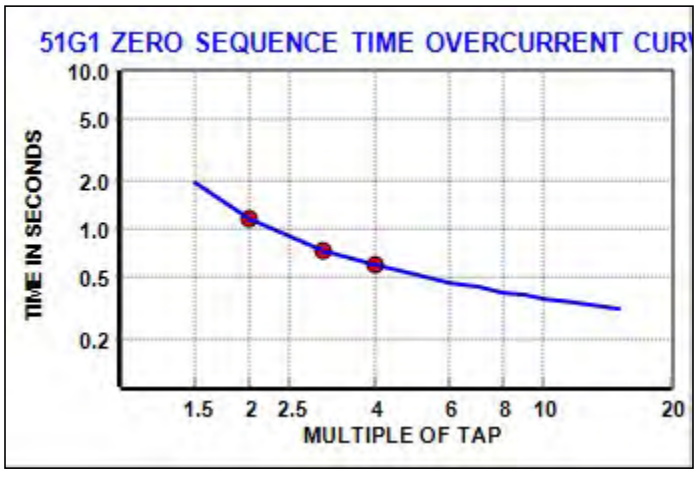


Device Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	1.485	1.500	-1.00	PASS

Device Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	3.000	69.03	1.150	1.144	0.59	PASS
3.00	4.500	43.72	0.729	0.731	-0.36	PASS
4.00	6.000	35.59	0.593	0.585	1.41	PASS



Routine	SEL-587Z.FST_LIB	**AFAL**	AL	**Test Date**	2/14/2024
Version	8.1			**Pass/Fail**	PASS

Device Data:

Customer:	City of Ann Arbor Waste Water Treatment		
Job_Number:	230858	SUBSTATION:	Sub 8
Relay_ID:	Bus A Differential	PHASE_ZONE:	
RELAY_MANF:	SEL	RELAY_TYPE:	SEL-587Z
MODEL_STYLE:		IEEE_DEVICE:	MF
IL_IB:		SERIAL_NUMBER:	
FIRMWARE:	SEL-587Z-R102-V0-Z001001-D20020903		
NERC_AUDITABLE:	0	MAINT_INTERVAL:	0
PREVIOUS_TESTDATE:		CURRENT_TESTDATE:	
NEXT_TESTDATE:		TESTSET_CALDATE:	
Tested_BY:			

Routine Notes:

Device Settings Used for Testing:

RID$=	"BUS 1"	TID$=	"STATION A"	CTR=	240
TDURD=	9.000	s87A1P=	200	s87A2P=	90
s87B1P=	200	s87B2P=	90	s87C1P=	200
s87C2P=	90	s50P1P$=	"OFF"	s50P2P$=	"OFF"
s50P3P$=	"OFF"	s50A1P$=	"OFF"	s50A2P$=	"OFF"
s50B1P$=	"OFF"	s50B2P$=	"OFF"	s50C1P$=	"OFF"
s50C2P$=	"OFF"	s51PP$=	"OFF"	s51PC$=	"U3"
s51PTD=	15.00	s51PRS$=	"N"	s51AP$=	"OFF"
s51AC$=	"U3"	s51ATD=	15.00	s51ARS$=	"N"
s51BP$=	"OFF"	s51BC$=	"U3"	s51BTD=	15.00
s51BRS$=	"N"	s51CP$=	"OFF"	s51CC$=	"U3"
s51CTD=	15.00	s51CRS$=	"N"	s50G1P$=	"OFF"
s50G2P$=	"OFF"	s51GP$=	"OFF"	s51GC$=	"U3"
s51GTD=	15.00	s51GRS$=	"N"	s50Q1P$=	"OFF"
s50Q2P$=	"OFF"	s51QP$=	"OFF"	s51QC$=	"U3"
s51QTD=	15.00	s51QRS$=	"N"	CFD=	60.000
DMTC=	5	PDEMP=	5.00	GDEMP=	1.50
QDEMP=	1.50	SV5PU=	120.000	SV5DO=	0.000
SV6PU=	15.000	SV6DO=	0.000	SV7PU=	0.000
SV7DO=	0.000	SV8PU=	0.000	SV8DO=	0.000
SV9PU=	0.000	SV9DO=	0.000	SV10PU=	0.000
SV10DO=	0.000	SV11PU=	0.000	SV11DO=	0.000
SV12PU=	0.000	SV12DO=	0.000	SV13PU=	0.000
SV13DO=	0.000	SV14PU=	0.000	SV14DO=	0.000
NFREQ=	60	PHROT$=	"ABC"	DATE_F$=	"MDY"
TR1$=	"87A1 + 87B1 + 87C1 + 50A1 + 50B1 + 50C1"				
TR2=	0	TR3=	0		
ULTR1$=	"!87A2 * !87B2 * !87C2 * !50A2 * !50B2 * !50C2 "				
ULTR2=	1	ULTR3=	1	s51PTC=	1
s51ATC=	1	s51BTC=	1	s51CTC=	1
s51GTC=	1	s51QTC=	1	s52A=	0
CL=	0	ULCL$=	"TRIP1"	ER1$=	"87A1 + 87B1 + 87C1"
ER2$=	"87A2 + 87B2 + 87C2"				
SV1=	0	SV2=	0	SV3=	0
SV4=	0	SV5=	0	SV6=	0
SV7=	0	SV8=	0	SV9=	0
SV10=	0	SV11=	0	SV12=	0
SV13=	0	SV14=	0	OUT1$=	"TRIP1"
OUT2$=	"TRIP1"	OUT3$=	"SV5T + SV6T"	OUT4=	0
DP1=	0	DP2=	0	DP3=	0
DP4=	0	DP5=	0	DP6=	0
DP7=	0	DP8=	0	P1_PROTO$=	"MOD"
P1_SPEED=	19200	P1_PARITY$=	"E"	P1_STOP=	1
P1_SLAVE=	3	PF_PROTO$=	"SEL"	PF_SPEED=	19200
PF_BITS=	8	PF_PARITY$=	"N"	PF_STOP=	1
PF_T_OUT=	15	PF_AUTO$=	"N"	PF_RTSCTS$=	"N"
PF_FASTOP$=	"N"				

Global Defines:

```
CONTACT$="4"         'OUTPUT CONTACT TO MASK
SEL_AUTO=1           '0=MANUAL, 1=AUTO MASK, 2=MANUAL W/MESSAGES
SKIP_TST=1           'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1             'NO ERROR MESSAGE IF NO OPERATION
```

Device Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

BUS 1                              Date: 02/14/2024    Time: 10:07:03.223
STATION A

FID=SEL-587Z-R102-V0-Z001001-D20020903      CID=0C9F

SELF TESTS

W=Warn    F=Fail

       87A      87B      87C      IA       IB       IC       MOF
OS      2        3        3        3        3        3        0

       +5V_PS   +5V_REG  -5V_REG  +10V_PS  -10V_PS  VBAT
PS      4.96     4.98    -5.04     9.95    -10.05    3.42

       TEMP     RAM      ROM      CR_RAM   EEPROM
        29.6    OK       OK       OK       OK

 Relay Enabled

=>>
```

Device Test Results for: RELAY SETTING VERIFICATION

Verify SETTINGS are as specified

(O) PASS

( ) FAIL

By selecting PASS you have determined that SETTINGS on this device are as specified.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RELAY INPUT VERIFICATION

Verify operation of the RELAY INPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that INPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RELAY OUTPUT VERIFICATION

Verify operation of the RELAY OUTPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that OUTPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM FUNTIONALITY

Verify functionality of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM is functional.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM PERFORMANCE

Verify PERFORMANCE of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM meets the PERFORMANCE CRITERIA pertinent to the communications technology applied.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CONTROL CIRCUITRY VERIFICATIONS

Verify CONTROL CIRCUITRY operations are proven

[x] Verified that each trip coil is able to operate the circuit breaker, interrupting device, or mitigating device.

[x] Verified electrical operation of electromechanical lockout devices.

[x] Verified all paths of the control circuits essential for proper operation of the Remedial Action Scheme (RAS).

[x] Verified all paths of the trip circuits inclusive of all auxiliary relays through the trip coil(s) of the circuit breakers or other interrupting devices.

(O) PASS

( ) FAIL

By selecting PASS you have determined that CONTROL CIRCUITRY operations have been proven.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Device Test Results for: 87A1P PHASE A VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
198.000	200.000	-1.00	PASS

Device Test Results for: 87A2P PHASE A VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
89.100	90.000	-1.00	PASS

Device Test Results for: 87B1P PHASE B VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
196.000	200.000	-2.00	PASS

Device Test Results for: 87B2P PHASE B VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
88.200	90.000	-2.00	PASS

Device Test Results for: 87C1P PHASE C VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
196.000	200.000	-2.00	PASS

Device Test Results for: 87C2P PHASE C VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
89.100	90.000	-1.00	PASS

Routine	SEL-587Z.FST_LIB	**AFAL**	AL	**Test Date**	2/15/2024
Version	8.1			**Pass/Fail**	PASS

Device Data:

Customer:	City of Ann Arbor Waste Water Treatment		
Job_Number:	230858	SUBSTATION:	Sub 8
Relay_ID:	Bus B Differential	PHASE_ZONE:	
RELAY_MANF:	SEL	RELAY_TYPE:	SEL-587Z
MODEL_STYLE:		IEEE_DEVICE:	MF
IL_IB:		SERIAL_NUMBER:	
FIRMWARE:	SEL-587Z-R102-V0-Z001001-D20020903		
NERC_AUDITABLE:	0	MAINT_INTERVAL:	0
PREVIOUS_TESTDATE:		CURRENT_TESTDATE:	
NEXT_TESTDATE:		TESTSET_CALDATE:	
Tested_BY:			

Routine Notes:

Device Settings Used for Testing:

RID$=	"BUS 1"	TID$=	"STATION A"	CTR=	240
TDURD=	9.000	s87A1P=	200	s87A2P=	90
s87B1P=	200	s87B2P=	90	s87C1P=	200
s87C2P=	90	s50P1P$=	"OFF"	s50P2P$=	"OFF"
s50P3P$=	"OFF"	s50A1P$=	"OFF"	s50A2P$=	"OFF"
s50B1P$=	"OFF"	s50B2P$=	"OFF"	s50C1P$=	"OFF"
s50C2P$=	"OFF"	s51PP$=	"OFF"	s51PC$=	"U3"
s51PTD=	15.00	s51PRS$=	"N"	s51AP$=	"OFF"
s51AC$=	"U3"	s51ATD=	15.00	s51ARS$=	"N"
s51BP$=	"OFF"	s51BC$=	"U3"	s51BTD=	15.00
s51BRS$=	"N"	s51CP$=	"OFF"	s51CC$=	"U3"
s51CTD=	15.00	s51CRS$=	"N"	s50G1P$=	"OFF"
s50G2P$=	"OFF"	s51GP$=	"OFF"	s51GC$=	"U3"
s51GTD=	15.00	s51GRS$=	"N"	s50Q1P$=	"OFF"
s50Q2P$=	"OFF"	s51QP$=	"OFF"	s51QC$=	"U3"
s51QTD=	15.00	s51QRS$=	"N"	CFD=	60.000
DMTC=	5	PDEMP=	5.00	GDEMP=	1.50
QDEMP=	1.50	SV5PU=	120.000	SV5DO=	0.000
SV6PU=	15.000	SV6DO=	0.000	SV7PU=	0.000
SV7DO=	0.000	SV8PU=	0.000	SV8DO=	0.000
SV9PU=	0.000	SV9DO=	0.000	SV10PU=	0.000
SV10DO=	0.000	SV11PU=	0.000	SV11DO=	0.000
SV12PU=	0.000	SV12DO=	0.000	SV13PU=	0.000
SV13DO=	0.000	SV14PU=	0.000	SV14DO=	0.000
NFREQ=	60	PHROT$=	"ABC"	DATE_F$=	"MDY"
TR1$=	"87A1 + 87B1 + 87C1 + 50A1 + 50B1 + 50C1"				
TR2=	0	TR3=	0		
ULTR1$=	"!87A2 * !87B2 * !87C2 * !50A2 * !50B2 * !50C2 "				
ULTR2=	1	ULTR3=	1	s51PTC=	1
s51ATC=	1	s51BTC=	1	s51CTC=	1
s51GTC=	1	s51QTC=	1	s52A=	0
CL=	0	ULCL$=	"TRIP1"	ER1$=	"87A1 + 87B1 + 87C1"
ER2$=	"87A2 + 87B2 + 87C2"				
SV1=	0	SV2=	0	SV3=	0
SV4=	0	SV5=	0	SV6=	0
SV7=	0	SV8=	0	SV9=	0
SV10=	0	SV11=	0	SV12=	0
SV13=	0	SV14=	0	OUT1$=	"TRIP1"
OUT2$=	"TRIP1"	OUT3$=	"SV5T + SV6T"	OUT4=	0
DP1=	0	DP2=	0	DP3=	0
DP4=	0	DP5=	0	DP6=	0
DP7=	0	DP8=	0	P1_PROTO$=	"MOD"
P1_SPEED=	19200	P1_PARITY$=	"E"	P1_STOP=	1
P1_SLAVE=	15	PF_PROTO$=	"SEL"	PF_SPEED=	19200
PF_BITS=	8	PF_PARITY$=	"N"	PF_STOP=	1
PF_T_OUT=	15	PF_AUTO$=	"N"	PF_RTSCTS$=	"N"
PF_FASTOP$=	"N"				

Global Defines:

```
CONTACT$="4"         'OUTPUT CONTACT TO MASK
SEL_AUTO=1           '0=MANUAL, 1=AUTO MASK, 2=MANUAL W/MESSAGES
SKIP_TST=0           'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=0             'NO ERROR MESSAGE IF NO OPERATION
```

Device Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

BUS 1                              Date: 02/15/2024    Time: 09:44:05.648
STATION A

FID=SEL-587Z-R102-V0-Z001001-D20020903      CID=0C9F

SELF TESTS

W=Warn    F=Fail

       87A      87B      87C      IA       IB       IC       MOF
OS      2        3        3        3        3        3        0

       +5V_PS   +5V_REG  -5V_REG  +10V_PS  -10V_PS  VBAT
PS      4.98     5.01    -5.04     9.94    -10.00    3.41

       TEMP     RAM      ROM      CR_RAM   EEPROM
        29.6    OK       OK       OK       OK

 Relay Enabled

=>>
```

Device Test Results for: RELAY SETTING VERIFICATION

Verify SETTINGS are as specified

(O) PASS

( ) FAIL

By selecting PASS you have determined that SETTINGS on this device are as specified.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RELAY INPUT VERIFICATION

Verify operation of the RELAY INPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that INPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: RELAY OUTPUT VERIFICATION

Verify operation of the RELAY OUTPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that OUTPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM FUNTIONALITY

Verify functionality of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM is functional.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: COMMUNICATIONS SYSTEM PERFORMANCE

Verify PERFORMANCE of the COMMUNICATIONS SYSTEM

(O) PASS

( ) FAIL

By selecting PASS you have determined that the COMMUNICATIONS SYSTEM meets the PERFORMANCE CRITERIA pertinent to the communications technology applied.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: CONTROL CIRCUITRY VERIFICATIONS

Verify CONTROL CIRCUITRY operations are proven

[x] Verified that each trip coil is able to operate the circuit breaker, interrupting device, or mitigating device.

[x] Verified electrical operation of electromechanical lockout devices.

[x] Verified all paths of the control circuits essential for proper operation of the Remedial Action Scheme (RAS).

[x] Verified all paths of the trip circuits inclusive of all auxiliary relays through the trip coil(s) of the circuit breakers or other interrupting devices.

(O) PASS

( ) FAIL

By selecting PASS you have determined that CONTROL CIRCUITRY operations have been proven.

If selecting FAIL, add an explanation below.

NOTES:

Device Test Results for: 87A1P PHASE A VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
198.000	200.000	-1.00	PASS

Device Test Results for: 87A2P PHASE A VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
89.100	90.000	-1.00	PASS

Device Test Results for: 87B1P PHASE B VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
196.000	200.000	-2.00	PASS

Device Test Results for: 87B2P PHASE B VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
88.200	90.000	-2.00	PASS

Device Test Results for: 87C1P PHASE C VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
196.000	200.000	-2.00	PASS

Device Test Results for: 87C2P PHASE C VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
88.200	90.000	-2.00	PASS

Routine	SR-469.FST_LIB	**AFAL**	AL	**Test Date**	2/14/2024
Version	2.7			**Pass/Fail**	PASS

Device Data:

Customer:	City of Ann Arbor Waste Water Treatment		
Job_Number:	230858	SUBSTATION:	Sub 8
Relay_ID:	PAB-E1	PHASE_ZONE:	
RELAY_MANF:	GE MULTILIN	RELAY_TYPE:	SR-469
MODEL_STYLE:		IEEE_DEVICE:	
IL_IB:		SERIAL_NUMBER:	
FIRMWARE:		NERC_AUDITABLE:	0
MAINT_INTERVAL:	0	PREVIOUS_TESTDATE:	
CURRENT_TESTDATE:		NEXT_TESTDATE:	
TESTSET_CALDATE:		Tested_BY:	

Routine Notes:

Device Settings Used for Testing:

SR_PART_NUM$=	"469-P5-HI-A20-T"
SR_FIRMWARE$=	"5200"
Default_Message_Cycle_Time=	2.0
Default_Message_Timeout=	300
Average_Motor_Load_Calculation_Period=	15
Temperature_Display_Units$=	"Celsius"
Trace_Memory_Trigger_Position=	25
Trace_Memory_Buffers$=	"8 x 28 cycles"
Display_Update_Interval=	0.4
Motor_Load_Filter_Interval=	0
Communication_Port_Passcode=	0
Passcode_write_Only_=	0
First_Scratchpad_Message$=	"Text 1"
Second_Scratchpad_Message$=	"Text 2"
Third_Scratchpad_Message$=	"Text 3"
Fourth_Scratchpad_Message$=	"Text 4"
Fifth_Scratchpad_Message$=	"GE MULTILIN 469 Motor Relay "
Phase_CT_Primary=	150

Device Settings (Continued):

Motor_Full_Load_Amps=	72
Ethernet_IP_Address=	0
Ethernet_Subnet_Mask=	4294966272
Ethernet_Gateway_Address=	0
DeviceNet_MAC_ID=	63
DeviceNet_Baud_Rate$=	"125 kbps"
Front_RS232_baud_rate$=	"19200 baud"
Slave_Address=	1
Computer_RS485_Baud_Rate$=	"19200 baud"
Computer_RS485_Parity$=	"None"
Auxiliary_RS485_Baud_Rate$=	"9600 baud"
Auxiliary_RS485_Parity$=	"None"
Ground_CT_Type$=	"5 A Secondary"
Phase_Differential_CT_Type$=	"None"
Enable_Two_Speed_Motor_Option$=	"Off/No"
Speed_Two_Phase_CT_Primary=	100
Speed_Two_Motor_Full_Load_Amps=	1
VoltageTransformer_Connection_Type$=	"Open Delta"
Enable_Single_VT_Connection$=	"Off"
Voltage_Transformer_Ratio=	35.00
Motor_Nameplate_Voltage=	4200
Nominal_System_Frequency$=	"60 Hz"
System_Phase_Sequence$=	"ABC"
Serial_Communication_Control$=	"Off/No"
Assign_Start_Control_Relays$=	"Auxiliary 2"
Reduced_Voltage_Starting$=	"Off/No"
Control_Relays_for_Reduced_Voltage_Starting$=	"Auxiliary 3"
Transition_On$=	"Current Only"

Device Settings (Continued):

```
Reduced_Voltage_Start_Level=                100

Reduced_Voltage_Start_Timer=                200

Incomplete_Sequence_Trip_Relays$=           "Trip"

Starter_Status_Switch$=                     "Start Aux a"

Assignable_Input_1_Function$=               "Off"

Counter_Alarm_Events$=                      "Off/No"

Rated_Speed=                                3600

Tachometer_Alarm$=                          "Off"

Tachometer_Alarm_Relays$=                   "Alarm"

Tachometer_Alarm_Speed=                     10

Tachometer_Alarm_Delay=                     1

Tachometer_Alarm_Events$=                   "Off/No"

Tachometer_Trip$=                           "Off"

Tachometer_Trip_Relays$=                    "Trip"

Tachometer_Trip_Speed=                      10

Tachometer_Trip_Delay=                      1

General_Switch_A_Name=                      0

General_Switch_A_Normal_State$=             "Normally Open"

General_Switch_A_Block_Input_From_Start=    0

General_Switch_A_Alarm$=                    "Off"

General_Switch_A_Alarm_Relays$=             "Alarm"

General_Switch_A_Alarm_Delay=               5.0

General_Switch_A_Alarm_Events$=             "Off/No"

General_Switch_A_Trip$=                     "Off"

General_Switch_A_Trip_Relays$=              "Trip"

General_Switch_A_Trip_Delay=                5.0

General_Switch_B_Name=                      0

General_Switch_B_Normal_State$=             "Normally Open"
```

Device Settings (Continued):

```
General_Switch_B_Block_Input_From_Start=      0
General_Switch_B_Alarm$=                      "Off"
General_Switch_B_Alarm_Relays$=               "Alarm"
General_Switch_B_Alarm_Delay=                 5.0
General_Switch_B_Alarm_Events$=               "Off/No"
General_Switch_B_Trip$=                       "Off"
General_Switch_B_Trip_Relays$=                "Trip"
General_Switch_B_Trip_Delay=                  5.0
General_Switch_C_Name=                        0
General_Switch_C_Normal_State$=               "Normally Open"
General_Switch_C_Block_Input_From_Start=      0
General_Switch_C_Alarm$=                      "Off"
General_Switch_C_Alarm_Relays$=               "Alarm"
General_Switch_C_Alarm_Delay=                 5.0
General_Switch_C_Alarm_Events$=               "Off/No"
General_Switch_C_Trip$=                       "Off"
General_Switch_C_Trip_Relays$=                "Trip"
General_Switch_C_Trip_Delay=                  5.0
General_Switch_D_Name=                        0
General_Switch_D_Normal_State$=               "Normally Open"
General_Switch_D_Block_Input_From_Start=      0
General_Switch_D_Alarm$=                      "Off"
General_Switch_D_Alarm_Relays$=               "Alarm"
General_Switch_D_Alarm_Delay=                 5.0
General_Switch_D_Alarm_Events$=               "Off/No"
General_Switch_D_Trip$=                       "Off"
General_Switch_D_Trip_Relays$=                "Trip"
General_Switch_D_Trip_Delay=                  5.0
```

Device Settings (Continued):

Assignable_Input_2_Function$=	"Off"
Assignable_Input_3_Function$=	"Off"
Assignable_Input_4_Function$=	"Off"
Reset_Mode_R1_Trip$=	"All Resets"
Force_R1_Output_Relay$=	"Enabled"
Force_R1_Operate_Time=	3
Reset_Mode_R4_Auxiliary$=	"All Resets"
Force_R4_Output_Relay$=	"Disabled"
Force_R4_Operate_Time=	0
Reset_Mode_R2_Auxiliary$=	"All Resets"
Force_R2_Output_Relay$=	"Disabled"
Force_R2_Output_Operate_Time=	3
Reset_Mode_R3_Auxiliary$=	"All Resets"
Force_R3_Output_Relay$=	"Disabled"
Force_R3_Operate_Time=	0
Force_R5_Output_Relay$=	"Disabled"
Force_R5_Operate_Time=	0
Reset_Mode_R6_Service$=	"All Resets"
Curve_Style$=	"Standard"
Overload_Pickup_Level=	1.15
Unbalance_k_Factor=	0
Cool_Time_Constant_Running=	15
Cool_Time_Constant_Stopped=	30
Hot_Cold_Safe_Stall_Ratio=	1.00
RTD_Blasing$=	"Off/No"
RTD_Blas_Minimum=	40
RTD_Blas_Center_Point=	130
RTD_Blas_Maximum=	155

Device Settings (Continued):

Thermal_Capacity_Alarm$=	"Off"
Thermal_Capacity_Alarm_Relays$=	"Alarm"
Thermal_Capacity_Alarm_Level=	75
Thermal_Capacity_Alarm_Events$=	"Off/No"
Overload_Trip_Relays$=	"Trip"
Standard_Overload_Curve_Number=	4
Minimum_Allowable_Line_Voltage=	80
Stall_Current_at_Min_Vline=	4.80
Safe_Stall_Time_at_Min_Vline=	20.0
Accel_Intersect_at_Min_Vline=	3.80
Stall_Current_at_100_Vline=	6.00
Safe_Stall_Time_at_100_Vline=	10.0
Accel_Intersect_at_100_Vline=	5.00
Short_Circuit_Trip$=	"Latched"
Short_Circuit_Trip_Backup$=	"Off/No"
Short_Circuit_Backup_Relays$=	"Aux2"
Short_Circuit_Trip_Backup_Delay=	200
Overload_Alarm$=	"Off"
Overload_Alarm_Relays$=	"Alarm"
Overload_Alarm_Events$=	"Off/No"
Overload_Alarm_Delay=	0.1
Mechanical_Jam_Trip$=	"Off"
Mechanical_Jam_Trip_Relays$=	"Trip"
Mechanical_Jam_Pickup=	1.50
Mechanical_Jam_Delay=	1
Block_Undercurrent_from_Start=	0
Undercurrent_Alarm$=	"Off"
Undercurrent_Alarm_Relays$=	"Alarm"

Device Settings (Continued):

Undercurrent_Alarm_Pickup=	0.70
Undercurrent_Alarm_Delay=	1
Undercurrent_Alarm_Events$=	"Off/No"
Undercurrent_Trip$=	"Off"
Undercurrent_Trip_Relays$=	"Trip"
Undercurrent_Trip_Pickup=	0.70
Undercurrent_Trip_Delay=	1
Current_Unbalance_Alarm$=	"Off"
Current_Unbalance_Alarm_Relays$=	"Alarm"
Current_Unbalance_Alarm_Pickup=	15
Current_Unbalance_Alarm_Delay=	1
Current_Unbalance_Alarm_Events$=	"Off/No"
Current_Unbalance_Trip$=	"Off"
Current_Unbalance_Trip_Relays$=	"Trip"
Current_Unbalance_Trip_Pickup=	20
Current_Unbalance_Trip_Delay=	1
Ground_Fault_Alarm$=	"Off"
Ground_Fault_Alarm_Relays$=	"Alarm"
Ground_Fault_Alarm_Pickup=	0.10
Alarm_Pickup_for_Multlin_CT_50_025=	1.00
Intentional_GF_Alarm_Delay=	0
Ground_Fault_Alarm_Events$=	"Off/No"
Ground_Fault_Trip$=	"Latched"
Ground_Fault_Trip_Relays$=	"Trip"
Ground_Fault_Trip_Pickup=	0.50
Trip_Pickup_for_Multlin_CT_50_025=	1.00
Intentional_GF_Trip_Delay=	200
Ground_Fault_Trip_Backup$=	"Off/No"

Device Settings (Continued):

```
Phase_Differential_Trip$=                    "Off"

Phase_Differential_Trip_Relays$=             "Trip"

Differential_Trip_Pickup_While_Starting=     0.10

Differential_Trip_Delay_While_Starting=      0

Differential_Trip_Pickup_While_Running=      0.10

Differential_Trip_Delay_While_Running=       0

Accleration_Timer_Trip$=                     "Off"

Acceleration_Timer_Trip_Relays$=             "Trip"

Acceleration_Timer_from_Start=               10.0

Start_Inhibit_Block$=                        "Off/No"

Thermal_Capacity_Used_Margin=                25

Jogging_Block$=                              "Off/No"

Maximum_Starts_Hour_Permissible=             3

Time_Between_Starts=                         10

Restart_Block$=                              "Off/No"

Restart_Block_Time=                          1

Stator_RTD_Type$=                            "100 Ohm Platinum"

Bearing_RTD_Type$=                           "100 Ohm Platinum"

Ambient_RTD_Type$=                           "100 Ohm Platinum"

Other_RTD_Type$=                             "100 Ohm Platinum"

RTD_1_Application$=                          "Stator"

RTD_1_Name=                                  0

RTD_1_Alarm$=                                "Off"

RTD_1_Alarm_Relays$=                         "Alarm"

RTD_1_Alarm_Temperature=                     130

RTD_1_Alarm_Events$=                         "Off/No"

RTD_1_Trip$=                                 "Off"

RTD_1_Trip_Voting$=                          "RTD #1"
```

Device Settings (Continued):

RTD_1_Trip_Relays$=	"Trip"
RTD_1_Trip_Temperature=	155
RTD_1_Hi_Alarm$=	"Off"
RTD_1_Hi_Alarm_Relays$=	"Alarm"
RTD_1_Hi_Alarm_Level=	130
RTD_2_Application$=	"Stator"
RTD_2_Name=	0
RTD_2_Alarm$=	"Off"
RTD_2_Alarm_Relays$=	"Alarm"
RTD_2_Alarm_Temperature=	130
RTD_2_Alarm_Events$=	"Off/No"
RTD_2_Trip$=	"Off"
RTD_2_Trip_Voting$=	"RTD #2"
RTD_2_Trip_Relays$=	"Trip"
RTD_2_Trip_Temperature=	155
RTD_2_Hi_Alarm$=	"Off"
RTD_2_Hi_Alarm_Relays$=	"Alarm"
RTD_2_Hi_Alarm_Level=	130
RTD_3_Application$=	"Stator"
RTD_3_Name=	0
RTD_3_Alarm$=	"Off"
RTD_3_Alarm_Relays$=	"Alarm"
RTD_3_Alarm_Temperature=	130
RTD_3_Alarm_Events$=	"Off/No"
RTD_3_Trip$=	"Off"
RTD_3_Trip_Voting$=	"RTD #3"
RTD_3_Trip_Relays$=	"Trip"
RTD_3_Trip_Temperature=	155

Device Settings (Continued):

RTD_3_Hi_Alarm$=	"Off"
RTD_3_Hi_Alarm_Relays$=	"Alarm"
RTD_3_Hi_Alarm_Level=	130
RTD_4_Application$=	"Stator"
RTD_4_Name=	0
RTD_4_Alarm$=	"Off"
RTD_4_Alarm_Relays$=	"Alarm"
RTD_4_Alarm_Temperature=	130
RTD_4_Alarm_Events$=	"Off/No"
RTD_4_Trip$=	"Off"
RTD_4_Trip_Voting$=	"RTD #4"
RTD_4_Trip_Relays$=	"Trip"
RTD_4_Trip_Temperature=	155
RTD_4_Hi_Alarm$=	"Off"
RTD_4_Hi_Alarm_Relays$=	"Alarm"
RTD_4_Hi_Alarm_Level=	130
RTD_5_Application$=	"Stator"
RTD_5_Name=	0
RTD_5_Alarm$=	"Off"
RTD_5_Alarm_Relays$=	"Alarm"
RTD_5_Alarm_Temperature=	130
RTD_5_Alarm_Events$=	"Off/No"
RTD_5_Trip$=	"Off"
RTD_5_Trip_Voting$=	"RTD #5"
RTD_5_Trip_Relays$=	"Trip"
RTD_5_Trip_Temperature=	155
RTD_5_Hi_Alarm$=	"Off"
RTD_5_Hi_Alarm_Relays$=	"Alarm"

Device Settings (Continued):

RTD_5_Hi_Alarm_Level=	130
RTD_6_Application$=	"Stator"
RTD_6_Name=	0
RTD_6_Alarm$=	"Off"
RTD_6_Alarm_Relays$=	"Alarm"
RTD_6_Alarm_Temperature=	130
RTD_6_Alarm_Events$=	"Off/No"
RTD_6_Trip$=	"Off"
RTD_6_Trip_Voting$=	"RTD #6"
RTD_6_Trip_Relays$=	"Trip"
RTD_6_Trip_Temperature=	155
RTD_6_Hi_Alarm$=	"Off"
RTD_6_Hi_Alarm_Relays$=	"Alarm"
RTD_6_Hi_Alarm_Level=	130
RTD_7_Application$=	"Bearing"
RTD_7_Name=	0
RTD_7_Alarm$=	"Off"
RTD_7_Alarm_Relays$=	"Alarm"
RTD_7_Alarm_Temperature=	80
RTD_7_Alarm_Events$=	"Off/No"
RTD_7_Trip$=	"Off"
RTD_7_Trip_Voting$=	"RTD #7"
RTD_7_Trip_Relays$=	"Trip"
RTD_7_Trip_Temperature=	90
RTD_7_Hi_Alarm$=	"Off"
RTD_7_Hi_Alarm_Relays$=	"Alarm"
RTD_7_Hi_Alarm_Level=	80
RTD_8_Application$=	"Bearing"

Device Settings (Continued):

RTD_8_Name=	0
RTD_8_Alarm$=	"Off"
RTD_8_Alarm_Relays$=	"Alarm"
RTD_8_Alarm_Temperature=	80
RTD_8_Alarm_Events$=	"Off/No"
RTD_8_Trip$=	"Off"
RTD_8_Trip_Voting$=	"RTD #8"
RTD_8_Trip_Relays$=	"Trip"
RTD_8_Trip_Temperature=	90
RTD_8_Hi_Alarm$=	"Off"
RTD_8_Hi_Alarm_Relays$=	"Alarm"
RTD_8_Hi_Alarm_Level=	80
RTD_9_Application$=	"Bearing"
RTD_9_Name=	0
RTD_9_Alarm$=	"Off"
RTD_9_Alarm_Relays$=	"Alarm"
RTD_9_Alarm_Temperature=	80
RTD_9_Alarm_Events$=	"Off/No"
RTD_9_Trip$=	"Off"
RTD_9_Trip_Voting$=	"RTD #9"
RTD_9_Trip_Relays$=	"Trip"
RTD_9_Trip_Temperature=	90
RTD_9_Hi_Alarm$=	"Off"
RTD_9_Hi_Alarm_Relays$=	"Alarm"
RTD_9_Hi_Alarm_Level=	80
RTD_10_Application$=	"Bearing"
RTD_10_Name=	0
RTD_10_Alarm$=	"Off"

Device Settings (Continued):

RTD_10_Alarm_Relays$=	"Alarm"
RTD_10_Alarm_Temperature=	80
RTD_10_Alarm_Events$=	"Off/No"
RTD_10_Trip$=	"Off"
RTD_10_Trip_Voting$=	"RTD #10"
RTD_10_Trip_Relays$=	"Trip"
RTD_10_Trip_Temperature=	90
RTD_10_Hi_Alarm$=	"Off"
RTD_10_Hi_Alarm_Relays$=	"Alarm"
RTD_10_Hi_Alarm_Level=	80
RTD_11_Application$=	"Other"
RTD_11_Name=	0
RTD_11_Alarm$=	"Off"
RTD_11_Alarm_Relays$=	"Alarm"
RTD_11_Alarm_Temperature=	80
RTD_11_Alarm_Events$=	"Off/No"
RTD_11_Trip$=	"Off"
RTD_11_Trip_Voting$=	"RTD #11"
RTD_11_Trip_Relays$=	"Trip"
RTD_11_Trip_Temperature=	90
RTD_11_Hi_Alarm$=	"Off"
RTD_11_Hi_Alarm_Relays$=	"Alarm"
RTD_11_Hi_Alarm_Level=	80
RTD_12_Application$=	"Ambient"
RTD_12_Name=	0
RTD_12_Alarm$=	"Off"
RTD_12_Alarm_Relays$=	"Alarm"
RTD_12_Alarm_Temperature=	60

Device Settings (Continued):

RTD_12_Alarm_Events$=	"Off/No"
RTD_12_Trip$=	"Off"
RTD_12_Trip_Voting$=	"RTD #12"
RTD_12_Trip_Relays$=	"Trip"
RTD_12_Trip_Temperature=	80
RTD_12_Hi_Alarm$=	"Off"
RTD_12_Hi_Alarm_Relays$=	"Alarm"
RTD_12_Hi_Alarm_Level=	60
Open_RTD_Sensor_Alarm$=	"Off"
Open_RTD_Sensor_Alarm_Relays$=	"Alarm"
Open_RTD_Sensor_Alarm_Events$=	"Off/No"
RTD_Short_Low_Temp_Alarm$=	"Off"
RTD_Short_Low_Temp_Alarm_Relays$=	"Alarm"
RTD_Short_Low_Temp_Alarm_Events$=	"Off/No"
Undervoltage_Active_Only_If_Bus_Energized$=	"Off/No"
Undervoltage_Alarm$=	"Off"
Undervoltage_Alarm_Relays$=	"Alarm"
Undervoltage_Alarm_Pickup=	0.85
Starting_Undervoltage_Alarm_Pickup=	1.00
Undervoltage_Alarm_Delay=	3.0
Undervoltage_Alarm_Events$=	"Off/No"
Undervoltage_Trip$=	"Off"
Undervoltage_Trip_Mode$=	"1-Phase"
Undervoltage_Trip_Relays$=	"Trip"
Undervoltage_Trip_Pickup=	0.80
Starting_Undervoltage_Trip_Pickup=	1.00
Undervoltage_Trip_Delay=	3.0
Overvoltage_Alarm$=	"Off"

Device Settings (Continued):

Overvoltage_Relays$=	"Alarm"
Overvoltage_Alarm_Pickup=	1.05
Overvoltage_Alarm_Delay=	3.0
Overvoltage_Alarm_Events$=	"Off/No"
Overvoltage_Trip$=	"Off"
Overvoltage_Trip_Relays$=	"Trip"
Overvoltage_Trip_Pickup=	1.10
Overvoltage_Trip_Delay=	3.0
Voltage_Phase_Reversal_Trip$=	"Off"
Voltage_Phase_Reversal_Trip_Relays$=	"Trip"
Voltage_Frequency_Alarm$=	"Off"
Voltage_Frequency_Alarm_Relays$=	"Alarm"
Overfrequency_Alarm_Level=	60.50
Underfrequency_Alarm_Level=	59.50
Voltage_Frequency_Alarm_Delay=	1.0
Voltage_Frequency_Alarm_Events$=	"Off/No"
Voltage_Frequency_Trip$=	"Off"
Voltage_Frequency_Trip_Relays$=	"Trip"
Overfrequency_Trip_Level=	60.50
Underfrequency_Trip_Level=	59.50
Voltage_Frequency_Trip_Delay=	1.0
Block_Power_Factor_Element_from_Start=	1
Power_Factor_Alarm$=	"Off"
Power_Factor_Alarm_Relays$=	"Alarm"
Power_Factor_Lead_Alarm_Level=	1.00
Power_Factor_Lag_Alarm_Level=	1.00
Power_Factor_Alarm_Delay=	1.0
Power_Factor_Alarm_Events$=	"Off/No"

Device Settings (Continued):

```
Power_Factor_Trip$=                     "Off"
Power_Factor_Trip_Relays$=              "Trip"
Power_Factor_Lead_Trip_Level=           1.00
Power_Factor_Lag_Trip_Level=            1.00
Power_Factor_Trip_Delay=                1.0
Block_kvar_Element_from_Start=          1
Reactive_Power_Alarm$=                  "Off"
Reactive_Power_Alarm_Relays$=           "Alarm"
Positive_Reactive_Power_Alarm_Level=    10
Negative_Reactive_Power_Alarm_Level=    10
Reactive_Power_Alarm_Delay=             1.0
Reactive_Power_Alarm_Events$=           "Off/No"
Reactive_Power_Trip$=                   "Off"
Reactive_Power_Trip_Relays$=            "Trip"
Positive_Reactive_Power_Trip_Level=     25
Negative_Reactive_Power_Trip_Level=     25
Reactive_Power_Trip_Delay=              1.0
Block_Underpower_From_Start=            0
Underpower_Alarm$=                      "Off"
Underpower_Alarm_Relays$=               "Alarm"
Underpower_Alarm_Level=                 2
Underpower_Alarm_Delay=                 1
Underpower_Alarm_Events$=               "Off/No"
Underpower_Trip$=                       "Off"
Underpower_Trip_Relays$=                "Trip"
Underpower_Trip_Level=                  1
Underpower_Trip_Delay=                  1
Block_Reverse_Power_From_Start=         0
```

Device Settings (Continued):

Reverse_Power_Alarm$=	"Off"
Reverse_Power_Alarm_Relays$=	"Alarm"
Reverse_Power_Alarm_Level=	1
Reverse_Power_Alarm_Delay=	1.0
Reverse_Power_Alarm_Events$=	"Off/No"
Reverse_Power_Trip$=	"Off"
Reverse_Power_Trip_Relays$=	"Trip"
Reverse_Power_Trip_Level=	1
Reverse_Power_Trip_Delay=	1.0
Torque_Metering$=	"Disabled"
Stator_Resistance=	0.004
Pole_Pairs=	2
Torque_Unit$=	"Newton-meter"
Overtorque_Alarm$=	"Off"
Overtorque_Alarm_Relays$=	"Alarm"
Overtorque_Alarm_Level=	4000.0
Overtorque_Alarm_Delay=	1.0
Overtorque_Alarm_Events$=	"Off/No"
Trip_Counter_Alarm$=	"Off"
Trip_Counter_Alarm_Relays$=	"Alarm"
Trip_Counter_Alarm_Level=	25
Trip_Counter_Alarm_Events$=	"Off/No"
Starter_Failure_Alarm_Starter_Failure_$=	"Off"
Starter_Type$=	"Breaker"
Starter_Failure_Alarm_Relays$=	"Alarm"
Starter_Failure_Alarm_Delay=	100
Supervision_of_Trip_Coil$=	"Disabled"
Starter_Failure_Alarm_Events$=	"Off/No"

Device Settings (Continued):

```
Current_Demand_Period=                  15
Current_Demand_Alarm$=                  "Off"
Current_Demand_Alarm_Relays$=           "Alarm"
Current_Demand_Alarm_Level=             100
Current_Demand_Alarm_Events$=           "Off/No"
kW_Demand_Period=                       15
kW_Demand_Alarm$=                       "Off"
kW_Demand_Alarm_Relays$=                "Alarm"
kW_Demand_Alarm_Level=                  100
kW_Demand_Alarm_Events$=                "Off/No"
kvar_Demand_Period=                     15
kvar_Demand_Alarm$=                     "Off"
kvar_Demand_Alarm_Relays$=              "Alarm"
kvar_Demand_Alarm_Level=                100
kvar_Demand_Alarm_Events$=              "Off/No"
kVA_Demand_Period=                      15
kVA_Demand_Alarm$=                      "Off"
kVA_Demand_Alarm_Relays$=               "Alarm"
kVA_Demand_Alarm_Level=                 100
kVA_Demand_Alarm_Events$=               "Off/No"
Positive_kWh_Pulse_Output_Relay$=       "Off"
Positive_kWh_Pulse_Output_Interval=     1
Positive_kvarh_Pulse_Output_Relay$=     "Off"
Positive_kvarh_Pulse_Output_Interval=   1
Negative_kvarh_Pulse_Output_Relay$=     "Off"
Negative_kvarh_Pulse_Output_Interval=   1
Analog_Output_1_Selection$=             "None"
Analog_Output_2_Selection$=             "Phase A Current"
```

Device Settings (Continued):

Analog_Output_3_Selection$=	"None"
Analog_Output_4_Selection$=	"None"
RTD_1_Minimum=	-50
RTD_1_Maximum=	250
RTD_2_Minimum=	-50
RTD_2_Maximum=	250
RTD_3_Minimum=	-50
RTD_3_Maximum=	250
RTD_4_Minimum=	-50
RTD_4_Maximum=	250
RTD_5_Minimum=	-50
RTD_5_Maximum=	250
RTD_6_Minimum=	-50
RTD_6_Maximum=	250
RTD_7_Minimum=	-50
RTD_7_Maximum=	250
RTD_8_Minimum=	-50
RTD_8_Maximum=	250
RTD_9_Minimum=	-50
RTD_9_Maximum=	250
RTD_10_Minimum=	-50
RTD_10_Maximum=	250
RTD_11_Minimum=	-50
RTD_11_Maximum=	250
RTD_12_Minimum=	-50
RTD_12_Maximum=	250
Power_Factor_Minimum=	0.80
Power_Factor_Maximum=	-0.80

Device Settings (Continued):

```
Reactive_Power_Minimum=                    0

Reactive_Power_Maximum=                    750

Real_Power_Minimum=                        0

Real_Power_Maximum=                        1000

Apparent_Power_Minimum=                    0

Apparent_Power_Maximum=                    1250

Thermal_Capacity_Used_Minimum=             0

Thermal_Capacity_Used_Maximum=             100

Relay_Lockout_Time_Minimum=                0

Relay_Lockout_Time_Maximum=                150

Current_Demand_Minimum=                    0

Current_Demand_Maximum=                    700

kvar_Demand_Minimum=                       0

kvar_Demand_Maximum=                       1000

kW_Demand_Minimum=                         0

kW_Demand_Maximum=                         1250

kVA_Demand_Minimum=                        0

kVA_Demand_Maximum=                        1500

Speed2_Standard_Overload_Curve_Number=     4

Speed2_Undercurrent_Alarm$=                "Off"

Speed2_Undercurrent_Alarm_Pickup=          0.70

Speed2_Undercurrent_Alarm_Delay=           1

Speed2_Undercurrent_Alarm_Events$=         "Off/No"

Speed2_Undercurrent_Trip$=                 "Off"

Speed2_Undercurrent_Trip_Pickup=           0.70

Speed2_Undercurrent_Trip_Delay=            1

Speed2_Acceleration_Timer_From_Start=      10.0

Acceleration_Timer_From_Speed_One_to_Two=  10.0
```

Device Settings (Continued):

Ground_CT_Primary=	50
Phase_Differential_CT_Primary=	100
Speed_2_Phase_Sequence$=	"ABC"
Remote_Alarm_Name=	0
Remote_Alarm_Function$=	"Unlatched"
Remote_Alarm_Relays$=	"Alarm"
Remote_Alarm_Events$=	"Off/No"
Remote_Trip_Name=	0
Remote_Trip_Relays$=	"Trip"
Speed_Switch_Trip_Relays$=	"Trip"
Speed_Switch_Trip_Delays=	5.0
Load_Shed_Trip_Relays$=	"Trip"
Block_Pressure_Switch_Alarm_from_Start=	0
Pressure_Switch_Alarm_Function$=	"Unlatched"
Pressure_Switch_Alarm_Relays$=	"Alarm"
Pressure_Switch_Alarm_Delay=	5.0
Pressure_Switch_Alarm_Events$=	"Off/No"
Block_Pressure_Switch_Trip_from_Start=	0
Pressure_Switch_Trip_Relays$=	"Trip"
Pressure_Switch_Trip_Delay=	5.0
Vibration_Switch_Alarm_Function$=	"Unlatched"
Vibration_Switch_Alarm_Relays$=	"Alarm"
Vibration_Switch_Alarm_Delay=	5.0
Vibration_Switch_Alarm_Events$=	"Off/No"
Vibration_Switch_Trip_Relays$=	"Trip"
Vibration_Switch_Trip_Delay=	5.0
Counter_Units_Name=	0
Counter_Preset_Value=	0

Device Settings (Continued):

Counter_Type$=	"Increment"
Counter_Alarm$=	"Off"
Counter_Alarm_Relays$=	"Alarm"
Counter_Alarm_Level=	100
Counter_Alarm_Pickup$=	"Over"
Time_to_Trip_at_1_01_FLA=	17414.5
Time_to_Trip_at_1_05_FLA=	3414.9
Time_to_Trip_at_1_10_FLA=	1666.7
Time_to_Trip_at_1_20_FLA=	795.4
Time_to_Trip_at_1_30_FLA=	507.2
Time_to_Trip_at_1_40_FLA=	364.6
Time_to_Trip_at_1_50_FLA=	280.0
Time_to_Trip_at_1_75_FLA=	169.7
Time_to_Trip_at_2_00_FLA=	116.6
Time_to_Trip_at_2_25_FLA=	86.1
Time_to_Trip_at_2_50_FLA=	66.6
Time_to_Trip_at_2_75_FLA=	53.3
Time_to_Trip_at_3_00_FLA=	43.7
Time_to_Trip_at_3_25_FLA=	36.6
Time_to_Trip_at_3_50_FLA=	31.1
Time_to_Trip_at_3_75_FLA=	26.8
TIme_to_Trip_at_4_00_FLA=	23.3
Time_to_Trip_at_4_25_FLA=	20.5
Time_to_Trip_at_4_50_FLA=	18.2
Time_to_Trip_at_4_75_FLA=	16.2
Time_to_Trip_at_5_00_FLA=	14.6
Time_to_Trip_at_5_50_FLA=	12.0
Time_to_Trip_at_6_00_FLA=	10.0

Device Settings (Continued):

Time_to_Trip_at_6_50_FLA=	8.5
Time_to_Trip_at_7_00_FLA=	7.3
Time_to_Trip_at_7_50_FLA=	6.3
Time_to_Trip_at_8_00_FLA=	5.6
Time_to_Trip_at_10_0_FLA=	5.6
Time_to_Trip_at_15_0_FLA=	5.6
Time_to_Trip_at_20_0_FLA=	5.6
Overreach_Filter$=	"Off/No"
Short_Circuit_Trip_Relays$=	"Trip"
Short_Circuit_Trip_Pickup=	4.0
Intentional_Short_Circuit_Trip_Delay=	200
Ground_Fault_Trip_Backup_Relays$=	"Aux2"
Ground_FaultTrip_Backup_Delay=	200
Running_Time_Pulse_Relay$=	"Off"
Running_Time_Pulse_Interval=	1
Loss_Of_Comms_Function$=	"Off"
Loss_Of_Comms_Function_Type$=	"Alarm"
Loss_Of_Comms_Port$=	"COMP_RS485"
Assign_Loss_Of_Comms_Alarm_Relay$=	"Alarm"
Assign_Loss_Of_Comms_Trip_Relay$=	"Trip"
Loss_Of_Comms_Delay=	1
Loss_Of_Comms_Alarm_Event$=	"Off/No"
Phase_A_Current_Minimum=	0
Phase_A_Current_Maximum=	100
Phase_B_Current_Minimum=	0
Phase_B_Current_Maximum=	100
Phase_C_Current_Minimum=	0
Phase_C_Current_Maximum=	100

Device Settings (Continued):

Average_Phase_Current_Minimum=	0
Average_Phase_Current_Maximum=	100
AB_Line_Voltage_Minimum=	3200
AB_Line_Voltage_Maximum=	4500
BC_Line_Voltage_Minimum=	3200
BC_Line_Voltage_Maximum=	4500
CA_Line_Voltage_Minimum=	3200
CA_Line_Voltage_Maximum=	4500
Average_Line_Voltage_Minimum=	3200
Average_Line_Voltage_Maximum=	4500
Phase_AN_Voltage_Minimum=	1900
Phase_AN_Voltage_Maximum=	2500
Phase_BN_Voltage_Minimum=	1900
Phase_BN_Voltage_Maximum=	2500
Phase_CN_Voltage_Minimum=	1900
Phase_CN_Voltage_Maximum=	2500
Average_Phase_Voltage_Minimum=	1900
Average_Phase_Voltage_Maximum=	2500
Hottest_Stator_RTD_Minimum=	0
Hottest_Stator_RTD_Maximum=	200
Hottest_Bearing_RTD_Minimum=	0
Hottest_Bearing_RTD_Maximum=	200
Hottest_Ambient_RTD_Minimum=	-50
Hottest_Ambient_RTD_Maximum=	60
Analog_Input_1_Minimum=	0
Analog_Input_1_Maximum=	50000
Analog_Input_2_Minimum=	0
Analog_Input_2_Maximum=	50000

Device Settings (Continued):

Analog_Input_3_Minimum=	0
Analog_Input_3_Maximum=	50000
Analog_Input_4_Minimum=	0
Analog_Input_4_Maximum=	50000
Tachometer_Min=	3500
Tachometer_Max=	3700
MWh_Minimum=	50.000
MWh_Maximum=	100.000
Torque_Minimum=	0.0
Torque_Maximum=	0.0
Analog_Input_Diff_1_2_Minimum=	0
Analog_Input_Diff_1_2_Maximum=	100
Analog_Input_Diff_3_4_Minimum=	0
Analog_Input_Diff_3_4_Maximum=	100
Analog_Input_1_Setup$=	"Disabled"
Analog_Input_1_Units=	0
Analog_Input_1_Minimum_analog_in_1_=	0
Analog_Input_1_Maximum_analog_in_1_=	100
Block_Analog_Input_1_From_Start=	0
Analog_Input_1_Alarm$=	"Off"
Analog_Input_1_Alarm_Relays$=	"Alarm"
Analog_Input_1_Alarm_Level=	10
Analog_Input_1_Alarm_Pickup$=	"Over"
Analog_Input_1_Alarm_Delay=	0.1
Analog_Input_1_Alarm_Events$=	"Off/No"
Analog_Input_1_Trip$=	"Off"
Analog_Input_1_Trip_Relays$=	"Trip"
Analog_Input_1_Trip_Level=	20

Device Settings (Continued):

```
Analog_Input_1_Trip_Pickup$=                "Over"
Analog_Input_1_Trip_Delay=                  0.1
Analog_Input_1_Name=                        0
Analog_Input_2_Setup$=                      "4-20 mA"
Analog_Input_2_Units=                       0
Analog_Input_2_Minimum_analog_in_2_=        0
Analog_Input_2_Maximum_analog_in_2_=        100
Block_Analog_Input_2_From_Start=            0
Analog_Input_2_Alarm$=                      "Off"
Analog_Input_2_Alarm_Relays$=               "Alarm"
Analog_Input_2_Alarm_Level=                 10
Analog_Input_2_Alarm_Pickup$=               "Over"
Analog_Input_2_Alarm_Delay=                 0.1
Analog_Input_2_Alarm_Events$=               "Off/No"
Analog_Input_2_Trip$=                       "Off"
Analog_Input_2_Trip_Relays$=                "Trip"
Analog_Input_2_Trip_Level=                  20
Analog_Input_2_Trip_Pickup$=                "Over"
Analog_Input_2_Trip_Delay=                  0.1
Analog_Input_2_Name=                        0
Analog_Input_3_Setup$=                      "Disabled"
Analog_Input_3_Units=                       0
Analog_Input_3_Minimum_analog_in_3_=        0
Analog_Input_3_Maximum_analog_in_3_=        100
Block_Analog_Input_3_From_Start=            0
Analog_Input_3_Alarm$=                      "Off"
Analog_Input_3_Alarm_Relays$=               "Alarm"
Analog_Input_3_Alarm_Level=                 10
```

Device Settings (Continued):

Analog_Input_3_Alarm_Pickup$=	"Over"
Analog_Input_3_Alarm_Delay=	0.1
Analog_Input_3_Alarm_Events$=	"Off/No"
Analog_Input_3_Trip$=	"Off"
Analog_Input_3_Trip_Relays$=	"Trip"
Analog_Input_3_Trip_Level=	20
Analog_Input_3_Trip_Pickup$=	"Over"
Analog_Input_3_Trip_Delay=	0.1
Analog_Input_3_Name=	0
Analog_Input_4_Setup$=	"Disabled"
Analog_Input_4_Units=	0
Analog_Input_4_Minimum_analog_in_4_=	0
Analog_Input_4_Maximum_analog_in_4_=	100
Block_Analog_Input_4_From_Start=	0
Analog_Input_4_Alarm$=	"Off"
Analog_Input_4_Alarm_Relays$=	"Alarm"
Analog_Input_4_Alarm_Level=	10
Analog_Input_4_Alarm_Pickup$=	"Over"
Analog_Input_4_Alarm_Delay=	0.1
Analog_Input_4_Alarm_Events$=	"Off/No"
Analog_Input_4_Trip$=	"Off"
Analog_Input_4_Trip_Relays$=	"Trip"
Analog_Input_4_Trip_Level=	20
Analog_Input_4_Trip_Pickup$=	"Over"
Analog_Input_4_Trip_Delay=	0.1
Analog_Input_4_Name=	0
Speed2_Time_to_Trip_at_1_01_FLA=	17414.5
Speed2_Time_to_Trip_at_1_05_FLA=	3414.9

Device Settings (Continued):

Speed2_Time_to_Trip_at_1_10_FLA=	1666.7
Speed2_Time_to_Trip_at_1_20_FLA=	795.4
Speed2_Time_to_Trip_at_1_30_FLA=	507.2
Speed2_Time_to_Trip_at_1_40_FLA=	364.6
Speed2_Time_to_Trip_at_1_50_FLA=	280.0
Speed2_Time_to_Trip_at_1_75_FLA=	169.7
Speed2_Time_to_Trip_at_2_00_FLA=	116.6
Speed2_Time_to_Trip_at_2_25_FLA=	86.1
Speed2_Time_to_Trip_at_2_50_FLA=	66.6
Speed2_Time_to_Trip_at_2_75_FLA=	53.3
Speed2_Time_to_Trip_at_3_00_FLA=	43.7
Speed2_Time_to_Trip_at_3_25_FLA=	36.6
Speed2_Time_to_Trip_at_3_50_FLA=	31.1
Speed2_Time_to_Trip_at_3_75_FLA=	26.8
Speed2_Time_to_Trip_at_4_00_FLA=	23.3
Speed2_Time_to_Trip_at_4_25_FLA=	20.5
Speed2_Time_to_Trip_at_4_50_FLA=	18.2
Speed2_Time_to_Trip_at_4_75_FLA=	16.2
Speed2_Time_to_Trip_at_5_00_FLA=	14.6
Speed2_Time_to_Trip_at_5_50_FLA=	12.0
Speed2_Time_to_Trip_at_6_00_FLA=	10.0
Speed2_Time_to_Trip_at_6_50_FLA=	8.5
Speed2_Time_to_Trip_at_7_00_FLA=	7.3
Speed2_Time_to_Trip_at_7_50_FLA=	6.3
Speed2_Time_to_Trip_at_8_00_FLA=	5.6
Speed2_Time_to_Trip_at_10_0_FLA=	5.6
Speed2_Time_to_Trip_at_15_0_FLA=	5.6
Speed2_Time_to_Trip_at_20_0_FLA=	5.6

Device Settings (Continued):

```
Speed2_Minimum_Allowable_Line_Voltage=        80

Speed2_Stall_Current_at_Min_Vline=            4.80

Speed2_Safe_Stall_Time_at_Min_Vline=          20.0

Speed2_Accel_Intersect_at_Min_Vline=          3.80

Speed2_Stall_Current_at_100_Vline=            6.00

Speed2_Safe_Stall_Time_at_100_Vline=          10.0

Speed2_Accel_Intersect_at_100_Vline=          5.00

Block_Speed2_Undercurrent_from_Start=         0

Speed_Switch_Trip_Speed2_Delay=               5.0

Speed2_Rated_Speed=                           3600

Analog_In_Differential_1_2_Enable$=           "Disabled"

Analog_In_Diff_1_2_Name=                      0

Analog_In_Differential_1_2_Comparison$=       "% Difference"

Analog_In_Differential_1_2_Logic$=            "1<>2 (or 3<>4)"

Analog_In_Differential_1_2_Active_When$=      "Always"

Analog_In_Differential_1_2_Block_from_Start=  0

Analog_In_Differential_1_2_Alarm$=            "Off"

Analog_In_Differential_1_2_Alarm_Relays$=     "Alarm"

Analog_In_Differential_1_2_Percent_Alarm=     10

Analog_In_Differential_1_2_Absolute_Alarm=    10

Analog_In_Differential_1_2_Alarm_Delay=       0.1

Analog_In_Differential_1_2_Alarm_Events$=     "Off/No"

Analog_In_Differential_1_2_Trip$=             "Off"

Analog_In_Differential_1_2_Trip_Relays$=      "Trip"

Analog_In_Differential_1_2_Percent_Trip=      10

Analog_In_Differential_1_2_Absolute_Trip=     10

Analog_In_Differential_1_2_Trip_Delay=        0.1

Analog_In_Differential_3_4_Enable$=           "Disabled"
```

Device Settings (Continued):

```
Analog_In_Diff_3_4_Name=                        0

Analog_In_Differential_3_4_Comparison$=         "% Difference"

Analog_In_Differential_3_4_Logic$=              "1<>2 (or 3<>4)"

Analog_In_Differential_3_4_Active_When$=        "Always"

Analog_In_Differential_3_4_Block_from_Start=    0

Analog_In_Differential_3_4_Alarm$=              "Off"

Analog_In_Differential_3_4_Alarm_Relays$=       "Alarm"

Analog_In_Differential_3_4_Percent_Alarm=       10

Analog_In_Differential_3_4_Absolute_Alarm=      10

Analog_In_Differential_3_4_Alarm_Delay=         0.1

Analog_In_Differential_3_4_Alarm_Events$=       "Off/No"

Analog_In_Differential_3_4_Trip$=               "Off"

Analog_In_Differential_3_4_Trip_Relays$=        "Trip"

Analog_In_Differential_3_4_Percent_Trip=        10

Analog_In_Differential_3_4_Absolute_Trip=       10

Analog_In_Differential_3_4_Trip_Delay=          0.1

Ground_Fault_Overreach_Filter$=                 "Off/No"

User_Map_Address_1=                             512

User_Map_Address_2=                             528

User_Map_Address_3=                             529

User_Map_Address_4=                             551

User_Map_Address_5=                             552

User_Map_Address_6=                             553

User_Map_Address_7=                             554

User_Map_Address_8=                             555

User_Map_Address_9=                             556

User_Map_Address_10=                            720

User_Map_Address_11=                            721
```

Device Settings (Continued):

User_Map_Address_12=	722
User_Map_Address_13=	723
User_Map_Address_14=	724
User_Map_Address_15=	729
User_Map_Address_16=	768
User_Map_Address_17=	769
User_Map_Address_18=	770
User_Map_Address_19=	771
User_Map_Address_20=	772
User_Map_Address_21=	773
User_Map_Address_22=	774
User_Map_Address_23=	775
User_Map_Address_24=	779
User_Map_Address_25=	780
User_Map_Address_26=	801
User_Map_Address_27=	802
User_Map_Address_28=	803
User_Map_Address_29=	804
User_Map_Address_30=	805
User_Map_Address_31=	806
User_Map_Address_32=	807
User_Map_Address_33=	808
User_Map_Address_34=	809
User_Map_Address_35=	810
User_Map_Address_36=	811
User_Map_Address_37=	812
User_Map_Address_38=	832
User_Map_Address_39=	833

Device Settings (Continued):

User_Map_Address_40=	834
User_Map_Address_41=	835
User_Map_Address_42=	840
User_Map_Address_43=	880
User_Map_Address_44=	881
User_Map_Address_45=	882
User_Map_Address_46=	884
User_Map_Address_47=	885
User_Map_Address_48=	886
User_Map_Address_49=	781
User_Map_Address_50=	782
User_Map_Address_51=	783
User_Map_Address_52=	725
User_Map_Address_53=	726
User_Map_Address_54=	727
User_Map_Address_55=	728
User_Map_Address_56=	0
User_Map_Address_57=	0
User_Map_Address_58=	0
User_Map_Address_59=	0
User_Map_Address_60=	0
User_Map_Address_61=	0
User_Map_Address_62=	0
User_Map_Address_63=	0
User_Map_Address_64=	0
User_Map_Address_65=	0
User_Map_Address_66=	0
User_Map_Address_67=	0

Device Settings (Continued):

```
User_Map_Address_68=                    0

User_Map_Address_69=                    0

User_Map_Address_70=                    0

User_Map_Address_71=                    0

User_Map_Address_72=                    0

User_Map_Address_73=                    0

User_Map_Address_74=                    0

User_Map_Address_75=                    0

User_Map_Address_76=                    0

User_Map_Address_77=                    0

User_Map_Address_78=                    0

User_Map_Address_79=                    0

User_Map_Address_80=                    0

User_Map_Address_81=                    0

User_Map_Address_82=                    0

User_Map_Address_83=                    0

User_Map_Address_84=                    0

User_Map_Address_85=                    0

User_Map_Address_86=                    0

User_Map_Address_87=                    0

User_Map_Address_88=                    0

User_Map_Address_89=                    0

User_Map_Address_90=                    0

User_Map_Address_91=                    0

User_Map_Address_92=                    0

User_Map_Address_93=                    0

User_Map_Address_94=                    0

User_Map_Address_95=                    0
```

Device Settings (Continued):

User_Map_Address_96=	0
User_Map_Address_97=	0
User_Map_Address_98=	0
User_Map_Address_99=	0
User_Map_Address_100=	0
User_Map_Address_101=	0
User_Map_Address_102=	0
User_Map_Address_103=	0
User_Map_Address_104=	0
User_Map_Address_105=	0
User_Map_Address_106=	0
User_Map_Address_107=	0
User_Map_Address_108=	0
User_Map_Address_109=	0
User_Map_Address_110=	0
User_Map_Address_111=	0
User_Map_Address_112=	0
User_Map_Address_113=	0
User_Map_Address_114=	0
User_Map_Address_115=	0
User_Map_Address_116=	0
User_Map_Address_117=	0
User_Map_Address_118=	0
User_Map_Address_119=	0
User_Map_Address_120=	0
User_Map_Address_121=	0
User_Map_Address_122=	0
User_Map_Address_123=	0

Device Settings (Continued):

```
User_Map_Address_124=                    0

User_Map_Address_125=                    0

Motor_Load_Minimum=                      0.00

Motor_Load_Maximum=                      1.25
```

Global Defines:

```
RELAY_ADDRESS=1                          'SPECIFIC RELAY ADDRESS USED FOR MODBUS
COMMUNICATIONS (DEFAULT=1)
TRIP_OUTPUT$="F1-E2"                     'OUTPUT CONTACT TO SENSE A TRIP
AUTO_MASK=1                              'SET TO 2 TO DISPLAY FLEX PROGRAMMING
SKIP_TST=0                               'SET TO 1 TO SKIP MESSAGES FOR TESTS SKIPPED
PRINT_RAN_TESTS=1                        'MARKS TESTS IF THEY WERE ATTEMPTED BUT NOT
APPLICABLE
Phase_CT_Secondary=5                     'THIS IS THE RELAYS PHASE NOMINAL CT INPUT
VTR=Voltage_Transformer_Ratio            'VT RATIO
CTR=Phase_CT_Primary/Phase_CT_Secondary  'CALCULATED CT RATIO
FLA=(MOTOR_Full_load_Amps)/CTR           'SECONDARY FULL LOAD CURRENT
MTR_START_MULT=0.5                       'MULT OF FULL LOAD AMPS
MTR_START_DELAY=120                      'WAIT TIME IN CYCLES FOR START
```

Device Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Device Test Results for: *** GET SETTINGS FILE FROM DEVICE ***

OK?
RAN

Device Test Results for: ***RELAY SETTINGS TO SETTINGS TAB***

OK?
RAN

Device Test Results for: CURRENT METER TEST

	EXPECTED CURRENT	CURRENT READ	RANGE	OK?
A PHASE	75.0	74.0	71.2 TO 78.8	PASS
B PHASE	75.0	74.0	71.2 TO 78.8	PASS
C PHASE	75.0	74.0	71.2 TO 78.8	PASS

Device Test Results for: OVERLOAD PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	2.788	2.760	1.01	PASS

Device Test Results for: OVERLOAD TIMING TEST

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
5.00	12.000	839.20	13.987	14.573	-4.03	PASS

Device Test Results for: SHORT CIRCUIT TRIP PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
20.000	20.000	-0.00	PASS

Device Test Results for: SHORT CIRCUIT TRIP DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	24.000	13.40	0.223	0.150 TO 0.250	PASS

Device Test Results for: UNDERCURRENT TRIP PICKUP

OK?
RAN

Device Test Results for: MECHANICAL JAM PICKUP

OK?
RAN

Device Test Results for: MECHANICAL JAM DELAY

OK?
RAN

Device Test Results for: CURRENT UNBALANCE PICKUP

UNBALANCE% PU	RANGE	OK?
0.00	0.00 TO 0.00	RAN

Device Test Results for: CURRENT UNBALANCE DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
0.32	12.800	57.24	0.954	0.500 TO 1.500	PASS

Device Test Results for: ACCELERATION TIMER

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
1.20	3.312	599.66	9.994	10.000	-0.06	PASS

Device Test Results for: ***VOLTAGE INPUT TEST***

	EXPECTED VOLTAGE	VOLATGE READ	RANGE	OK?
APH-BPH	7274.6	7287.0	7129.1 TO 7420.1	PASS
BPH-CPH	7274.6	7282.0	7129.1 TO 7420.1	PASS
CPH-APH	7274.6	7255.0	7129.1 TO 7420.1	PASS

Device Test Results for: UNDERVOLTAGE PICKUP

OK?
RAN

Device Test Results for: UNDERVOLTAGE DELAY

OK?
RAN

Device Test Results for: OVERVOLTAGE PICKUP

OK?
RAN

Device Test Results for: OVERVOLTAGE DELAY

OK?
RAN

Device Test Results for: VOLTAGE PHASE REVERSAL

OK?
RAN

Device Test Results for: UNDERFREQUENCY PICKUP

OK?
RAN

Device Test Results for: UNDERFREQUENCY DELAY

OK?
RAN

Device Test Results for: OVERFREQUENCY PICKUP

OK?
RAN

Device Test Results for: OVERFREQUENCY DELAY

OK?
RAN

Device Test Results for: ***POWER INPUT TEST***

EXPECTED POWER FACTOR	POWER FACTOR READ	EXPECTED KILOWATTS	KILOWATTS READ	RANGE	OK?
0.951	0.950	862.8	860.0	844.7 TO 880.9	PASS

Device Test Results for: POWER FACTOR LEAD PICKUP

ANG(LAG)	VOLTAGE	CURRENT	POWER FACTOR	RANGE	OK?
0.00	0.00	0.000	0.000	0.000 TO 0.000	RAN

Device Test Results for: POWER FACTOR LAG PICKUP

ANG(LAG)	VOLTAGE	CURRENT	POWER FACTOR	RANGE	OK?
0.00	0.00	0.000	0.000	0.000 TO 0.000	RAN

Device Test Results for: REACTIVE POS KVAR TRIP PU

OK?
RAN

Device Test Results for: REACTIVE NEG KVAR TRIP PU

OK?
RAN

Device Test Results for: REACTIVE KVAR TRIP DELAY

OK?
RAN

Device Test Results for: REVERSE POWER TRIP PU

OK?
RAN

Device Test Results for: REVERSE POWER TRIP DELAY

OK?
RAN

Device Test Results for: UNDERPOWER TRIP PU

OK?
RAN

Device Test Results for: UNDERPOWER TRIP DELAY

OK?
RAN

Device Test Results for: ***GROUND(1A/5A) INPUT TEST***

EXPECTED CURRENT	CURRENT READ	RANGE	OK?
50.0	49.9	49.0 TO 51.0	PASS

Device Test Results for: GROUND(1A/5A) FAULT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
2.525	2.500	1.00	PASS

Device Test Results for: GROUND(1A/5A) FAULT DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.10	2.750	13.49	0.225	0.000 TO 0.700	PASS

Device Test Results for: ***GROUND(50/025) INPUT TEST***

0.0	0.0	0.0	TO	0.0	RAN

Device Test Results for: GROUND(50/025) FAULT PICKUP

OK?
RAN

Device Test Results for: GROUND(50/025) FAULT DELAY

OK?
RAN

Device Test Results for: ***DIFFERENTIAL INPUT TEST***

0.0	0.0	0.0	TO	0.0	RAN

Device Test Results for: DIFFERENTIAL PICKUP PH A

OK?
RAN

Device Test Results for: DIFFERENTIAL PICKUP PH B

OK?
RAN

Device Test Results for: DIFFERENTIAL PICKUP PH C

OK?
RAN

Device Test Results for: DIFFERENTIAL FAULT DELAY

OK?
RAN

Routine	SR-469.FST_LIB	**AFAL**	AL	**Test Date**	2/15/2024
Version	2.7			**Pass/Fail**	PASS

Device Data:

Customer:	City of Ann Arbor Waste Water Treatment		
Job_Number:	230858	SUBSTATION:	Sub 8
Relay_ID:	PAB-E2	PHASE_ZONE:	
RELAY_MANF:	GE MULTILIN	RELAY_TYPE:	SR-469
MODEL_STYLE:		IEEE_DEVICE:	
IL_IB:		SERIAL_NUMBER:	
FIRMWARE:		NERC_AUDITABLE:	0
MAINT_INTERVAL:	0	PREVIOUS_TESTDATE:	
CURRENT_TESTDATE:		NEXT_TESTDATE:	
TESTSET_CALDATE:		Tested_BY:	

Routine Notes:

Device Settings Used for Testing:

SR_PART_NUM$=	"469-P5-HI-A20-T"
SR_FIRMWARE$=	"5200"
Default_Message_Cycle_Time=	2.0
Default_Message_Timeout=	300
Average_Motor_Load_Calculation_Period=	15
Temperature_Display_Units$=	"Celsius"
Trace_Memory_Trigger_Position=	25
Trace_Memory_Buffers$=	"8 x 28 cycles"
Display_Update_Interval=	0.4
Motor_Load_Filter_Interval=	0
Communication_Port_Passcode=	0
Passcode_write_Only_=	0
First_Scratchpad_Message$=	"Text 1"
Second_Scratchpad_Message$=	"Text 2"
Third_Scratchpad_Message$=	"Text 3"
Fourth_Scratchpad_Message$=	"Text 4"
Fifth_Scratchpad_Message$=	"GE MULTILIN 469 Motor Relay "
Phase_CT_Primary=	150

Device Settings (Continued):

Motor_Full_Load_Amps=	72
Ethernet_IP_Address=	0
Ethernet_Subnet_Mask=	4294966272
Ethernet_Gateway_Address=	0
DeviceNet_MAC_ID=	63
DeviceNet_Baud_Rate$=	"125 kbps"
Front_RS232_baud_rate$=	"19200 baud"
Slave_Address=	254
Computer_RS485_Baud_Rate$=	"19200 baud"
Computer_RS485_Parity$=	"None"
Auxiliary_RS485_Baud_Rate$=	"9600 baud"
Auxiliary_RS485_Parity$=	"None"
Ground_CT_Type$=	"5 A Secondary"
Phase_Differential_CT_Type$=	"None"
Enable_Two_Speed_Motor_Option$=	"Off/No"
Speed_Two_Phase_CT_Primary=	100
Speed_Two_Motor_Full_Load_Amps=	1
VoltageTransformer_Connection_Type$=	"Open Delta"
Enable_Single_VT_Connection$=	"Off"
Voltage_Transformer_Ratio=	35.00
Motor_Nameplate_Voltage=	4200
Nominal_System_Frequency$=	"60 Hz"
System_Phase_Sequence$=	"ABC"
Serial_Communication_Control$=	"Off/No"
Assign_Start_Control_Relays$=	"Auxiliary 2"
Reduced_Voltage_Starting$=	"Off/No"
Control_Relays_for_Reduced_Voltage_Starting$=	"Auxiliary 3"
Transition_On$=	"Current Only"

Device Settings (Continued):

```
Reduced_Voltage_Start_Level=                100

Reduced_Voltage_Start_Timer=                200

Incomplete_Sequence_Trip_Relays$=           "Trip"

Starter_Status_Switch$=                     "Start Aux a"

Assignable_Input_1_Function$=               "Off"

Counter_Alarm_Events$=                      "Off/No"

Rated_Speed=                                3600

Tachometer_Alarm$=                          "Off"

Tachometer_Alarm_Relays$=                   "Alarm"

Tachometer_Alarm_Speed=                     10

Tachometer_Alarm_Delay=                     1

Tachometer_Alarm_Events$=                   "Off/No"

Tachometer_Trip$=                           "Off"

Tachometer_Trip_Relays$=                    "Trip"

Tachometer_Trip_Speed=                      10

Tachometer_Trip_Delay=                      1

General_Switch_A_Name=                      0

General_Switch_A_Normal_State$=             "Normally Open"

General_Switch_A_Block_Input_From_Start=    0

General_Switch_A_Alarm$=                    "Off"

General_Switch_A_Alarm_Relays$=             "Alarm"

General_Switch_A_Alarm_Delay=               5.0

General_Switch_A_Alarm_Events$=             "Off/No"

General_Switch_A_Trip$=                     "Off"

General_Switch_A_Trip_Relays$=              "Trip"

General_Switch_A_Trip_Delay=                5.0

General_Switch_B_Name=                      0

General_Switch_B_Normal_State$=             "Normally Open"
```

Device Settings (Continued):

```
General_Switch_B_Block_Input_From_Start=      0
General_Switch_B_Alarm$=                      "Off"
General_Switch_B_Alarm_Relays$=               "Alarm"
General_Switch_B_Alarm_Delay=                 5.0
General_Switch_B_Alarm_Events$=               "Off/No"
General_Switch_B_Trip$=                       "Off"
General_Switch_B_Trip_Relays$=                "Trip"
General_Switch_B_Trip_Delay=                  5.0
General_Switch_C_Name=                        0
General_Switch_C_Normal_State$=               "Normally Open"
General_Switch_C_Block_Input_From_Start=      0
General_Switch_C_Alarm$=                      "Off"
General_Switch_C_Alarm_Relays$=               "Alarm"
General_Switch_C_Alarm_Delay=                 5.0
General_Switch_C_Alarm_Events$=               "Off/No"
General_Switch_C_Trip$=                       "Off"
General_Switch_C_Trip_Relays$=                "Trip"
General_Switch_C_Trip_Delay=                  5.0
General_Switch_D_Name=                        0
General_Switch_D_Normal_State$=               "Normally Open"
General_Switch_D_Block_Input_From_Start=      0
General_Switch_D_Alarm$=                      "Off"
General_Switch_D_Alarm_Relays$=               "Alarm"
General_Switch_D_Alarm_Delay=                 5.0
General_Switch_D_Alarm_Events$=               "Off/No"
General_Switch_D_Trip$=                       "Off"
General_Switch_D_Trip_Relays$=                "Trip"
General_Switch_D_Trip_Delay=                  5.0
```

Device Settings (Continued):

Assignable_Input_2_Function$=	"Off"
Assignable_Input_3_Function$=	"Off"
Assignable_Input_4_Function$=	"Off"
Reset_Mode_R1_Trip$=	"All Resets"
Force_R1_Output_Relay$=	"Disabled"
Force_R1_Operate_Time=	0
Reset_Mode_R4_Auxiliary$=	"All Resets"
Force_R4_Output_Relay$=	"Disabled"
Force_R4_Operate_Time=	0
Reset_Mode_R2_Auxiliary$=	"All Resets"
Force_R2_Output_Relay$=	"Disabled"
Force_R2_Output_Operate_Time=	0
Reset_Mode_R3_Auxiliary$=	"All Resets"
Force_R3_Output_Relay$=	"Disabled"
Force_R3_Operate_Time=	0
Force_R5_Output_Relay$=	"Disabled"
Force_R5_Operate_Time=	0
Reset_Mode_R6_Service$=	"All Resets"
Curve_Style$=	"Standard"
Overload_Pickup_Level=	1.15
Unbalance_k_Factor=	0
Cool_Time_Constant_Running=	15
Cool_Time_Constant_Stopped=	30
Hot_Cold_Safe_Stall_Ratio=	1.00
RTD_Blasing$=	"Off/No"
RTD_Blas_Minimum=	40
RTD_Blas_Center_Point=	130
RTD_Blas_Maximum=	155

Device Settings (Continued):

Thermal_Capacity_Alarm$=	"Off"
Thermal_Capacity_Alarm_Relays$=	"Alarm"
Thermal_Capacity_Alarm_Level=	75
Thermal_Capacity_Alarm_Events$=	"Off/No"
Overload_Trip_Relays$=	"Trip"
Standard_Overload_Curve_Number=	4
Minimum_Allowable_Line_Voltage=	80
Stall_Current_at_Min_Vline=	4.80
Safe_Stall_Time_at_Min_Vline=	20.0
Accel_Intersect_at_Min_Vline=	3.80
Stall_Current_at_100_Vline=	6.00
Safe_Stall_Time_at_100_Vline=	10.0
Accel_Intersect_at_100_Vline=	5.00
Short_Circuit_Trip$=	"Latched"
Short_Circuit_Trip_Backup$=	"Off/No"
Short_Circuit_Backup_Relays$=	"Aux2"
Short_Circuit_Trip_Backup_Delay=	200
Overload_Alarm$=	"Off"
Overload_Alarm_Relays$=	"Alarm"
Overload_Alarm_Events$=	"Off/No"
Overload_Alarm_Delay=	0.1
Mechanical_Jam_Trip$=	"Off"
Mechanical_Jam_Trip_Relays$=	"Trip"
Mechanical_Jam_Pickup=	1.50
Mechanical_Jam_Delay=	1
Block_Undercurrent_from_Start=	0
Undercurrent_Alarm$=	"Off"
Undercurrent_Alarm_Relays$=	"Alarm"

Device Settings (Continued):

```
Undercurrent_Alarm_Pickup=                  0.70

Undercurrent_Alarm_Delay=                   1

Undercurrent_Alarm_Events$=                 "Off/No"

Undercurrent_Trip$=                         "Off"

Undercurrent_Trip_Relays$=                  "Trip"

Undercurrent_Trip_Pickup=                   0.70

Undercurrent_Trip_Delay=                    1

Current_Unbalance_Alarm$=                   "Off"

Current_Unbalance_Alarm_Relays$=            "Alarm"

Current_Unbalance_Alarm_Pickup=             15

Current_Unbalance_Alarm_Delay=              1

Current_Unbalance_Alarm_Events$=            "Off/No"

Current_Unbalance_Trip$=                    "Off"

Current_Unbalance_Trip_Relays$=             "Trip"

Current_Unbalance_Trip_Pickup=              20

Current_Unbalance_Trip_Delay=               1

Ground_Fault_Alarm$=                        "Off"

Ground_Fault_Alarm_Relays$=                 "Alarm"

Ground_Fault_Alarm_Pickup=                  0.10

Alarm_Pickup_for_Multlin_CT_50_025=         1.00

Intentional_GF_Alarm_Delay=                 0

Ground_Fault_Alarm_Events$=                 "Off/No"

Ground_Fault_Trip$=                         "Latched"

Ground_Fault_Trip_Relays$=                  "Trip"

Ground_Fault_Trip_Pickup=                   0.50

Trip_Pickup_for_Multlin_CT_50_025=          1.00

Intentional_GF_Trip_Delay=                  200

Ground_Fault_Trip_Backup$=                  "Off/No"
```

Device Settings (Continued):

```
Phase_Differential_Trip$=                    "Off"

Phase_Differential_Trip_Relays$=             "Trip"

Differential_Trip_Pickup_While_Starting=     0.10

Differential_Trip_Delay_While_Starting=      0

Differential_Trip_Pickup_While_Running=      0.10

Differential_Trip_Delay_While_Running=       0

Accleration_Timer_Trip$=                     "Off"

Acceleration_Timer_Trip_Relays$=             "Trip"

Acceleration_Timer_from_Start=               10.0

Start_Inhibit_Block$=                        "Off/No"

Thermal_Capacity_Used_Margin=                25

Jogging_Block$=                              "Off/No"

Maximum_Starts_Hour_Permissible=             3

Time_Between_Starts=                         10

Restart_Block$=                              "Off/No"

Restart_Block_Time=                          1

Stator_RTD_Type$=                            "100 Ohm Platinum"

Bearing_RTD_Type$=                           "100 Ohm Platinum"

Ambient_RTD_Type$=                           "100 Ohm Platinum"

Other_RTD_Type$=                             "100 Ohm Platinum"

RTD_1_Application$=                          "Stator"

RTD_1_Name=                                  0

RTD_1_Alarm$=                                "Off"

RTD_1_Alarm_Relays$=                         "Alarm"

RTD_1_Alarm_Temperature=                     130

RTD_1_Alarm_Events$=                         "Off/No"

RTD_1_Trip$=                                 "Off"

RTD_1_Trip_Voting$=                          "RTD #1"
```

Device Settings (Continued):

RTD_1_Trip_Relays$=	"Trip"
RTD_1_Trip_Temperature=	155
RTD_1_Hi_Alarm$=	"Off"
RTD_1_Hi_Alarm_Relays$=	"Alarm"
RTD_1_Hi_Alarm_Level=	130
RTD_2_Application$=	"Stator"
RTD_2_Name=	0
RTD_2_Alarm$=	"Off"
RTD_2_Alarm_Relays$=	"Alarm"
RTD_2_Alarm_Temperature=	130
RTD_2_Alarm_Events$=	"Off/No"
RTD_2_Trip$=	"Off"
RTD_2_Trip_Voting$=	"RTD #2"
RTD_2_Trip_Relays$=	"Trip"
RTD_2_Trip_Temperature=	155
RTD_2_Hi_Alarm$=	"Off"
RTD_2_Hi_Alarm_Relays$=	"Alarm"
RTD_2_Hi_Alarm_Level=	130
RTD_3_Application$=	"Stator"
RTD_3_Name=	0
RTD_3_Alarm$=	"Off"
RTD_3_Alarm_Relays$=	"Alarm"
RTD_3_Alarm_Temperature=	130
RTD_3_Alarm_Events$=	"Off/No"
RTD_3_Trip$=	"Off"
RTD_3_Trip_Voting$=	"RTD #3"
RTD_3_Trip_Relays$=	"Trip"
RTD_3_Trip_Temperature=	155

Device Settings (Continued):

RTD_3_Hi_Alarm$=	"Off"
RTD_3_Hi_Alarm_Relays$=	"Alarm"
RTD_3_Hi_Alarm_Level=	130
RTD_4_Application$=	"Stator"
RTD_4_Name=	0
RTD_4_Alarm$=	"Off"
RTD_4_Alarm_Relays$=	"Alarm"
RTD_4_Alarm_Temperature=	130
RTD_4_Alarm_Events$=	"Off/No"
RTD_4_Trip$=	"Off"
RTD_4_Trip_Voting$=	"RTD #4"
RTD_4_Trip_Relays$=	"Trip"
RTD_4_Trip_Temperature=	155
RTD_4_Hi_Alarm$=	"Off"
RTD_4_Hi_Alarm_Relays$=	"Alarm"
RTD_4_Hi_Alarm_Level=	130
RTD_5_Application$=	"Stator"
RTD_5_Name=	0
RTD_5_Alarm$=	"Off"
RTD_5_Alarm_Relays$=	"Alarm"
RTD_5_Alarm_Temperature=	130
RTD_5_Alarm_Events$=	"Off/No"
RTD_5_Trip$=	"Off"
RTD_5_Trip_Voting$=	"RTD #5"
RTD_5_Trip_Relays$=	"Trip"
RTD_5_Trip_Temperature=	155
RTD_5_Hi_Alarm$=	"Off"
RTD_5_Hi_Alarm_Relays$=	"Alarm"

Device Settings (Continued):

RTD_5_Hi_Alarm_Level=	130
RTD_6_Application$=	"Stator"
RTD_6_Name=	0
RTD_6_Alarm$=	"Off"
RTD_6_Alarm_Relays$=	"Alarm"
RTD_6_Alarm_Temperature=	130
RTD_6_Alarm_Events$=	"Off/No"
RTD_6_Trip$=	"Off"
RTD_6_Trip_Voting$=	"RTD #6"
RTD_6_Trip_Relays$=	"Trip"
RTD_6_Trip_Temperature=	155
RTD_6_Hi_Alarm$=	"Off"
RTD_6_Hi_Alarm_Relays$=	"Alarm"
RTD_6_Hi_Alarm_Level=	130
RTD_7_Application$=	"Bearing"
RTD_7_Name=	0
RTD_7_Alarm$=	"Off"
RTD_7_Alarm_Relays$=	"Alarm"
RTD_7_Alarm_Temperature=	80
RTD_7_Alarm_Events$=	"Off/No"
RTD_7_Trip$=	"Off"
RTD_7_Trip_Voting$=	"RTD #7"
RTD_7_Trip_Relays$=	"Trip"
RTD_7_Trip_Temperature=	90
RTD_7_Hi_Alarm$=	"Off"
RTD_7_Hi_Alarm_Relays$=	"Alarm"
RTD_7_Hi_Alarm_Level=	80
RTD_8_Application$=	"Bearing"

Device Settings (Continued):

RTD_8_Name=	0
RTD_8_Alarm$=	"Off"
RTD_8_Alarm_Relays$=	"Alarm"
RTD_8_Alarm_Temperature=	80
RTD_8_Alarm_Events$=	"Off/No"
RTD_8_Trip$=	"Off"
RTD_8_Trip_Voting$=	"RTD #8"
RTD_8_Trip_Relays$=	"Trip"
RTD_8_Trip_Temperature=	90
RTD_8_Hi_Alarm$=	"Off"
RTD_8_Hi_Alarm_Relays$=	"Alarm"
RTD_8_Hi_Alarm_Level=	80
RTD_9_Application$=	"Bearing"
RTD_9_Name=	0
RTD_9_Alarm$=	"Off"
RTD_9_Alarm_Relays$=	"Alarm"
RTD_9_Alarm_Temperature=	80
RTD_9_Alarm_Events$=	"Off/No"
RTD_9_Trip$=	"Off"
RTD_9_Trip_Voting$=	"RTD #9"
RTD_9_Trip_Relays$=	"Trip"
RTD_9_Trip_Temperature=	90
RTD_9_Hi_Alarm$=	"Off"
RTD_9_Hi_Alarm_Relays$=	"Alarm"
RTD_9_Hi_Alarm_Level=	80
RTD_10_Application$=	"Bearing"
RTD_10_Name=	0
RTD_10_Alarm$=	"Off"

Device Settings (Continued):

RTD_10_Alarm_Relays$=	"Alarm"
RTD_10_Alarm_Temperature=	80
RTD_10_Alarm_Events$=	"Off/No"
RTD_10_Trip$=	"Off"
RTD_10_Trip_Voting$=	"RTD #10"
RTD_10_Trip_Relays$=	"Trip"
RTD_10_Trip_Temperature=	90
RTD_10_Hi_Alarm$=	"Off"
RTD_10_Hi_Alarm_Relays$=	"Alarm"
RTD_10_Hi_Alarm_Level=	80
RTD_11_Application$=	"Other"
RTD_11_Name=	0
RTD_11_Alarm$=	"Off"
RTD_11_Alarm_Relays$=	"Alarm"
RTD_11_Alarm_Temperature=	80
RTD_11_Alarm_Events$=	"Off/No"
RTD_11_Trip$=	"Off"
RTD_11_Trip_Voting$=	"RTD #11"
RTD_11_Trip_Relays$=	"Trip"
RTD_11_Trip_Temperature=	90
RTD_11_Hi_Alarm$=	"Off"
RTD_11_Hi_Alarm_Relays$=	"Alarm"
RTD_11_Hi_Alarm_Level=	80
RTD_12_Application$=	"Ambient"
RTD_12_Name=	0
RTD_12_Alarm$=	"Off"
RTD_12_Alarm_Relays$=	"Alarm"
RTD_12_Alarm_Temperature=	60

Device Settings (Continued):

RTD_12_Alarm_Events$=	"Off/No"
RTD_12_Trip$=	"Off"
RTD_12_Trip_Voting$=	"RTD #12"
RTD_12_Trip_Relays$=	"Trip"
RTD_12_Trip_Temperature=	80
RTD_12_Hi_Alarm$=	"Off"
RTD_12_Hi_Alarm_Relays$=	"Alarm"
RTD_12_Hi_Alarm_Level=	60
Open_RTD_Sensor_Alarm$=	"Off"
Open_RTD_Sensor_Alarm_Relays$=	"Alarm"
Open_RTD_Sensor_Alarm_Events$=	"Off/No"
RTD_Short_Low_Temp_Alarm$=	"Off"
RTD_Short_Low_Temp_Alarm_Relays$=	"Alarm"
RTD_Short_Low_Temp_Alarm_Events$=	"Off/No"
Undervoltage_Active_Only_If_Bus_Energized$=	"Off/No"
Undervoltage_Alarm$=	"Off"
Undervoltage_Alarm_Relays$=	"Alarm"
Undervoltage_Alarm_Pickup=	0.85
Starting_Undervoltage_Alarm_Pickup=	1.00
Undervoltage_Alarm_Delay=	3.0
Undervoltage_Alarm_Events$=	"Off/No"
Undervoltage_Trip$=	"Off"
Undervoltage_Trip_Mode$=	"1-Phase"
Undervoltage_Trip_Relays$=	"Trip"
Undervoltage_Trip_Pickup=	0.80
Starting_Undervoltage_Trip_Pickup=	1.00
Undervoltage_Trip_Delay=	3.0
Overvoltage_Alarm$=	"Off"

Device Settings (Continued):

Overvoltage_Relays$=	"Alarm"
Overvoltage_Alarm_Pickup=	1.05
Overvoltage_Alarm_Delay=	3.0
Overvoltage_Alarm_Events$=	"Off/No"
Overvoltage_Trip$=	"Off"
Overvoltage_Trip_Relays$=	"Trip"
Overvoltage_Trip_Pickup=	1.10
Overvoltage_Trip_Delay=	3.0
Voltage_Phase_Reversal_Trip$=	"Off"
Voltage_Phase_Reversal_Trip_Relays$=	"Trip"
Voltage_Frequency_Alarm$=	"Off"
Voltage_Frequency_Alarm_Relays$=	"Alarm"
Overfrequency_Alarm_Level=	60.50
Underfrequency_Alarm_Level=	59.50
Voltage_Frequency_Alarm_Delay=	1.0
Voltage_Frequency_Alarm_Events$=	"Off/No"
Voltage_Frequency_Trip$=	"Off"
Voltage_Frequency_Trip_Relays$=	"Trip"
Overfrequency_Trip_Level=	60.50
Underfrequency_Trip_Level=	59.50
Voltage_Frequency_Trip_Delay=	1.0
Block_Power_Factor_Element_from_Start=	1
Power_Factor_Alarm$=	"Off"
Power_Factor_Alarm_Relays$=	"Alarm"
Power_Factor_Lead_Alarm_Level=	1.00
Power_Factor_Lag_Alarm_Level=	1.00
Power_Factor_Alarm_Delay=	1.0
Power_Factor_Alarm_Events$=	"Off/No"

Device Settings (Continued):

Power_Factor_Trip$=	"Off"
Power_Factor_Trip_Relays$=	"Trip"
Power_Factor_Lead_Trip_Level=	1.00
Power_Factor_Lag_Trip_Level=	1.00
Power_Factor_Trip_Delay=	1.0
Block_kvar_Element_from_Start=	1
Reactive_Power_Alarm$=	"Off"
Reactive_Power_Alarm_Relays$=	"Alarm"
Positive_Reactive_Power_Alarm_Level=	10
Negative_Reactive_Power_Alarm_Level=	10
Reactive_Power_Alarm_Delay=	1.0
Reactive_Power_Alarm_Events$=	"Off/No"
Reactive_Power_Trip$=	"Off"
Reactive_Power_Trip_Relays$=	"Trip"
Positive_Reactive_Power_Trip_Level=	25
Negative_Reactive_Power_Trip_Level=	25
Reactive_Power_Trip_Delay=	1.0
Block_Underpower_From_Start=	0
Underpower_Alarm$=	"Off"
Underpower_Alarm_Relays$=	"Alarm"
Underpower_Alarm_Level=	2
Underpower_Alarm_Delay=	1
Underpower_Alarm_Events$=	"Off/No"
Underpower_Trip$=	"Off"
Underpower_Trip_Relays$=	"Trip"
Underpower_Trip_Level=	1
Underpower_Trip_Delay=	1
Block_Reverse_Power_From_Start=	0

Device Settings (Continued):

Reverse_Power_Alarm$=	"Off"
Reverse_Power_Alarm_Relays$=	"Alarm"
Reverse_Power_Alarm_Level=	1
Reverse_Power_Alarm_Delay=	1.0
Reverse_Power_Alarm_Events$=	"Off/No"
Reverse_Power_Trip$=	"Off"
Reverse_Power_Trip_Relays$=	"Trip"
Reverse_Power_Trip_Level=	1
Reverse_Power_Trip_Delay=	1.0
Torque_Metering$=	"Disabled"
Stator_Resistance=	0.004
Pole_Pairs=	2
Torque_Unit$=	"Newton-meter"
Overtorque_Alarm$=	"Off"
Overtorque_Alarm_Relays$=	"Alarm"
Overtorque_Alarm_Level=	4000.0
Overtorque_Alarm_Delay=	1.0
Overtorque_Alarm_Events$=	"Off/No"
Trip_Counter_Alarm$=	"Off"
Trip_Counter_Alarm_Relays$=	"Alarm"
Trip_Counter_Alarm_Level=	25
Trip_Counter_Alarm_Events$=	"Off/No"
Starter_Failure_Alarm_Starter_Failure_$=	"Off"
Starter_Type$=	"Breaker"
Starter_Failure_Alarm_Relays$=	"Alarm"
Starter_Failure_Alarm_Delay=	100
Supervision_of_Trip_Coil$=	"Disabled"
Starter_Failure_Alarm_Events$=	"Off/No"

Device Settings (Continued):

```
Current_Demand_Period=                  15
Current_Demand_Alarm$=                  "Off"
Current_Demand_Alarm_Relays$=           "Alarm"
Current_Demand_Alarm_Level=             100
Current_Demand_Alarm_Events$=           "Off/No"
kW_Demand_Period=                       15
kW_Demand_Alarm$=                       "Off"
kW_Demand_Alarm_Relays$=                "Alarm"
kW_Demand_Alarm_Level=                  100
kW_Demand_Alarm_Events$=                "Off/No"
kvar_Demand_Period=                     15
kvar_Demand_Alarm$=                     "Off"
kvar_Demand_Alarm_Relays$=              "Alarm"
kvar_Demand_Alarm_Level=                100
kvar_Demand_Alarm_Events$=              "Off/No"
kVA_Demand_Period=                      15
kVA_Demand_Alarm$=                      "Off"
kVA_Demand_Alarm_Relays$=               "Alarm"
kVA_Demand_Alarm_Level=                 100
kVA_Demand_Alarm_Events$=               "Off/No"
Positive_kWh_Pulse_Output_Relay$=       "Off"
Positive_kWh_Pulse_Output_Interval=     1
Positive_kvarh_Pulse_Output_Relay$=     "Off"
Positive_kvarh_Pulse_Output_Interval=   1
Negative_kvarh_Pulse_Output_Relay$=     "Off"
Negative_kvarh_Pulse_Output_Interval=   1
Analog_Output_1_Selection$=             "Phase B Current"
Analog_Output_2_Selection$=             "Phase A Current"
```

Device Settings (Continued):

Analog_Output_3_Selection$=	"None"
Analog_Output_4_Selection$=	"None"
RTD_1_Minimum=	-50
RTD_1_Maximum=	250
RTD_2_Minimum=	-50
RTD_2_Maximum=	250
RTD_3_Minimum=	-50
RTD_3_Maximum=	250
RTD_4_Minimum=	-50
RTD_4_Maximum=	250
RTD_5_Minimum=	-50
RTD_5_Maximum=	250
RTD_6_Minimum=	-50
RTD_6_Maximum=	250
RTD_7_Minimum=	-50
RTD_7_Maximum=	250
RTD_8_Minimum=	-50
RTD_8_Maximum=	250
RTD_9_Minimum=	-50
RTD_9_Maximum=	250
RTD_10_Minimum=	-50
RTD_10_Maximum=	250
RTD_11_Minimum=	-50
RTD_11_Maximum=	250
RTD_12_Minimum=	-50
RTD_12_Maximum=	250
Power_Factor_Minimum=	0.80
Power_Factor_Maximum=	-0.80

Device Settings (Continued):

```
Reactive_Power_Minimum=                    0

Reactive_Power_Maximum=                    750

Real_Power_Minimum=                        0

Real_Power_Maximum=                        1000

Apparent_Power_Minimum=                    0

Apparent_Power_Maximum=                    1250

Thermal_Capacity_Used_Minimum=             0

Thermal_Capacity_Used_Maximum=             100

Relay_Lockout_Time_Minimum=                0

Relay_Lockout_Time_Maximum=                150

Current_Demand_Minimum=                    0

Current_Demand_Maximum=                    700

kvar_Demand_Minimum=                       0

kvar_Demand_Maximum=                       1000

kW_Demand_Minimum=                         0

kW_Demand_Maximum=                         1250

kVA_Demand_Minimum=                        0

kVA_Demand_Maximum=                        1500

Speed2_Standard_Overload_Curve_Number=     4

Speed2_Undercurrent_Alarm$=                "Off"

Speed2_Undercurrent_Alarm_Pickup=          0.70

Speed2_Undercurrent_Alarm_Delay=           1

Speed2_Undercurrent_Alarm_Events$=         "Off/No"

Speed2_Undercurrent_Trip$=                 "Off"

Speed2_Undercurrent_Trip_Pickup=           0.70

Speed2_Undercurrent_Trip_Delay=            1

Speed2_Acceleration_Timer_From_Start=      10.0

Acceleration_Timer_From_Speed_One_to_Two=  10.0
```

Device Settings (Continued):

Ground_CT_Primary=	50
Phase_Differential_CT_Primary=	100
Speed_2_Phase_Sequence$=	"ABC"
Remote_Alarm_Name=	0
Remote_Alarm_Function$=	"Unlatched"
Remote_Alarm_Relays$=	"Alarm"
Remote_Alarm_Events$=	"Off/No"
Remote_Trip_Name=	0
Remote_Trip_Relays$=	"Trip"
Speed_Switch_Trip_Relays$=	"Trip"
Speed_Switch_Trip_Delays=	5.0
Load_Shed_Trip_Relays$=	"Trip"
Block_Pressure_Switch_Alarm_from_Start=	0
Pressure_Switch_Alarm_Function$=	"Unlatched"
Pressure_Switch_Alarm_Relays$=	"Alarm"
Pressure_Switch_Alarm_Delay=	5.0
Pressure_Switch_Alarm_Events$=	"Off/No"
Block_Pressure_Switch_Trip_from_Start=	0
Pressure_Switch_Trip_Relays$=	"Trip"
Pressure_Switch_Trip_Delay=	5.0
Vibration_Switch_Alarm_Function$=	"Unlatched"
Vibration_Switch_Alarm_Relays$=	"Alarm"
Vibration_Switch_Alarm_Delay=	5.0
Vibration_Switch_Alarm_Events$=	"Off/No"
Vibration_Switch_Trip_Relays$=	"Trip"
Vibration_Switch_Trip_Delay=	5.0
Counter_Units_Name=	0
Counter_Preset_Value=	0

Device Settings (Continued):

Counter_Type$=	"Increment"
Counter_Alarm$=	"Off"
Counter_Alarm_Relays$=	"Alarm"
Counter_Alarm_Level=	100
Counter_Alarm_Pickup$=	"Over"
Time_to_Trip_at_1_01_FLA=	17414.5
Time_to_Trip_at_1_05_FLA=	3414.9
Time_to_Trip_at_1_10_FLA=	1666.7
Time_to_Trip_at_1_20_FLA=	795.4
Time_to_Trip_at_1_30_FLA=	507.2
Time_to_Trip_at_1_40_FLA=	364.6
Time_to_Trip_at_1_50_FLA=	280.0
Time_to_Trip_at_1_75_FLA=	169.7
Time_to_Trip_at_2_00_FLA=	116.6
Time_to_Trip_at_2_25_FLA=	86.1
Time_to_Trip_at_2_50_FLA=	66.6
Time_to_Trip_at_2_75_FLA=	53.3
Time_to_Trip_at_3_00_FLA=	43.7
Time_to_Trip_at_3_25_FLA=	36.6
Time_to_Trip_at_3_50_FLA=	31.1
Time_to_Trip_at_3_75_FLA=	26.8
TIme_to_Trip_at_4_00_FLA=	23.3
Time_to_Trip_at_4_25_FLA=	20.5
Time_to_Trip_at_4_50_FLA=	18.2
Time_to_Trip_at_4_75_FLA=	16.2
Time_to_Trip_at_5_00_FLA=	14.6
Time_to_Trip_at_5_50_FLA=	12.0
Time_to_Trip_at_6_00_FLA=	10.0

Device Settings (Continued):

Time_to_Trip_at_6_50_FLA=	8.5
Time_to_Trip_at_7_00_FLA=	7.3
Time_to_Trip_at_7_50_FLA=	6.3
Time_to_Trip_at_8_00_FLA=	5.6
Time_to_Trip_at_10_0_FLA=	5.6
Time_to_Trip_at_15_0_FLA=	5.6
Time_to_Trip_at_20_0_FLA=	5.6
Overreach_Filter$=	"Off/No"
Short_Circuit_Trip_Relays$=	"Trip"
Short_Circuit_Trip_Pickup=	4.0
Intentional_Short_Circuit_Trip_Delay=	200
Ground_Fault_Trip_Backup_Relays$=	"Aux2"
Ground_FaultTrip_Backup_Delay=	200
Running_Time_Pulse_Relay$=	"Off"
Running_Time_Pulse_Interval=	1
Loss_Of_Comms_Function$=	"Off"
Loss_Of_Comms_Function_Type$=	"Alarm"
Loss_Of_Comms_Port$=	"COMP_RS485"
Assign_Loss_Of_Comms_Alarm_Relay$=	"Alarm"
Assign_Loss_Of_Comms_Trip_Relay$=	"Trip"
Loss_Of_Comms_Delay=	1
Loss_Of_Comms_Alarm_Event$=	"Off/No"
Phase_A_Current_Minimum=	0
Phase_A_Current_Maximum=	100
Phase_B_Current_Minimum=	0
Phase_B_Current_Maximum=	100
Phase_C_Current_Minimum=	0
Phase_C_Current_Maximum=	100

Device Settings (Continued):

Average_Phase_Current_Minimum=	0
Average_Phase_Current_Maximum=	100
AB_Line_Voltage_Minimum=	3200
AB_Line_Voltage_Maximum=	4500
BC_Line_Voltage_Minimum=	3200
BC_Line_Voltage_Maximum=	4500
CA_Line_Voltage_Minimum=	3200
CA_Line_Voltage_Maximum=	4500
Average_Line_Voltage_Minimum=	3200
Average_Line_Voltage_Maximum=	4500
Phase_AN_Voltage_Minimum=	1900
Phase_AN_Voltage_Maximum=	2500
Phase_BN_Voltage_Minimum=	1900
Phase_BN_Voltage_Maximum=	2500
Phase_CN_Voltage_Minimum=	1900
Phase_CN_Voltage_Maximum=	2500
Average_Phase_Voltage_Minimum=	1900
Average_Phase_Voltage_Maximum=	2500
Hottest_Stator_RTD_Minimum=	0
Hottest_Stator_RTD_Maximum=	200
Hottest_Bearing_RTD_Minimum=	0
Hottest_Bearing_RTD_Maximum=	200
Hottest_Ambient_RTD_Minimum=	-50
Hottest_Ambient_RTD_Maximum=	60
Analog_Input_1_Minimum=	0
Analog_Input_1_Maximum=	50000
Analog_Input_2_Minimum=	0
Analog_Input_2_Maximum=	50000

Device Settings (Continued):

Analog_Input_3_Minimum=	0
Analog_Input_3_Maximum=	50000
Analog_Input_4_Minimum=	0
Analog_Input_4_Maximum=	50000
Tachometer_Min=	3500
Tachometer_Max=	3700
MWh_Minimum=	50.000
MWh_Maximum=	100.000
Torque_Minimum=	0.0
Torque_Maximum=	0.0
Analog_Input_Diff_1_2_Minimum=	0
Analog_Input_Diff_1_2_Maximum=	100
Analog_Input_Diff_3_4_Minimum=	0
Analog_Input_Diff_3_4_Maximum=	100
Analog_Input_1_Setup$=	"4-20 mA"
Analog_Input_1_Units=	0
Analog_Input_1_Minimum_analog_in_1_=	0
Analog_Input_1_Maximum_analog_in_1_=	100
Block_Analog_Input_1_From_Start=	0
Analog_Input_1_Alarm$=	"Off"
Analog_Input_1_Alarm_Relays$=	"Alarm"
Analog_Input_1_Alarm_Level=	10
Analog_Input_1_Alarm_Pickup$=	"Over"
Analog_Input_1_Alarm_Delay=	0.1
Analog_Input_1_Alarm_Events$=	"Off/No"
Analog_Input_1_Trip$=	"Off"
Analog_Input_1_Trip_Relays$=	"Trip"
Analog_Input_1_Trip_Level=	20

Device Settings (Continued):

Analog_Input_1_Trip_Pickup$=	"Over"
Analog_Input_1_Trip_Delay=	0.1
Analog_Input_1_Name=	0
Analog_Input_2_Setup$=	"4-20 mA"
Analog_Input_2_Units=	0
Analog_Input_2_Minimum_analog_in_2_=	0
Analog_Input_2_Maximum_analog_in_2_=	100
Block_Analog_Input_2_From_Start=	0
Analog_Input_2_Alarm$=	"Off"
Analog_Input_2_Alarm_Relays$=	"Alarm"
Analog_Input_2_Alarm_Level=	10
Analog_Input_2_Alarm_Pickup$=	"Over"
Analog_Input_2_Alarm_Delay=	0.1
Analog_Input_2_Alarm_Events$=	"Off/No"
Analog_Input_2_Trip$=	"Off"
Analog_Input_2_Trip_Relays$=	"Trip"
Analog_Input_2_Trip_Level=	20
Analog_Input_2_Trip_Pickup$=	"Over"
Analog_Input_2_Trip_Delay=	0.1
Analog_Input_2_Name=	0
Analog_Input_3_Setup$=	"Disabled"
Analog_Input_3_Units=	0
Analog_Input_3_Minimum_analog_in_3_=	0
Analog_Input_3_Maximum_analog_in_3_=	100
Block_Analog_Input_3_From_Start=	0
Analog_Input_3_Alarm$=	"Off"
Analog_Input_3_Alarm_Relays$=	"Alarm"
Analog_Input_3_Alarm_Level=	10

Device Settings (Continued):

Analog_Input_3_Alarm_Pickup$=	"Over"
Analog_Input_3_Alarm_Delay=	0.1
Analog_Input_3_Alarm_Events$=	"Off/No"
Analog_Input_3_Trip$=	"Off"
Analog_Input_3_Trip_Relays$=	"Trip"
Analog_Input_3_Trip_Level=	20
Analog_Input_3_Trip_Pickup$=	"Over"
Analog_Input_3_Trip_Delay=	0.1
Analog_Input_3_Name=	0
Analog_Input_4_Setup$=	"Disabled"
Analog_Input_4_Units=	0
Analog_Input_4_Minimum_analog_in_4_=	0
Analog_Input_4_Maximum_analog_in_4_=	100
Block_Analog_Input_4_From_Start=	0
Analog_Input_4_Alarm$=	"Off"
Analog_Input_4_Alarm_Relays$=	"Alarm"
Analog_Input_4_Alarm_Level=	10
Analog_Input_4_Alarm_Pickup$=	"Over"
Analog_Input_4_Alarm_Delay=	0.1
Analog_Input_4_Alarm_Events$=	"Off/No"
Analog_Input_4_Trip$=	"Off"
Analog_Input_4_Trip_Relays$=	"Trip"
Analog_Input_4_Trip_Level=	20
Analog_Input_4_Trip_Pickup$=	"Over"
Analog_Input_4_Trip_Delay=	0.1
Analog_Input_4_Name=	0
Speed2_Time_to_Trip_at_1_01_FLA=	17414.5
Speed2_Time_to_Trip_at_1_05_FLA=	3414.9

Device Settings (Continued):

Speed2_Time_to_Trip_at_1_10_FLA=	1666.7
Speed2_Time_to_Trip_at_1_20_FLA=	795.4
Speed2_Time_to_Trip_at_1_30_FLA=	507.2
Speed2_Time_to_Trip_at_1_40_FLA=	364.6
Speed2_Time_to_Trip_at_1_50_FLA=	280.0
Speed2_Time_to_Trip_at_1_75_FLA=	169.7
Speed2_Time_to_Trip_at_2_00_FLA=	116.6
Speed2_Time_to_Trip_at_2_25_FLA=	86.1
Speed2_Time_to_Trip_at_2_50_FLA=	66.6
Speed2_Time_to_Trip_at_2_75_FLA=	53.3
Speed2_Time_to_Trip_at_3_00_FLA=	43.7
Speed2_Time_to_Trip_at_3_25_FLA=	36.6
Speed2_Time_to_Trip_at_3_50_FLA=	31.1
Speed2_Time_to_Trip_at_3_75_FLA=	26.8
Speed2_Time_to_Trip_at_4_00_FLA=	23.3
Speed2_Time_to_Trip_at_4_25_FLA=	20.5
Speed2_Time_to_Trip_at_4_50_FLA=	18.2
Speed2_Time_to_Trip_at_4_75_FLA=	16.2
Speed2_Time_to_Trip_at_5_00_FLA=	14.6
Speed2_Time_to_Trip_at_5_50_FLA=	12.0
Speed2_Time_to_Trip_at_6_00_FLA=	10.0
Speed2_Time_to_Trip_at_6_50_FLA=	8.5
Speed2_Time_to_Trip_at_7_00_FLA=	7.3
Speed2_Time_to_Trip_at_7_50_FLA=	6.3
Speed2_Time_to_Trip_at_8_00_FLA=	5.6
Speed2_Time_to_Trip_at_10_0_FLA=	5.6
Speed2_Time_to_Trip_at_15_0_FLA=	5.6
Speed2_Time_to_Trip_at_20_0_FLA=	5.6

Device Settings (Continued):

```
Speed2_Minimum_Allowable_Line_Voltage=        80

Speed2_Stall_Current_at_Min_Vline=            4.80

Speed2_Safe_Stall_Time_at_Min_Vline=          20.0

Speed2_Accel_Intersect_at_Min_Vline=          3.80

Speed2_Stall_Current_at_100_Vline=            6.00

Speed2_Safe_Stall_Time_at_100_Vline=          10.0

Speed2_Accel_Intersect_at_100_Vline=          5.00

Block_Speed2_Undercurrent_from_Start=         0

Speed_Switch_Trip_Speed2_Delay=               5.0

Speed2_Rated_Speed=                           3600

Analog_In_Differential_1_2_Enable$=           "Disabled"

Analog_In_Diff_1_2_Name=                      0

Analog_In_Differential_1_2_Comparison$=       "% Difference"

Analog_In_Differential_1_2_Logic$=            "1<>2 (or 3<>4)"

Analog_In_Differential_1_2_Active_When$=      "Always"

Analog_In_Differential_1_2_Block_from_Start=  0

Analog_In_Differential_1_2_Alarm$=            "Off"

Analog_In_Differential_1_2_Alarm_Relays$=     "Alarm"

Analog_In_Differential_1_2_Percent_Alarm=     10

Analog_In_Differential_1_2_Absolute_Alarm=    10

Analog_In_Differential_1_2_Alarm_Delay=       0.1

Analog_In_Differential_1_2_Alarm_Events$=     "Off/No"

Analog_In_Differential_1_2_Trip$=             "Off"

Analog_In_Differential_1_2_Trip_Relays$=      "Trip"

Analog_In_Differential_1_2_Percent_Trip=      10

Analog_In_Differential_1_2_Absolute_Trip=     10

Analog_In_Differential_1_2_Trip_Delay=        0.1

Analog_In_Differential_3_4_Enable$=           "Disabled"
```

Device Settings (Continued):

```
Analog_In_Diff_3_4_Name=                        0

Analog_In_Differential_3_4_Comparison$=         "% Difference"

Analog_In_Differential_3_4_Logic$=              "1<>2 (or 3<>4)"

Analog_In_Differential_3_4_Active_When$=        "Always"

Analog_In_Differential_3_4_Block_from_Start=    0

Analog_In_Differential_3_4_Alarm$=              "Off"

Analog_In_Differential_3_4_Alarm_Relays$=       "Alarm"

Analog_In_Differential_3_4_Percent_Alarm=       10

Analog_In_Differential_3_4_Absolute_Alarm=      10

Analog_In_Differential_3_4_Alarm_Delay=         0.1

Analog_In_Differential_3_4_Alarm_Events$=       "Off/No"

Analog_In_Differential_3_4_Trip$=               "Off"

Analog_In_Differential_3_4_Trip_Relays$=        "Trip"

Analog_In_Differential_3_4_Percent_Trip=        10

Analog_In_Differential_3_4_Absolute_Trip=       10

Analog_In_Differential_3_4_Trip_Delay=          0.1

Ground_Fault_Overreach_Filter$=                 "Off/No"

User_Map_Address_1=                             512

User_Map_Address_2=                             528

User_Map_Address_3=                             529

User_Map_Address_4=                             551

User_Map_Address_5=                             552

User_Map_Address_6=                             553

User_Map_Address_7=                             554

User_Map_Address_8=                             555

User_Map_Address_9=                             556

User_Map_Address_10=                            720

User_Map_Address_11=                            721
```

Device Settings (Continued):

User_Map_Address_12=	722
User_Map_Address_13=	723
User_Map_Address_14=	724
User_Map_Address_15=	729
User_Map_Address_16=	768
User_Map_Address_17=	769
User_Map_Address_18=	770
User_Map_Address_19=	771
User_Map_Address_20=	772
User_Map_Address_21=	773
User_Map_Address_22=	774
User_Map_Address_23=	775
User_Map_Address_24=	779
User_Map_Address_25=	780
User_Map_Address_26=	801
User_Map_Address_27=	802
User_Map_Address_28=	803
User_Map_Address_29=	804
User_Map_Address_30=	805
User_Map_Address_31=	806
User_Map_Address_32=	807
User_Map_Address_33=	808
User_Map_Address_34=	809
User_Map_Address_35=	810
User_Map_Address_36=	811
User_Map_Address_37=	812
User_Map_Address_38=	832
User_Map_Address_39=	833

Device Settings (Continued):

User_Map_Address_40=	834
User_Map_Address_41=	835
User_Map_Address_42=	840
User_Map_Address_43=	880
User_Map_Address_44=	881
User_Map_Address_45=	882
User_Map_Address_46=	884
User_Map_Address_47=	885
User_Map_Address_48=	886
User_Map_Address_49=	781
User_Map_Address_50=	782
User_Map_Address_51=	783
User_Map_Address_52=	725
User_Map_Address_53=	726
User_Map_Address_54=	727
User_Map_Address_55=	728
User_Map_Address_56=	0
User_Map_Address_57=	0
User_Map_Address_58=	0
User_Map_Address_59=	0
User_Map_Address_60=	0
User_Map_Address_61=	0
User_Map_Address_62=	0
User_Map_Address_63=	0
User_Map_Address_64=	0
User_Map_Address_65=	0
User_Map_Address_66=	0
User_Map_Address_67=	0

Device Settings (Continued):

```
User_Map_Address_68=                    0

User_Map_Address_69=                    0

User_Map_Address_70=                    0

User_Map_Address_71=                    0

User_Map_Address_72=                    0

User_Map_Address_73=                    0

User_Map_Address_74=                    0

User_Map_Address_75=                    0

User_Map_Address_76=                    0

User_Map_Address_77=                    0

User_Map_Address_78=                    0

User_Map_Address_79=                    0

User_Map_Address_80=                    0

User_Map_Address_81=                    0

User_Map_Address_82=                    0

User_Map_Address_83=                    0

User_Map_Address_84=                    0

User_Map_Address_85=                    0

User_Map_Address_86=                    0

User_Map_Address_87=                    0

User_Map_Address_88=                    0

User_Map_Address_89=                    0

User_Map_Address_90=                    0

User_Map_Address_91=                    0

User_Map_Address_92=                    0

User_Map_Address_93=                    0

User_Map_Address_94=                    0

User_Map_Address_95=                    0
```

Device Settings (Continued):

User_Map_Address_96=	0
User_Map_Address_97=	0
User_Map_Address_98=	0
User_Map_Address_99=	0
User_Map_Address_100=	0
User_Map_Address_101=	0
User_Map_Address_102=	0
User_Map_Address_103=	0
User_Map_Address_104=	0
User_Map_Address_105=	0
User_Map_Address_106=	0
User_Map_Address_107=	0
User_Map_Address_108=	0
User_Map_Address_109=	0
User_Map_Address_110=	0
User_Map_Address_111=	0
User_Map_Address_112=	0
User_Map_Address_113=	0
User_Map_Address_114=	0
User_Map_Address_115=	0
User_Map_Address_116=	0
User_Map_Address_117=	0
User_Map_Address_118=	0
User_Map_Address_119=	0
User_Map_Address_120=	0
User_Map_Address_121=	0
User_Map_Address_122=	0
User_Map_Address_123=	0

Device Settings (Continued):

```
User_Map_Address_124=                    0

User_Map_Address_125=                    0

Motor_Load_Minimum=                      0.00

Motor_Load_Maximum=                      1.25
```

Global Defines:

```
RELAY_ADDRESS=1                          'SPECIFIC RELAY ADDRESS USED FOR MODBUS
COMMUNICATIONS (DEFAULT=1)
TRIP_OUTPUT$="F1-E2"                     'OUTPUT CONTACT TO SENSE A TRIP
AUTO_MASK=1                              'SET TO 2 TO DISPLAY FLEX PROGRAMMING
SKIP_TST=0                               'SET TO 1 TO SKIP MESSAGES FOR TESTS SKIPPED
PRINT_RAN_TESTS=1                        'MARKS TESTS IF THEY WERE ATTEMPTED BUT NOT
APPLICABLE
Phase_CT_Secondary=5                     'THIS IS THE RELAYS PHASE NOMINAL CT INPUT
VTR=Voltage_Transformer_Ratio            'VT RATIO
CTR=Phase_CT_Primary/Phase_CT_Secondary  'CALCULATED CT RATIO
FLA=(MOTOR_Full_load_Amps)/CTR           'SECONDARY FULL LOAD CURRENT
MTR_START_MULT=0.5                       'MULT OF FULL LOAD AMPS
MTR_START_DELAY=120                      'WAIT TIME IN CYCLES FOR START
```

Device Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Device Test Results for: *** GET SETTINGS FILE FROM DEVICE ***

OK?
RAN

Device Test Results for: ***RELAY SETTINGS TO SETTINGS TAB***

OK?
RAN

Device Test Results for: CURRENT METER TEST

	EXPECTED CURRENT	CURRENT READ	RANGE	OK?
A PHASE	75.0	75.0	71.2 TO 78.8	PASS
B PHASE	75.0	75.0	71.2 TO 78.8	PASS
C PHASE	75.0	75.0	71.2 TO 78.8	PASS

Device Test Results for: OVERLOAD PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	2.788	2.760	1.01	PASS

Device Test Results for: OVERLOAD TIMING TEST

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
5.00	12.000	875.66	14.594	14.573	0.14	PASS

Device Test Results for: SHORT CIRCUIT TRIP PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
20.000	20.000	-0.00	PASS

Device Test Results for: SHORT CIRCUIT TRIP DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	24.000	13.57	0.226	0.150 TO 0.250	PASS

Device Test Results for: UNDERCURRENT TRIP PICKUP

OK?
RAN

Device Test Results for: MECHANICAL JAM PICKUP

OK?
RAN

Device Test Results for: MECHANICAL JAM DELAY

OK?
RAN

Device Test Results for: CURRENT UNBALANCE PICKUP

UNBALANCE% PU	RANGE	OK?
0.00	0.00 TO 0.00	RAN

Device Test Results for: CURRENT UNBALANCE DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
0.32	12.800	64.70	1.078	0.500 TO 1.500	PASS

Device Test Results for: ACCELERATION TIMER

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
1.20	3.312	598.33	9.972	10.000	-0.28	PASS

Device Test Results for: ***VOLTAGE INPUT TEST***

	EXPECTED VOLTAGE	VOLATGE READ	RANGE	OK?
APH-BPH	7274.6	7282.0	7129.1 TO 7420.1	PASS
BPH-CPH	7274.6	7288.0	7129.1 TO 7420.1	PASS
CPH-APH	7274.6	7264.0	7129.1 TO 7420.1	PASS

Device Test Results for: UNDERVOLTAGE PICKUP

OK?
RAN

Device Test Results for: UNDERVOLTAGE DELAY

OK?
RAN

Device Test Results for: OVERVOLTAGE PICKUP

OK?
RAN

Device Test Results for: OVERVOLTAGE DELAY

OK?
RAN

Device Test Results for: VOLTAGE PHASE REVERSAL

OK?
RAN

Device Test Results for: UNDERFREQUENCY PICKUP

OK?
RAN

Device Test Results for: UNDERFREQUENCY DELAY

OK?
RAN

Device Test Results for: OVERFREQUENCY PICKUP

OK?
RAN

Device Test Results for: OVERFREQUENCY DELAY

OK?
RAN

Device Test Results for: ***POWER INPUT TEST***

EXPECTED POWER FACTOR	POWER FACTOR READ	EXPECTED KILOWATTS	KILOWATTS READ	RANGE	OK?
0.951	0.950	862.8	865.0	844.7 TO 880.9	PASS

Device Test Results for: POWER FACTOR LEAD PICKUP

ANG(LAG)	VOLTAGE	CURRENT	POWER FACTOR	RANGE	OK?
0.00	0.00	0.000	0.000	0.000 TO 0.000	RAN

Device Test Results for: POWER FACTOR LAG PICKUP

ANG(LAG)	VOLTAGE	CURRENT	POWER FACTOR	RANGE	OK?
0.00	0.00	0.000	0.000	0.000 TO 0.000	RAN

Device Test Results for: REACTIVE POS KVAR TRIP PU

OK?
RAN

Device Test Results for: REACTIVE NEG KVAR TRIP PU

OK?
RAN

Device Test Results for: REACTIVE KVAR TRIP DELAY

OK?
RAN

Device Test Results for: REVERSE POWER TRIP PU

OK?
RAN

Device Test Results for: REVERSE POWER TRIP DELAY

OK?
RAN

Device Test Results for: UNDERPOWER TRIP PU

OK?
RAN

Device Test Results for: UNDERPOWER TRIP DELAY

OK?
RAN

Device Test Results for: ***GROUND(1A/5A) INPUT TEST***

EXPECTED CURRENT	CURRENT READ	RANGE	OK?
50.0	49.8	49.0 TO 51.0	PASS

Device Test Results for: GROUND(1A/5A) FAULT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
2.525	2.500	1.00	PASS

Device Test Results for: GROUND(1A/5A) FAULT DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.10	2.750	14.36	0.239	0.000 TO 0.700	PASS

Device Test Results for: ***GROUND(50/025) INPUT TEST***

0.0	0.0	0.0	TO	0.0	RAN

Device Test Results for: GROUND(50/025) FAULT PICKUP

OK?
RAN

Device Test Results for: GROUND(50/025) FAULT DELAY

OK?
RAN

Device Test Results for: ***DIFFERENTIAL INPUT TEST***

0.0	0.0	0.0	TO	0.0	RAN

Device Test Results for: DIFFERENTIAL PICKUP PH A

OK?
RAN

Device Test Results for: DIFFERENTIAL PICKUP PH B

OK?
RAN

Device Test Results for: DIFFERENTIAL PICKUP PH C

OK?
RAN

Device Test Results for: DIFFERENTIAL FAULT DELAY

OK?
RAN

Routine	SR-469.FST_LIB	**AFAL**	AL	**Test Date**	2/14/2024
Version	2.7			**Pass/Fail**	PASS

Device Data:

Customer:	City of Ann Arbor Waste Water Treatment		
Job_Number:	230858	SUBSTATION:	Sub 8
Relay_ID:	PAB-E3	PHASE_ZONE:	
RELAY_MANF:	GE MULTILIN	RELAY_TYPE:	SR-469
MODEL_STYLE:		IEEE_DEVICE:	
IL_IB:		SERIAL_NUMBER:	
FIRMWARE:		NERC_AUDITABLE:	0
MAINT_INTERVAL:	0	PREVIOUS_TESTDATE:	
CURRENT_TESTDATE:		NEXT_TESTDATE:	
TESTSET_CALDATE:		Tested_BY:	

Routine Notes:

Device Settings Used for Testing:

SR_PART_NUM$=	"469-P5-HI-A20-T"
SR_FIRMWARE$=	"5200"
Default_Message_Cycle_Time=	2.0
Default_Message_Timeout=	300
Average_Motor_Load_Calculation_Period=	15
Temperature_Display_Units$=	"Celsius"
Trace_Memory_Trigger_Position=	25
Trace_Memory_Buffers$=	"8 x 28 cycles"
Display_Update_Interval=	0.4
Motor_Load_Filter_Interval=	0
Communication_Port_Passcode=	0
Passcode_write_Only_=	0
First_Scratchpad_Message$=	"Text 1"
Second_Scratchpad_Message$=	"Text 2"
Third_Scratchpad_Message$=	"Text 3"
Fourth_Scratchpad_Message$=	"Text 4"
Fifth_Scratchpad_Message$=	"GE MULTILIN 469 Motor Relay "
Phase_CT_Primary=	150

Device Settings (Continued):

```
Motor_Full_Load_Amps=                          72

Ethernet_IP_Address=                           0

Ethernet_Subnet_Mask=                          4294966272

Ethernet_Gateway_Address=                      0

DeviceNet_MAC_ID=                              63

DeviceNet_Baud_Rate$=                          "125 kbps"

Front_RS232_baud_rate$=                        "19200 baud"

Slave_Address=                                 1

Computer_RS485_Baud_Rate$=                     "19200 baud"

Computer_RS485_Parity$=                        "None"

Auxiliary_RS485_Baud_Rate$=                    "9600 baud"

Auxiliary_RS485_Parity$=                       "None"

Ground_CT_Type$=                               "5 A Secondary"

Phase_Differential_CT_Type$=                   "None"

Enable_Two_Speed_Motor_Option$=                "Off/No"

Speed_Two_Phase_CT_Primary=                    100

Speed_Two_Motor_Full_Load_Amps=                1

VoltageTransformer_Connection_Type$=           "Open Delta"

Enable_Single_VT_Connection$=                  "Off"

Voltage_Transformer_Ratio=                     35.00

Motor_Nameplate_Voltage=                       4200

Nominal_System_Frequency$=                     "60 Hz"

System_Phase_Sequence$=                        "ABC"

Serial_Communication_Control$=                 "Off/No"

Assign_Start_Control_Relays$=                  "Auxiliary 2"

Reduced_Voltage_Starting$=                     "Off/No"

Control_Relays_for_Reduced_Voltage_Starting$= "Auxiliary 3"

Transition_On$=                                "Current Only"
```

Device Settings (Continued):

```
Reduced_Voltage_Start_Level=                100

Reduced_Voltage_Start_Timer=                200

Incomplete_Sequence_Trip_Relays$=           "Trip"

Starter_Status_Switch$=                     "Start Aux a"

Assignable_Input_1_Function$=               "Off"

Counter_Alarm_Events$=                      "Off/No"

Rated_Speed=                                3600

Tachometer_Alarm$=                          "Off"

Tachometer_Alarm_Relays$=                   "Alarm"

Tachometer_Alarm_Speed=                     10

Tachometer_Alarm_Delay=                     1

Tachometer_Alarm_Events$=                   "Off/No"

Tachometer_Trip$=                           "Off"

Tachometer_Trip_Relays$=                    "Trip"

Tachometer_Trip_Speed=                      10

Tachometer_Trip_Delay=                      1

General_Switch_A_Name=                      0

General_Switch_A_Normal_State$=             "Normally Open"

General_Switch_A_Block_Input_From_Start=    0

General_Switch_A_Alarm$=                    "Off"

General_Switch_A_Alarm_Relays$=             "Alarm"

General_Switch_A_Alarm_Delay=               5.0

General_Switch_A_Alarm_Events$=             "Off/No"

General_Switch_A_Trip$=                     "Off"

General_Switch_A_Trip_Relays$=              "Trip"

General_Switch_A_Trip_Delay=                5.0

General_Switch_B_Name=                      0

General_Switch_B_Normal_State$=             "Normally Open"
```

Device Settings (Continued):

```
General_Switch_B_Block_Input_From_Start=      0
General_Switch_B_Alarm$=                      "Off"
General_Switch_B_Alarm_Relays$=               "Alarm"
General_Switch_B_Alarm_Delay=                 5.0
General_Switch_B_Alarm_Events$=               "Off/No"
General_Switch_B_Trip$=                       "Off"
General_Switch_B_Trip_Relays$=                "Trip"
General_Switch_B_Trip_Delay=                  5.0
General_Switch_C_Name=                        0
General_Switch_C_Normal_State$=               "Normally Open"
General_Switch_C_Block_Input_From_Start=      0
General_Switch_C_Alarm$=                      "Off"
General_Switch_C_Alarm_Relays$=               "Alarm"
General_Switch_C_Alarm_Delay=                 5.0
General_Switch_C_Alarm_Events$=               "Off/No"
General_Switch_C_Trip$=                       "Off"
General_Switch_C_Trip_Relays$=                "Trip"
General_Switch_C_Trip_Delay=                  5.0
General_Switch_D_Name=                        0
General_Switch_D_Normal_State$=               "Normally Open"
General_Switch_D_Block_Input_From_Start=      0
General_Switch_D_Alarm$=                      "Off"
General_Switch_D_Alarm_Relays$=               "Alarm"
General_Switch_D_Alarm_Delay=                 5.0
General_Switch_D_Alarm_Events$=               "Off/No"
General_Switch_D_Trip$=                       "Off"
General_Switch_D_Trip_Relays$=                "Trip"
General_Switch_D_Trip_Delay=                  5.0
```

Device Settings (Continued):

Assignable_Input_2_Function$=	"Off"
Assignable_Input_3_Function$=	"Off"
Assignable_Input_4_Function$=	"Off"
Reset_Mode_R1_Trip$=	"All Resets"
Force_R1_Output_Relay$=	"Disabled"
Force_R1_Operate_Time=	0
Reset_Mode_R4_Auxiliary$=	"All Resets"
Force_R4_Output_Relay$=	"Disabled"
Force_R4_Operate_Time=	0
Reset_Mode_R2_Auxiliary$=	"All Resets"
Force_R2_Output_Relay$=	"Disabled"
Force_R2_Output_Operate_Time=	0
Reset_Mode_R3_Auxiliary$=	"All Resets"
Force_R3_Output_Relay$=	"Disabled"
Force_R3_Operate_Time=	0
Force_R5_Output_Relay$=	"Disabled"
Force_R5_Operate_Time=	0
Reset_Mode_R6_Service$=	"All Resets"
Curve_Style$=	"Standard"
Overload_Pickup_Level=	1.15
Unbalance_k_Factor=	0
Cool_Time_Constant_Running=	15
Cool_Time_Constant_Stopped=	30
Hot_Cold_Safe_Stall_Ratio=	1.00
RTD_Blasing$=	"Off/No"
RTD_Blas_Minimum=	40
RTD_Blas_Center_Point=	130
RTD_Blas_Maximum=	155

Device Settings (Continued):

Thermal_Capacity_Alarm$=	"Off"
Thermal_Capacity_Alarm_Relays$=	"Alarm"
Thermal_Capacity_Alarm_Level=	75
Thermal_Capacity_Alarm_Events$=	"Off/No"
Overload_Trip_Relays$=	"Trip"
Standard_Overload_Curve_Number=	4
Minimum_Allowable_Line_Voltage=	80
Stall_Current_at_Min_Vline=	4.80
Safe_Stall_Time_at_Min_Vline=	20.0
Accel_Intersect_at_Min_Vline=	3.80
Stall_Current_at_100_Vline=	6.00
Safe_Stall_Time_at_100_Vline=	10.0
Accel_Intersect_at_100_Vline=	5.00
Short_Circuit_Trip$=	"Latched"
Short_Circuit_Trip_Backup$=	"Off/No"
Short_Circuit_Backup_Relays$=	"Aux2"
Short_Circuit_Trip_Backup_Delay=	200
Overload_Alarm$=	"Off"
Overload_Alarm_Relays$=	"Alarm"
Overload_Alarm_Events$=	"Off/No"
Overload_Alarm_Delay=	0.1
Mechanical_Jam_Trip$=	"Off"
Mechanical_Jam_Trip_Relays$=	"Trip"
Mechanical_Jam_Pickup=	1.50
Mechanical_Jam_Delay=	1
Block_Undercurrent_from_Start=	0
Undercurrent_Alarm$=	"Off"
Undercurrent_Alarm_Relays$=	"Alarm"

Device Settings (Continued):

Undercurrent_Alarm_Pickup=	0.70
Undercurrent_Alarm_Delay=	1
Undercurrent_Alarm_Events$=	"Off/No"
Undercurrent_Trip$=	"Off"
Undercurrent_Trip_Relays$=	"Trip"
Undercurrent_Trip_Pickup=	0.70
Undercurrent_Trip_Delay=	1
Current_Unbalance_Alarm$=	"Off"
Current_Unbalance_Alarm_Relays$=	"Alarm"
Current_Unbalance_Alarm_Pickup=	15
Current_Unbalance_Alarm_Delay=	1
Current_Unbalance_Alarm_Events$=	"Off/No"
Current_Unbalance_Trip$=	"Off"
Current_Unbalance_Trip_Relays$=	"Trip"
Current_Unbalance_Trip_Pickup=	20
Current_Unbalance_Trip_Delay=	1
Ground_Fault_Alarm$=	"Off"
Ground_Fault_Alarm_Relays$=	"Alarm"
Ground_Fault_Alarm_Pickup=	0.10
Alarm_Pickup_for_Multlin_CT_50_025=	1.00
Intentional_GF_Alarm_Delay=	0
Ground_Fault_Alarm_Events$=	"Off/No"
Ground_Fault_Trip$=	"Latched"
Ground_Fault_Trip_Relays$=	"Trip"
Ground_Fault_Trip_Pickup=	0.50
Trip_Pickup_for_Multlin_CT_50_025=	1.00
Intentional_GF_Trip_Delay=	200
Ground_Fault_Trip_Backup$=	"Off/No"

Device Settings (Continued):

```
Phase_Differential_Trip$=                    "Off"

Phase_Differential_Trip_Relays$=             "Trip"

Differential_Trip_Pickup_While_Starting=     0.10

Differential_Trip_Delay_While_Starting=      0

Differential_Trip_Pickup_While_Running=      0.10

Differential_Trip_Delay_While_Running=       0

Accleration_Timer_Trip$=                     "Off"

Acceleration_Timer_Trip_Relays$=             "Trip"

Acceleration_Timer_from_Start=               10.0

Start_Inhibit_Block$=                        "Off/No"

Thermal_Capacity_Used_Margin=                25

Jogging_Block$=                              "Off/No"

Maximum_Starts_Hour_Permissible=             3

Time_Between_Starts=                         10

Restart_Block$=                              "Off/No"

Restart_Block_Time=                          1

Stator_RTD_Type$=                            "100 Ohm Platinum"

Bearing_RTD_Type$=                           "100 Ohm Platinum"

Ambient_RTD_Type$=                           "100 Ohm Platinum"

Other_RTD_Type$=                             "100 Ohm Platinum"

RTD_1_Application$=                          "Stator"

RTD_1_Name=                                  0

RTD_1_Alarm$=                                "Off"

RTD_1_Alarm_Relays$=                         "Alarm"

RTD_1_Alarm_Temperature=                     130

RTD_1_Alarm_Events$=                         "Off/No"

RTD_1_Trip$=                                 "Off"

RTD_1_Trip_Voting$=                          "RTD #1"
```

Device Settings (Continued):

RTD_1_Trip_Relays$=	"Trip"
RTD_1_Trip_Temperature=	155
RTD_1_Hi_Alarm$=	"Off"
RTD_1_Hi_Alarm_Relays$=	"Alarm"
RTD_1_Hi_Alarm_Level=	130
RTD_2_Application$=	"Stator"
RTD_2_Name=	0
RTD_2_Alarm$=	"Off"
RTD_2_Alarm_Relays$=	"Alarm"
RTD_2_Alarm_Temperature=	130
RTD_2_Alarm_Events$=	"Off/No"
RTD_2_Trip$=	"Off"
RTD_2_Trip_Voting$=	"RTD #2"
RTD_2_Trip_Relays$=	"Trip"
RTD_2_Trip_Temperature=	155
RTD_2_Hi_Alarm$=	"Off"
RTD_2_Hi_Alarm_Relays$=	"Alarm"
RTD_2_Hi_Alarm_Level=	130
RTD_3_Application$=	"Stator"
RTD_3_Name=	0
RTD_3_Alarm$=	"Off"
RTD_3_Alarm_Relays$=	"Alarm"
RTD_3_Alarm_Temperature=	130
RTD_3_Alarm_Events$=	"Off/No"
RTD_3_Trip$=	"Off"
RTD_3_Trip_Voting$=	"RTD #3"
RTD_3_Trip_Relays$=	"Trip"
RTD_3_Trip_Temperature=	155

Device Settings (Continued):

RTD_3_Hi_Alarm$=	"Off"
RTD_3_Hi_Alarm_Relays$=	"Alarm"
RTD_3_Hi_Alarm_Level=	130
RTD_4_Application$=	"Stator"
RTD_4_Name=	0
RTD_4_Alarm$=	"Off"
RTD_4_Alarm_Relays$=	"Alarm"
RTD_4_Alarm_Temperature=	130
RTD_4_Alarm_Events$=	"Off/No"
RTD_4_Trip$=	"Off"
RTD_4_Trip_Voting$=	"RTD #4"
RTD_4_Trip_Relays$=	"Trip"
RTD_4_Trip_Temperature=	155
RTD_4_Hi_Alarm$=	"Off"
RTD_4_Hi_Alarm_Relays$=	"Alarm"
RTD_4_Hi_Alarm_Level=	130
RTD_5_Application$=	"Stator"
RTD_5_Name=	0
RTD_5_Alarm$=	"Off"
RTD_5_Alarm_Relays$=	"Alarm"
RTD_5_Alarm_Temperature=	130
RTD_5_Alarm_Events$=	"Off/No"
RTD_5_Trip$=	"Off"
RTD_5_Trip_Voting$=	"RTD #5"
RTD_5_Trip_Relays$=	"Trip"
RTD_5_Trip_Temperature=	155
RTD_5_Hi_Alarm$=	"Off"
RTD_5_Hi_Alarm_Relays$=	"Alarm"

Device Settings (Continued):

RTD_5_Hi_Alarm_Level=	130
RTD_6_Application$=	"Stator"
RTD_6_Name=	0
RTD_6_Alarm$=	"Off"
RTD_6_Alarm_Relays$=	"Alarm"
RTD_6_Alarm_Temperature=	130
RTD_6_Alarm_Events$=	"Off/No"
RTD_6_Trip$=	"Off"
RTD_6_Trip_Voting$=	"RTD #6"
RTD_6_Trip_Relays$=	"Trip"
RTD_6_Trip_Temperature=	155
RTD_6_Hi_Alarm$=	"Off"
RTD_6_Hi_Alarm_Relays$=	"Alarm"
RTD_6_Hi_Alarm_Level=	130
RTD_7_Application$=	"Bearing"
RTD_7_Name=	0
RTD_7_Alarm$=	"Off"
RTD_7_Alarm_Relays$=	"Alarm"
RTD_7_Alarm_Temperature=	80
RTD_7_Alarm_Events$=	"Off/No"
RTD_7_Trip$=	"Off"
RTD_7_Trip_Voting$=	"RTD #7"
RTD_7_Trip_Relays$=	"Trip"
RTD_7_Trip_Temperature=	90
RTD_7_Hi_Alarm$=	"Off"
RTD_7_Hi_Alarm_Relays$=	"Alarm"
RTD_7_Hi_Alarm_Level=	80
RTD_8_Application$=	"Bearing"

Device Settings (Continued):

RTD_8_Name=	0
RTD_8_Alarm$=	"Off"
RTD_8_Alarm_Relays$=	"Alarm"
RTD_8_Alarm_Temperature=	80
RTD_8_Alarm_Events$=	"Off/No"
RTD_8_Trip$=	"Off"
RTD_8_Trip_Voting$=	"RTD #8"
RTD_8_Trip_Relays$=	"Trip"
RTD_8_Trip_Temperature=	90
RTD_8_Hi_Alarm$=	"Off"
RTD_8_Hi_Alarm_Relays$=	"Alarm"
RTD_8_Hi_Alarm_Level=	80
RTD_9_Application$=	"Bearing"
RTD_9_Name=	0
RTD_9_Alarm$=	"Off"
RTD_9_Alarm_Relays$=	"Alarm"
RTD_9_Alarm_Temperature=	80
RTD_9_Alarm_Events$=	"Off/No"
RTD_9_Trip$=	"Off"
RTD_9_Trip_Voting$=	"RTD #9"
RTD_9_Trip_Relays$=	"Trip"
RTD_9_Trip_Temperature=	90
RTD_9_Hi_Alarm$=	"Off"
RTD_9_Hi_Alarm_Relays$=	"Alarm"
RTD_9_Hi_Alarm_Level=	80
RTD_10_Application$=	"Bearing"
RTD_10_Name=	0
RTD_10_Alarm$=	"Off"

Device Settings (Continued):

RTD_10_Alarm_Relays$=	"Alarm"
RTD_10_Alarm_Temperature=	80
RTD_10_Alarm_Events$=	"Off/No"
RTD_10_Trip$=	"Off"
RTD_10_Trip_Voting$=	"RTD #10"
RTD_10_Trip_Relays$=	"Trip"
RTD_10_Trip_Temperature=	90
RTD_10_Hi_Alarm$=	"Off"
RTD_10_Hi_Alarm_Relays$=	"Alarm"
RTD_10_Hi_Alarm_Level=	80
RTD_11_Application$=	"Other"
RTD_11_Name=	0
RTD_11_Alarm$=	"Off"
RTD_11_Alarm_Relays$=	"Alarm"
RTD_11_Alarm_Temperature=	80
RTD_11_Alarm_Events$=	"Off/No"
RTD_11_Trip$=	"Off"
RTD_11_Trip_Voting$=	"RTD #11"
RTD_11_Trip_Relays$=	"Trip"
RTD_11_Trip_Temperature=	90
RTD_11_Hi_Alarm$=	"Off"
RTD_11_Hi_Alarm_Relays$=	"Alarm"
RTD_11_Hi_Alarm_Level=	80
RTD_12_Application$=	"Ambient"
RTD_12_Name=	0
RTD_12_Alarm$=	"Off"
RTD_12_Alarm_Relays$=	"Alarm"
RTD_12_Alarm_Temperature=	60

Device Settings (Continued):

RTD_12_Alarm_Events$=	"Off/No"
RTD_12_Trip$=	"Off"
RTD_12_Trip_Voting$=	"RTD #12"
RTD_12_Trip_Relays$=	"Trip"
RTD_12_Trip_Temperature=	80
RTD_12_Hi_Alarm$=	"Off"
RTD_12_Hi_Alarm_Relays$=	"Alarm"
RTD_12_Hi_Alarm_Level=	60
Open_RTD_Sensor_Alarm$=	"Off"
Open_RTD_Sensor_Alarm_Relays$=	"Alarm"
Open_RTD_Sensor_Alarm_Events$=	"Off/No"
RTD_Short_Low_Temp_Alarm$=	"Off"
RTD_Short_Low_Temp_Alarm_Relays$=	"Alarm"
RTD_Short_Low_Temp_Alarm_Events$=	"Off/No"
Undervoltage_Active_Only_If_Bus_Energized$=	"Off/No"
Undervoltage_Alarm$=	"Off"
Undervoltage_Alarm_Relays$=	"Alarm"
Undervoltage_Alarm_Pickup=	0.85
Starting_Undervoltage_Alarm_Pickup=	1.00
Undervoltage_Alarm_Delay=	3.0
Undervoltage_Alarm_Events$=	"Off/No"
Undervoltage_Trip$=	"Off"
Undervoltage_Trip_Mode$=	"1-Phase"
Undervoltage_Trip_Relays$=	"Trip"
Undervoltage_Trip_Pickup=	0.80
Starting_Undervoltage_Trip_Pickup=	1.00
Undervoltage_Trip_Delay=	3.0
Overvoltage_Alarm$=	"Off"

Device Settings (Continued):

```
Overvoltage_Relays$=                        "Alarm"
Overvoltage_Alarm_Pickup=                   1.05
Overvoltage_Alarm_Delay=                    3.0
Overvoltage_Alarm_Events$=                  "Off/No"
Overvoltage_Trip$=                          "Off"
Overvoltage_Trip_Relays$=                   "Trip"
Overvoltage_Trip_Pickup=                    1.10
Overvoltage_Trip_Delay=                     3.0
Voltage_Phase_Reversal_Trip$=               "Off"
Voltage_Phase_Reversal_Trip_Relays$=        "Trip"
Voltage_Frequency_Alarm$=                   "Off"
Voltage_Frequency_Alarm_Relays$=            "Alarm"
Overfrequency_Alarm_Level=                  60.50
Underfrequency_Alarm_Level=                 59.50
Voltage_Frequency_Alarm_Delay=              1.0
Voltage_Frequency_Alarm_Events$=            "Off/No"
Voltage_Frequency_Trip$=                    "Off"
Voltage_Frequency_Trip_Relays$=             "Trip"
Overfrequency_Trip_Level=                   60.50
Underfrequency_Trip_Level=                  59.50
Voltage_Frequency_Trip_Delay=               1.0
Block_Power_Factor_Element_from_Start=      1
Power_Factor_Alarm$=                        "Off"
Power_Factor_Alarm_Relays$=                 "Alarm"
Power_Factor_Lead_Alarm_Level=              1.00
Power_Factor_Lag_Alarm_Level=               1.00
Power_Factor_Alarm_Delay=                   1.0
Power_Factor_Alarm_Events$=                 "Off/No"
```

Device Settings (Continued):

Power_Factor_Trip$=	"Off"
Power_Factor_Trip_Relays$=	"Trip"
Power_Factor_Lead_Trip_Level=	1.00
Power_Factor_Lag_Trip_Level=	1.00
Power_Factor_Trip_Delay=	1.0
Block_kvar_Element_from_Start=	1
Reactive_Power_Alarm$=	"Off"
Reactive_Power_Alarm_Relays$=	"Alarm"
Positive_Reactive_Power_Alarm_Level=	10
Negative_Reactive_Power_Alarm_Level=	10
Reactive_Power_Alarm_Delay=	1.0
Reactive_Power_Alarm_Events$=	"Off/No"
Reactive_Power_Trip$=	"Off"
Reactive_Power_Trip_Relays$=	"Trip"
Positive_Reactive_Power_Trip_Level=	25
Negative_Reactive_Power_Trip_Level=	25
Reactive_Power_Trip_Delay=	1.0
Block_Underpower_From_Start=	0
Underpower_Alarm$=	"Off"
Underpower_Alarm_Relays$=	"Alarm"
Underpower_Alarm_Level=	2
Underpower_Alarm_Delay=	1
Underpower_Alarm_Events$=	"Off/No"
Underpower_Trip$=	"Off"
Underpower_Trip_Relays$=	"Trip"
Underpower_Trip_Level=	1
Underpower_Trip_Delay=	1
Block_Reverse_Power_From_Start=	0

Device Settings (Continued):

Reverse_Power_Alarm$=	"Off"
Reverse_Power_Alarm_Relays$=	"Alarm"
Reverse_Power_Alarm_Level=	1
Reverse_Power_Alarm_Delay=	1.0
Reverse_Power_Alarm_Events$=	"Off/No"
Reverse_Power_Trip$=	"Off"
Reverse_Power_Trip_Relays$=	"Trip"
Reverse_Power_Trip_Level=	1
Reverse_Power_Trip_Delay=	1.0
Torque_Metering$=	"Disabled"
Stator_Resistance=	0.004
Pole_Pairs=	2
Torque_Unit$=	"Newton-meter"
Overtorque_Alarm$=	"Off"
Overtorque_Alarm_Relays$=	"Alarm"
Overtorque_Alarm_Level=	4000.0
Overtorque_Alarm_Delay=	1.0
Overtorque_Alarm_Events$=	"Off/No"
Trip_Counter_Alarm$=	"Off"
Trip_Counter_Alarm_Relays$=	"Alarm"
Trip_Counter_Alarm_Level=	25
Trip_Counter_Alarm_Events$=	"Off/No"
Starter_Failure_Alarm_Starter_Failure_$=	"Off"
Starter_Type$=	"Breaker"
Starter_Failure_Alarm_Relays$=	"Alarm"
Starter_Failure_Alarm_Delay=	100
Supervision_of_Trip_Coil$=	"Disabled"
Starter_Failure_Alarm_Events$=	"Off/No"

Device Settings (Continued):

```
Current_Demand_Period=                  15
Current_Demand_Alarm$=                  "Off"
Current_Demand_Alarm_Relays$=           "Alarm"
Current_Demand_Alarm_Level=             100
Current_Demand_Alarm_Events$=           "Off/No"
kW_Demand_Period=                       15
kW_Demand_Alarm$=                       "Off"
kW_Demand_Alarm_Relays$=                "Alarm"
kW_Demand_Alarm_Level=                  100
kW_Demand_Alarm_Events$=                "Off/No"
kvar_Demand_Period=                     15
kvar_Demand_Alarm$=                     "Off"
kvar_Demand_Alarm_Relays$=              "Alarm"
kvar_Demand_Alarm_Level=                100
kvar_Demand_Alarm_Events$=              "Off/No"
kVA_Demand_Period=                      15
kVA_Demand_Alarm$=                      "Off"
kVA_Demand_Alarm_Relays$=               "Alarm"
kVA_Demand_Alarm_Level=                 100
kVA_Demand_Alarm_Events$=               "Off/No"
Positive_kWh_Pulse_Output_Relay$=       "Off"
Positive_kWh_Pulse_Output_Interval=     1
Positive_kvarh_Pulse_Output_Relay$=     "Off"
Positive_kvarh_Pulse_Output_Interval=   1
Negative_kvarh_Pulse_Output_Relay$=     "Off"
Negative_kvarh_Pulse_Output_Interval=   1
Analog_Output_1_Selection$=             "None"
Analog_Output_2_Selection$=             "Phase A Current"
```

Device Settings (Continued):

Analog_Output_3_Selection$=	"None"
Analog_Output_4_Selection$=	"None"
RTD_1_Minimum=	-50
RTD_1_Maximum=	250
RTD_2_Minimum=	-50
RTD_2_Maximum=	250
RTD_3_Minimum=	-50
RTD_3_Maximum=	250
RTD_4_Minimum=	-50
RTD_4_Maximum=	250
RTD_5_Minimum=	-50
RTD_5_Maximum=	250
RTD_6_Minimum=	-50
RTD_6_Maximum=	250
RTD_7_Minimum=	-50
RTD_7_Maximum=	250
RTD_8_Minimum=	-50
RTD_8_Maximum=	250
RTD_9_Minimum=	-50
RTD_9_Maximum=	250
RTD_10_Minimum=	-50
RTD_10_Maximum=	250
RTD_11_Minimum=	-50
RTD_11_Maximum=	250
RTD_12_Minimum=	-50
RTD_12_Maximum=	250
Power_Factor_Minimum=	0.80
Power_Factor_Maximum=	-0.80

Device Settings (Continued):

```
Reactive_Power_Minimum=                    0

Reactive_Power_Maximum=                    750

Real_Power_Minimum=                        0

Real_Power_Maximum=                        1000

Apparent_Power_Minimum=                    0

Apparent_Power_Maximum=                    1250

Thermal_Capacity_Used_Minimum=             0

Thermal_Capacity_Used_Maximum=             100

Relay_Lockout_Time_Minimum=                0

Relay_Lockout_Time_Maximum=                150

Current_Demand_Minimum=                    0

Current_Demand_Maximum=                    700

kvar_Demand_Minimum=                       0

kvar_Demand_Maximum=                       1000

kW_Demand_Minimum=                         0

kW_Demand_Maximum=                         1250

kVA_Demand_Minimum=                        0

kVA_Demand_Maximum=                        1500

Speed2_Standard_Overload_Curve_Number=     4

Speed2_Undercurrent_Alarm$=                "Off"

Speed2_Undercurrent_Alarm_Pickup=          0.70

Speed2_Undercurrent_Alarm_Delay=           1

Speed2_Undercurrent_Alarm_Events$=         "Off/No"

Speed2_Undercurrent_Trip$=                 "Off"

Speed2_Undercurrent_Trip_Pickup=           0.70

Speed2_Undercurrent_Trip_Delay=            1

Speed2_Acceleration_Timer_From_Start=      10.0

Acceleration_Timer_From_Speed_One_to_Two=  10.0
```

Device Settings (Continued):

```
Ground_CT_Primary=                          50

Phase_Differential_CT_Primary=              100

Speed_2_Phase_Sequence$=                    "ABC"

Remote_Alarm_Name=                          0

Remote_Alarm_Function$=                     "Unlatched"

Remote_Alarm_Relays$=                       "Alarm"

Remote_Alarm_Events$=                       "Off/No"

Remote_Trip_Name=                           0

Remote_Trip_Relays$=                        "Trip"

Speed_Switch_Trip_Relays$=                  "Trip"

Speed_Switch_Trip_Delays=                   5.0

Load_Shed_Trip_Relays$=                     "Trip"

Block_Pressure_Switch_Alarm_from_Start=     0

Pressure_Switch_Alarm_Function$=            "Unlatched"

Pressure_Switch_Alarm_Relays$=              "Alarm"

Pressure_Switch_Alarm_Delay=                5.0

Pressure_Switch_Alarm_Events$=              "Off/No"

Block_Pressure_Switch_Trip_from_Start=      0

Pressure_Switch_Trip_Relays$=               "Trip"

Pressure_Switch_Trip_Delay=                 5.0

Vibration_Switch_Alarm_Function$=           "Unlatched"

Vibration_Switch_Alarm_Relays$=             "Alarm"

Vibration_Switch_Alarm_Delay=               5.0

Vibration_Switch_Alarm_Events$=             "Off/No"

Vibration_Switch_Trip_Relays$=              "Trip"

Vibration_Switch_Trip_Delay=                5.0

Counter_Units_Name=                         0

Counter_Preset_Value=                       0
```

Device Settings (Continued):

Counter_Type$=	"Increment"
Counter_Alarm$=	"Off"
Counter_Alarm_Relays$=	"Alarm"
Counter_Alarm_Level=	100
Counter_Alarm_Pickup$=	"Over"
Time_to_Trip_at_1_01_FLA=	17414.5
Time_to_Trip_at_1_05_FLA=	3414.9
Time_to_Trip_at_1_10_FLA=	1666.7
Time_to_Trip_at_1_20_FLA=	795.4
Time_to_Trip_at_1_30_FLA=	507.2
Time_to_Trip_at_1_40_FLA=	364.6
Time_to_Trip_at_1_50_FLA=	280.0
Time_to_Trip_at_1_75_FLA=	169.7
Time_to_Trip_at_2_00_FLA=	116.6
Time_to_Trip_at_2_25_FLA=	86.1
Time_to_Trip_at_2_50_FLA=	66.6
Time_to_Trip_at_2_75_FLA=	53.3
Time_to_Trip_at_3_00_FLA=	43.7
Time_to_Trip_at_3_25_FLA=	36.6
Time_to_Trip_at_3_50_FLA=	31.1
Time_to_Trip_at_3_75_FLA=	26.8
TIme_to_Trip_at_4_00_FLA=	23.3
Time_to_Trip_at_4_25_FLA=	20.5
Time_to_Trip_at_4_50_FLA=	18.2
Time_to_Trip_at_4_75_FLA=	16.2
Time_to_Trip_at_5_00_FLA=	14.6
Time_to_Trip_at_5_50_FLA=	12.0
Time_to_Trip_at_6_00_FLA=	10.0

Device Settings (Continued):

Time_to_Trip_at_6_50_FLA=	8.5
Time_to_Trip_at_7_00_FLA=	7.3
Time_to_Trip_at_7_50_FLA=	6.3
Time_to_Trip_at_8_00_FLA=	5.6
Time_to_Trip_at_10_0_FLA=	5.6
Time_to_Trip_at_15_0_FLA=	5.6
Time_to_Trip_at_20_0_FLA=	5.6
Overreach_Filter$=	"Off/No"
Short_Circuit_Trip_Relays$=	"Trip"
Short_Circuit_Trip_Pickup=	4.0
Intentional_Short_Circuit_Trip_Delay=	200
Ground_Fault_Trip_Backup_Relays$=	"Aux2"
Ground_FaultTrip_Backup_Delay=	200
Running_Time_Pulse_Relay$=	"Off"
Running_Time_Pulse_Interval=	1
Loss_Of_Comms_Function$=	"Off"
Loss_Of_Comms_Function_Type$=	"Alarm"
Loss_Of_Comms_Port$=	"COMP_RS485"
Assign_Loss_Of_Comms_Alarm_Relay$=	"Alarm"
Assign_Loss_Of_Comms_Trip_Relay$=	"Trip"
Loss_Of_Comms_Delay=	1
Loss_Of_Comms_Alarm_Event$=	"Off/No"
Phase_A_Current_Minimum=	0
Phase_A_Current_Maximum=	100
Phase_B_Current_Minimum=	0
Phase_B_Current_Maximum=	100
Phase_C_Current_Minimum=	0
Phase_C_Current_Maximum=	100

Device Settings (Continued):

Average_Phase_Current_Minimum=	0
Average_Phase_Current_Maximum=	100
AB_Line_Voltage_Minimum=	3200
AB_Line_Voltage_Maximum=	4500
BC_Line_Voltage_Minimum=	3200
BC_Line_Voltage_Maximum=	4500
CA_Line_Voltage_Minimum=	3200
CA_Line_Voltage_Maximum=	4500
Average_Line_Voltage_Minimum=	3200
Average_Line_Voltage_Maximum=	4500
Phase_AN_Voltage_Minimum=	1900
Phase_AN_Voltage_Maximum=	2500
Phase_BN_Voltage_Minimum=	1900
Phase_BN_Voltage_Maximum=	2500
Phase_CN_Voltage_Minimum=	1900
Phase_CN_Voltage_Maximum=	2500
Average_Phase_Voltage_Minimum=	1900
Average_Phase_Voltage_Maximum=	2500
Hottest_Stator_RTD_Minimum=	0
Hottest_Stator_RTD_Maximum=	200
Hottest_Bearing_RTD_Minimum=	0
Hottest_Bearing_RTD_Maximum=	200
Hottest_Ambient_RTD_Minimum=	-50
Hottest_Ambient_RTD_Maximum=	60
Analog_Input_1_Minimum=	0
Analog_Input_1_Maximum=	50000
Analog_Input_2_Minimum=	0
Analog_Input_2_Maximum=	50000

Device Settings (Continued):

Analog_Input_3_Minimum=	0
Analog_Input_3_Maximum=	50000
Analog_Input_4_Minimum=	0
Analog_Input_4_Maximum=	50000
Tachometer_Min=	3500
Tachometer_Max=	3700
MWh_Minimum=	50.000
MWh_Maximum=	100.000
Torque_Minimum=	0.0
Torque_Maximum=	0.0
Analog_Input_Diff_1_2_Minimum=	0
Analog_Input_Diff_1_2_Maximum=	100
Analog_Input_Diff_3_4_Minimum=	0
Analog_Input_Diff_3_4_Maximum=	100
Analog_Input_1_Setup$=	"Disabled"
Analog_Input_1_Units=	0
Analog_Input_1_Minimum_analog_in_1_=	0
Analog_Input_1_Maximum_analog_in_1_=	100
Block_Analog_Input_1_From_Start=	0
Analog_Input_1_Alarm$=	"Off"
Analog_Input_1_Alarm_Relays$=	"Alarm"
Analog_Input_1_Alarm_Level=	10
Analog_Input_1_Alarm_Pickup$=	"Over"
Analog_Input_1_Alarm_Delay=	0.1
Analog_Input_1_Alarm_Events$=	"Off/No"
Analog_Input_1_Trip$=	"Off"
Analog_Input_1_Trip_Relays$=	"Trip"
Analog_Input_1_Trip_Level=	20

Device Settings (Continued):

Analog_Input_1_Trip_Pickup$=	"Over"
Analog_Input_1_Trip_Delay=	0.1
Analog_Input_1_Name=	0
Analog_Input_2_Setup$=	"4-20 mA"
Analog_Input_2_Units=	0
Analog_Input_2_Minimum_analog_in_2_=	0
Analog_Input_2_Maximum_analog_in_2_=	100
Block_Analog_Input_2_From_Start=	0
Analog_Input_2_Alarm$=	"Off"
Analog_Input_2_Alarm_Relays$=	"Alarm"
Analog_Input_2_Alarm_Level=	10
Analog_Input_2_Alarm_Pickup$=	"Over"
Analog_Input_2_Alarm_Delay=	0.1
Analog_Input_2_Alarm_Events$=	"Off/No"
Analog_Input_2_Trip$=	"Off"
Analog_Input_2_Trip_Relays$=	"Trip"
Analog_Input_2_Trip_Level=	20
Analog_Input_2_Trip_Pickup$=	"Over"
Analog_Input_2_Trip_Delay=	0.1
Analog_Input_2_Name=	0
Analog_Input_3_Setup$=	"Disabled"
Analog_Input_3_Units=	0
Analog_Input_3_Minimum_analog_in_3_=	0
Analog_Input_3_Maximum_analog_in_3_=	100
Block_Analog_Input_3_From_Start=	0
Analog_Input_3_Alarm$=	"Off"
Analog_Input_3_Alarm_Relays$=	"Alarm"
Analog_Input_3_Alarm_Level=	10

Device Settings (Continued):

```
Analog_Input_3_Alarm_Pickup$=              "Over"
Analog_Input_3_Alarm_Delay=                0.1
Analog_Input_3_Alarm_Events$=              "Off/No"
Analog_Input_3_Trip$=                      "Off"
Analog_Input_3_Trip_Relays$=               "Trip"
Analog_Input_3_Trip_Level=                 20
Analog_Input_3_Trip_Pickup$=               "Over"
Analog_Input_3_Trip_Delay=                 0.1
Analog_Input_3_Name=                       0
Analog_Input_4_Setup$=                     "Disabled"
Analog_Input_4_Units=                      0
Analog_Input_4_Minimum_analog_in_4_=       0
Analog_Input_4_Maximum_analog_in_4_=       100
Block_Analog_Input_4_From_Start=           0
Analog_Input_4_Alarm$=                     "Off"
Analog_Input_4_Alarm_Relays$=              "Alarm"
Analog_Input_4_Alarm_Level=                10
Analog_Input_4_Alarm_Pickup$=              "Over"
Analog_Input_4_Alarm_Delay=                0.1
Analog_Input_4_Alarm_Events$=              "Off/No"
Analog_Input_4_Trip$=                      "Off"
Analog_Input_4_Trip_Relays$=               "Trip"
Analog_Input_4_Trip_Level=                 20
Analog_Input_4_Trip_Pickup$=               "Over"
Analog_Input_4_Trip_Delay=                 0.1
Analog_Input_4_Name=                       0
Speed2_Time_to_Trip_at_1_01_FLA=           17414.5
Speed2_Time_to_Trip_at_1_05_FLA=           3414.9
```

Device Settings (Continued):

Speed2_Time_to_Trip_at_1_10_FLA=	1666.7
Speed2_Time_to_Trip_at_1_20_FLA=	795.4
Speed2_Time_to_Trip_at_1_30_FLA=	507.2
Speed2_Time_to_Trip_at_1_40_FLA=	364.6
Speed2_Time_to_Trip_at_1_50_FLA=	280.0
Speed2_Time_to_Trip_at_1_75_FLA=	169.7
Speed2_Time_to_Trip_at_2_00_FLA=	116.6
Speed2_Time_to_Trip_at_2_25_FLA=	86.1
Speed2_Time_to_Trip_at_2_50_FLA=	66.6
Speed2_Time_to_Trip_at_2_75_FLA=	53.3
Speed2_Time_to_Trip_at_3_00_FLA=	43.7
Speed2_Time_to_Trip_at_3_25_FLA=	36.6
Speed2_Time_to_Trip_at_3_50_FLA=	31.1
Speed2_Time_to_Trip_at_3_75_FLA=	26.8
Speed2_Time_to_Trip_at_4_00_FLA=	23.3
Speed2_Time_to_Trip_at_4_25_FLA=	20.5
Speed2_Time_to_Trip_at_4_50_FLA=	18.2
Speed2_Time_to_Trip_at_4_75_FLA=	16.2
Speed2_Time_to_Trip_at_5_00_FLA=	14.6
Speed2_Time_to_Trip_at_5_50_FLA=	12.0
Speed2_Time_to_Trip_at_6_00_FLA=	10.0
Speed2_Time_to_Trip_at_6_50_FLA=	8.5
Speed2_Time_to_Trip_at_7_00_FLA=	7.3
Speed2_Time_to_Trip_at_7_50_FLA=	6.3
Speed2_Time_to_Trip_at_8_00_FLA=	5.6
Speed2_Time_to_Trip_at_10_0_FLA=	5.6
Speed2_Time_to_Trip_at_15_0_FLA=	5.6
Speed2_Time_to_Trip_at_20_0_FLA=	5.6

Device Settings (Continued):

```
Speed2_Minimum_Allowable_Line_Voltage=        80

Speed2_Stall_Current_at_Min_Vline=            4.80

Speed2_Safe_Stall_Time_at_Min_Vline=          20.0

Speed2_Accel_Intersect_at_Min_Vline=          3.80

Speed2_Stall_Current_at_100_Vline=            6.00

Speed2_Safe_Stall_Time_at_100_Vline=          10.0

Speed2_Accel_Intersect_at_100_Vline=          5.00

Block_Speed2_Undercurrent_from_Start=         0

Speed_Switch_Trip_Speed2_Delay=               5.0

Speed2_Rated_Speed=                           3600

Analog_In_Differential_1_2_Enable$=           "Disabled"

Analog_In_Diff_1_2_Name=                      0

Analog_In_Differential_1_2_Comparison$=       "% Difference"

Analog_In_Differential_1_2_Logic$=            "1<>2 (or 3<>4)"

Analog_In_Differential_1_2_Active_When$=      "Always"

Analog_In_Differential_1_2_Block_from_Start=  0

Analog_In_Differential_1_2_Alarm$=            "Off"

Analog_In_Differential_1_2_Alarm_Relays$=     "Alarm"

Analog_In_Differential_1_2_Percent_Alarm=     10

Analog_In_Differential_1_2_Absolute_Alarm=    10

Analog_In_Differential_1_2_Alarm_Delay=       0.1

Analog_In_Differential_1_2_Alarm_Events$=     "Off/No"

Analog_In_Differential_1_2_Trip$=             "Off"

Analog_In_Differential_1_2_Trip_Relays$=      "Trip"

Analog_In_Differential_1_2_Percent_Trip=      10

Analog_In_Differential_1_2_Absolute_Trip=     10

Analog_In_Differential_1_2_Trip_Delay=        0.1

Analog_In_Differential_3_4_Enable$=           "Disabled"
```

Device Settings (Continued):

```
Analog_In_Diff_3_4_Name=                        0

Analog_In_Differential_3_4_Comparison$=         "% Difference"

Analog_In_Differential_3_4_Logic$=              "1<>2 (or 3<>4)"

Analog_In_Differential_3_4_Active_When$=        "Always"

Analog_In_Differential_3_4_Block_from_Start=    0

Analog_In_Differential_3_4_Alarm$=              "Off"

Analog_In_Differential_3_4_Alarm_Relays$=       "Alarm"

Analog_In_Differential_3_4_Percent_Alarm=       10

Analog_In_Differential_3_4_Absolute_Alarm=      10

Analog_In_Differential_3_4_Alarm_Delay=         0.1

Analog_In_Differential_3_4_Alarm_Events$=       "Off/No"

Analog_In_Differential_3_4_Trip$=               "Off"

Analog_In_Differential_3_4_Trip_Relays$=        "Trip"

Analog_In_Differential_3_4_Percent_Trip=        10

Analog_In_Differential_3_4_Absolute_Trip=       10

Analog_In_Differential_3_4_Trip_Delay=          0.1

Ground_Fault_Overreach_Filter$=                 "Off/No"

User_Map_Address_1=                             512

User_Map_Address_2=                             528

User_Map_Address_3=                             529

User_Map_Address_4=                             551

User_Map_Address_5=                             552

User_Map_Address_6=                             553

User_Map_Address_7=                             554

User_Map_Address_8=                             555

User_Map_Address_9=                             556

User_Map_Address_10=                            720

User_Map_Address_11=                            721
```

Device Settings (Continued):

User_Map_Address_12=	722
User_Map_Address_13=	723
User_Map_Address_14=	724
User_Map_Address_15=	729
User_Map_Address_16=	768
User_Map_Address_17=	769
User_Map_Address_18=	770
User_Map_Address_19=	771
User_Map_Address_20=	772
User_Map_Address_21=	773
User_Map_Address_22=	774
User_Map_Address_23=	775
User_Map_Address_24=	779
User_Map_Address_25=	780
User_Map_Address_26=	801
User_Map_Address_27=	802
User_Map_Address_28=	803
User_Map_Address_29=	804
User_Map_Address_30=	805
User_Map_Address_31=	806
User_Map_Address_32=	807
User_Map_Address_33=	808
User_Map_Address_34=	809
User_Map_Address_35=	810
User_Map_Address_36=	811
User_Map_Address_37=	812
User_Map_Address_38=	832
User_Map_Address_39=	833

Device Settings (Continued):

User_Map_Address_40=	834
User_Map_Address_41=	835
User_Map_Address_42=	840
User_Map_Address_43=	880
User_Map_Address_44=	881
User_Map_Address_45=	882
User_Map_Address_46=	884
User_Map_Address_47=	885
User_Map_Address_48=	886
User_Map_Address_49=	781
User_Map_Address_50=	782
User_Map_Address_51=	783
User_Map_Address_52=	725
User_Map_Address_53=	726
User_Map_Address_54=	727
User_Map_Address_55=	728
User_Map_Address_56=	0
User_Map_Address_57=	0
User_Map_Address_58=	0
User_Map_Address_59=	0
User_Map_Address_60=	0
User_Map_Address_61=	0
User_Map_Address_62=	0
User_Map_Address_63=	0
User_Map_Address_64=	0
User_Map_Address_65=	0
User_Map_Address_66=	0
User_Map_Address_67=	0

Device Settings (Continued):

```
User_Map_Address_68=                    0

User_Map_Address_69=                    0

User_Map_Address_70=                    0

User_Map_Address_71=                    0

User_Map_Address_72=                    0

User_Map_Address_73=                    0

User_Map_Address_74=                    0

User_Map_Address_75=                    0

User_Map_Address_76=                    0

User_Map_Address_77=                    0

User_Map_Address_78=                    0

User_Map_Address_79=                    0

User_Map_Address_80=                    0

User_Map_Address_81=                    0

User_Map_Address_82=                    0

User_Map_Address_83=                    0

User_Map_Address_84=                    0

User_Map_Address_85=                    0

User_Map_Address_86=                    0

User_Map_Address_87=                    0

User_Map_Address_88=                    0

User_Map_Address_89=                    0

User_Map_Address_90=                    0

User_Map_Address_91=                    0

User_Map_Address_92=                    0

User_Map_Address_93=                    0

User_Map_Address_94=                    0

User_Map_Address_95=                    0
```

Device Settings (Continued):

User_Map_Address_96=	0
User_Map_Address_97=	0
User_Map_Address_98=	0
User_Map_Address_99=	0
User_Map_Address_100=	0
User_Map_Address_101=	0
User_Map_Address_102=	0
User_Map_Address_103=	0
User_Map_Address_104=	0
User_Map_Address_105=	0
User_Map_Address_106=	0
User_Map_Address_107=	0
User_Map_Address_108=	0
User_Map_Address_109=	0
User_Map_Address_110=	0
User_Map_Address_111=	0
User_Map_Address_112=	0
User_Map_Address_113=	0
User_Map_Address_114=	0
User_Map_Address_115=	0
User_Map_Address_116=	0
User_Map_Address_117=	0
User_Map_Address_118=	0
User_Map_Address_119=	0
User_Map_Address_120=	0
User_Map_Address_121=	0
User_Map_Address_122=	0
User_Map_Address_123=	0

Device Settings (Continued):

```
User_Map_Address_124=                    0

User_Map_Address_125=                    0

Motor_Load_Minimum=                      0.00

Motor_Load_Maximum=                      1.25
```

Global Defines:

```
RELAY_ADDRESS=1                          'SPECIFIC RELAY ADDRESS USED FOR MODBUS
COMMUNICATIONS (DEFAULT=1)
TRIP_OUTPUT$="F1-E2"                     'OUTPUT CONTACT TO SENSE A TRIP
AUTO_MASK=1                              'SET TO 2 TO DISPLAY FLEX PROGRAMMING
SKIP_TST=0                               'SET TO 1 TO SKIP MESSAGES FOR TESTS SKIPPED
PRINT_RAN_TESTS=1                        'MARKS TESTS IF THEY WERE ATTEMPTED BUT NOT
APPLICABLE
Phase_CT_Secondary=5                     'THIS IS THE RELAYS PHASE NOMINAL CT INPUT
VTR=Voltage_Transformer_Ratio            'VT RATIO
CTR=Phase_CT_Primary/Phase_CT_Secondary  'CALCULATED CT RATIO
FLA=(MOTOR_Full_load_Amps)/CTR           'SECONDARY FULL LOAD CURRENT
MTR_START_MULT=0.5                       'MULT OF FULL LOAD AMPS
MTR_START_DELAY=120                      'WAIT TIME IN CYCLES FOR START
```

Device Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Device Test Results for: *** GET SETTINGS FILE FROM DEVICE ***

OK?
RAN

Device Test Results for: ***RELAY SETTINGS TO SETTINGS TAB***

OK?
RAN

Device Test Results for: CURRENT METER TEST

	EXPECTED CURRENT	CURRENT READ	RANGE	OK?
A PHASE	75.0	75.0	71.2 TO 78.8	PASS
B PHASE	75.0	75.0	71.2 TO 78.8	PASS
C PHASE	75.0	75.0	71.2 TO 78.8	PASS

Device Test Results for: OVERLOAD PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	2.788	2.760	1.01	PASS

Device Test Results for: OVERLOAD TIMING TEST

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
5.00	12.000	858.23	14.304	14.573	-1.85	PASS

Device Test Results for: SHORT CIRCUIT TRIP PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
19.600	20.000	-2.00	PASS

Device Test Results for: SHORT CIRCUIT TRIP DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	24.000	13.31	0.222	0.150 TO 0.250	PASS

Device Test Results for: UNDERCURRENT TRIP PICKUP

OK?
RAN

Device Test Results for: MECHANICAL JAM PICKUP

OK?
RAN

Device Test Results for: MECHANICAL JAM DELAY

OK?
RAN

Device Test Results for: CURRENT UNBALANCE PICKUP

UNBALANCE% PU	RANGE	OK?
0.00	0.00 TO 0.00	RAN

Device Test Results for: CURRENT UNBALANCE DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
0.32	12.800	56.52	0.942	0.500 TO 1.500	PASS

Device Test Results for: ACCELERATION TIMER

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
1.20	3.312	600.17	10.003	10.000	0.03	PASS

Device Test Results for: ***VOLTAGE INPUT TEST***

	EXPECTED VOLTAGE	VOLATGE READ	RANGE	OK?
APH-BPH	7274.6	7287.0	7129.1 TO 7420.1	PASS
BPH-CPH	7274.6	7281.0	7129.1 TO 7420.1	PASS
CPH-APH	7274.6	7305.0	7129.1 TO 7420.1	PASS

Device Test Results for: UNDERVOLTAGE PICKUP

OK?
RAN

Device Test Results for: UNDERVOLTAGE DELAY

OK?
RAN

Device Test Results for: OVERVOLTAGE PICKUP

OK?
RAN

Device Test Results for: OVERVOLTAGE DELAY

OK?
RAN

Device Test Results for: VOLTAGE PHASE REVERSAL

OK?
RAN

Device Test Results for: UNDERFREQUENCY PICKUP

OK?
RAN

Device Test Results for: UNDERFREQUENCY DELAY

OK?
RAN

Device Test Results for: OVERFREQUENCY PICKUP

OK?
RAN

Device Test Results for: OVERFREQUENCY DELAY

OK?
RAN

Device Test Results for: ***POWER INPUT TEST***

EXPECTED POWER FACTOR	POWER FACTOR READ	EXPECTED KILOWATTS	KILOWATTS READ	RANGE	OK?
0.951	0.960	862.8	865.0	844.7 TO 880.9	PASS

Device Test Results for: POWER FACTOR LEAD PICKUP

ANG(LAG)	VOLTAGE	CURRENT	POWER FACTOR	RANGE	OK?
0.00	0.00	0.000	0.000	0.000 TO 0.000	RAN

Device Test Results for: POWER FACTOR LAG PICKUP

ANG(LAG)	VOLTAGE	CURRENT	POWER FACTOR	RANGE	OK?
0.00	0.00	0.000	0.000	0.000 TO 0.000	RAN

Device Test Results for: REACTIVE POS KVAR TRIP PU

OK?
RAN

Device Test Results for: REACTIVE NEG KVAR TRIP PU

OK?
RAN

Device Test Results for: REACTIVE KVAR TRIP DELAY

OK?
RAN

Device Test Results for: REVERSE POWER TRIP PU

OK?
RAN

Device Test Results for: REVERSE POWER TRIP DELAY

OK?
RAN

Device Test Results for: UNDERPOWER TRIP PU

OK?
RAN

Device Test Results for: UNDERPOWER TRIP DELAY

OK?
RAN

Device Test Results for: ***GROUND(1A/5A) INPUT TEST***

EXPECTED CURRENT	CURRENT READ	RANGE	OK?
50.0	49.8	49.0 TO 51.0	PASS

Device Test Results for: GROUND(1A/5A) FAULT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
2.525	2.500	1.00	PASS

Device Test Results for: GROUND(1A/5A) FAULT DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.10	2.750	14.17	0.236	0.000 TO 0.700	PASS

Device Test Results for: ***GROUND(50/025) INPUT TEST***

0.0	0.0	0.0	TO	0.0	RAN

Device Test Results for: GROUND(50/025) FAULT PICKUP

OK?
RAN

Device Test Results for: GROUND(50/025) FAULT DELAY

OK?
RAN

Device Test Results for: ***DIFFERENTIAL INPUT TEST***

0.0	0.0	0.0	TO	0.0	RAN

Device Test Results for: DIFFERENTIAL PICKUP PH A

OK?
RAN

Device Test Results for: DIFFERENTIAL PICKUP PH B

OK?
RAN

Device Test Results for: DIFFERENTIAL PICKUP PH C

OK?
RAN

Device Test Results for: DIFFERENTIAL FAULT DELAY

OK?
RAN

DEVICE TEST RESULTS

Routine	SEL-551.FST_LIB	**AFAL**	AL	**Test Date**	1/4/2024
Version	9.1			**Pass/Fail**	PASS

Device Data:

Customer:	City of Ann Arbor	Job_Number:	230858
SUBSTATION:	CEB	Relay_ID:	52F2SP
PHASE_ZONE:	3 Phase	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	N/A
SERIAL_NUMBER:	1132620122		
FIRMWARE: SEL-551-R514-VF-Z002002-D20110408		NERC_AUDITABLE:	0
MAINT_INTERVAL:	3	PREVIOUS_TESTDATE:	5/8/2020
CURRENT_TESTDATE:	1/4/2024	NEXT_TESTDATE:	1/4/2027
TESTSET_CALDATE:	2/15/2023	Tested_BY:	Steve Monte

Routine Notes:

Device Settings Used for Testing:

```
RID$=     "FDR-52F2SP"    TID$=     "EBB 52-1A"     CTR=      120
CTRN=     120             TDURD=    9.000           s50P1P=   45.0
s50P2P$=  "OFF"           s50P3P$=  "OFF"           s50P4P$=  "OFF"
s50P5P$=  "OFF"           s50P6P$=  "OFF"           s50ABCP$= "OFF"
s51P1P=   2.0             s51P1C$=  "C3"            s51P1TD=  0.33
s51P1RS$= "N"             s51P2P$=  "OFF"           s51P2C$=  "U3"
s51P2TD=  15.00           s51P2RS$= "N"             s50N1P$=  "OFF"
s50N2P$=  "OFF"           s51N1P$=  "OFF"           s51N1C$=  "U4"
s51N1TD=  3.00            s51N1RS$= "N"             s50G1P=   5.4
s50G2P$=  "OFF"           s51G1P=   0.5             s51G1C$=  "U1"
s51G1TD=  0.50            s51G1RS$= "N"             s50Q1P$=  "OFF"
s50Q2P$=  "OFF"           s51Q1P$=  "OFF"           s51Q1C$=  "U3"
s51Q1TD=  15.00           s51Q1RS$= "N"             s51Q2P$=  "OFF"
s51Q2C$=  "U3"            s51Q2TD=  15.00           s51Q2RS$= "N"
s79OI1=   0.000           s79OI2=   600.000         s79OI3=   0.000
s79OI4=   0.000           s79RSD=   1800.000        s79RSLD=  300.000
CFD=      60.000          DMTC=     5               PDEMP=    5.00
NDEMP=    1.50            GDEMP=    1.50            QDEMP=    1.50
SV5PU=    0.000           SV5DO=    0.000           SV6PU=    0.000
SV6DO=    0.000           SV7PU=    0.000           SV7DO=    0.000
SV8PU=    0.000           SV8DO=    0.000           SV9PU=    0.000
SV9DO=    0.000           SV10PU=   0.000           SV10DO=   0.000
SV11PU=   0.000           SV11DO=   0.000           SV12PU=   0.000
SV12DO=   0.000           SV13PU=   0.000           SV13DO=   0.000
SV14PU=   0.000           SV14DO=   0.000           NFREQ=    60
PHROT$=   "ABC"           DATE_F$=  "MDY"           TR$=      "51P1T + 51G1T + 50P1 + 50G1"
ULTR$=    "!(51P1 + 51G1)"s51P1TC=  1               s51P2TC=  1
s51N1TC=  1               s51G1TC=  1               s51Q1TC=  1
s51Q2TC=  1               s52A$=    "IN1"           CL$=      "LB4"
ULCL$=    "TRIP"          s79RI$=   "TRIP"          s79RIS$=  "IN1"
s79DTL$=  "!LB1 + LB3"    s79DLS$=  "79LO"          s79SKP$=  "50P2 * SH0"
s79STL$=  "TRIP"          s79BRS$=  "(51P1 + 51G1) * (79RS + 79CY)"

s79SEQ=   0               ER1$=     "51P1 + 51G1 + 51N1"

ER2=      0               SV1=      0               SV2=      0
SV3=      0               SV4=      0               SV5=      0
SV6=      0               SV7=      0               SV8=      0
SV9=      0               SV10=     0               SV11=     0
SV12=     0               SV13=     0               SV14=     0
OUT1$=    "TRIP"          OUT2=     0               OUT3=     0
OUT4=     0               DP1$=     "IN1"           DP2=      0
DP3=      0               DP4=      0               DP5=      0
DP6=      0               DP7=      0               DP8=      0
```

Global Defines:

```
CONTACT$="4"        'OUTPUT CONTACT TO MASK
SEL_AUTO=1          '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1          'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1            'NO ERROR MESSAGE IF NO OPERATION
```

Device Test Results for: RELAY STATUS CHECK

N/A

Additional Data:
STA

FDR-52F2SP Date: 01/04/24 Time: 12:27:38.572
EBB 52-1A

FID=SEL-551-R514-Vf-Z002002-D20110408 CID=CCFD

SELF TESTS

W=Warn F=Fail

	IA	IB	IC	IN	MOF
OS	3	3	3	3	0

	+5V_PS	+5V_REG	-5V_REG	+10V_PS	-10V_PS	VBAT
PS	4.99	5.01	-5.01	10.00	-10.07	3.50

TEMP	RAM	ROM	CR_RAM	EEPROM
28.6	OK	OK	OK	OK

Relay Enabled

=>>

Device Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	217.0	0.5	PASS
B-N	0.0	0.0	0.0	240.0	240.0	0.0	PASS
C-N	0.0	0.0	0.0	264.0	264.0	0.0	PASS

Device Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	45.000	45.000	0.00	PASS
B-N	45.000	45.000	0.00	PASS
C-N	45.450	45.000	1.00	PASS

Device Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
5.400	5.400	0.00	PASS

Device Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	2.000	2.000	0.00	PASS
B-N	2.000	2.000	0.00	PASS
C-N	2.000	2.000	0.00	PASS

Device Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

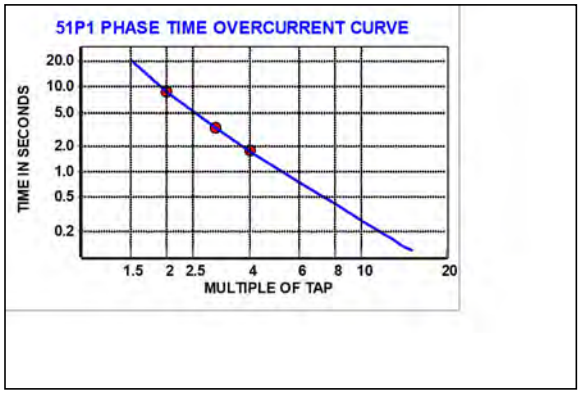
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.000	526.68	8.778	8.800	-0.25	PASS
3.00	6.000	198.54	3.309	3.300	0.27	PASS
4.00	8.000	107.09	1.785	1.760	1.41	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.000	527.60	8.793	8.800	-0.08	PASS
3.00	6.000	198.32	3.305	3.300	0.16	PASS
4.00	8.000	106.10	1.768	1.760	0.47	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.000	528.88	8.815	8.800	0.17	PASS
3.00	6.000	200.00	3.333	3.300	1.01	PASS
4.00	8.000	107.17	1.786	1.760	1.49	PASS

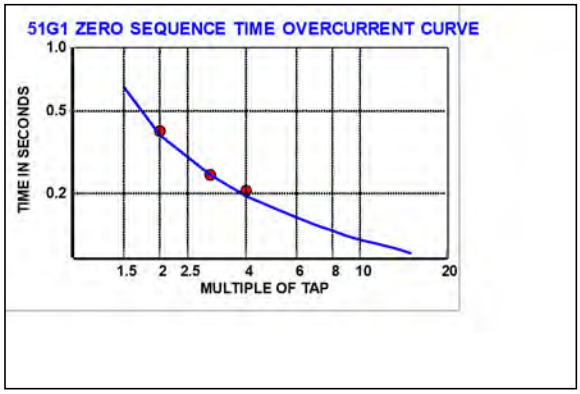


Device Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
0.485	0.500	-3.00	PASS

Device Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE			OK?
2.00	1.000	23.83	0.397	0.340	TO	0.428	PASS
3.00	1.500	14.84	0.247	0.208	TO	0.283	PASS
4.00	2.000	12.44	0.207	0.161	TO	0.231	PASS



Routine	SEL-587Z.FST_LIB	**AFAL**	AL	**Test Date**	1/5/2024
Version	9.0			**Pass/Fail**	PASS

Device Data:

Customer:	City of Ann Arbor	Job_Number:	230858
SUBSTATION:	CEB	Relay_ID:	Bus 1 Differential
PHASE_ZONE:	3 Phase	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-587Z	MODEL_STYLE:	0587Z0X325512XX
IEEE_DEVICE:	MF	IL_IB:	n/a
SERIAL_NUMBER:	1133470571		
FIRMWARE: SEL-587Z-R102-V0-Z001001-D20020903		NERC_AUDITABLE:	0
MAINT_INTERVAL:	3	PREVIOUS_TESTDATE:	5/8/2020
CURRENT_TESTDATE:	1/5/2024	NEXT_TESTDATE:	1/5/2024
TESTSET_CALDATE:	2/15/2023	Tested_BY:	Steve Monte

Routine Notes:

Device Settings Used for Testing:

RID$=	"BUS 1"	TID$=	"STATION A"	CTR=	240
TDURD=	9.000	s87A1P=	200	s87A2P=	90
s87B1P=	200	s87B2P=	90	s87C1P=	200
s87C2P=	90	s50P1P$=	"OFF"	s50P2P$=	"OFF"
s50P3P$=	"OFF"	s50A1P$=	"OFF"	s50A2P$=	"OFF"
s50B1P$=	"OFF"	s50B2P$=	"OFF"	s50C1P$=	"OFF"
s50C2P$=	"OFF"	s51PP$=	"OFF"	s51PC$=	"U3"
s51PTD=	15.00	s51PRS$=	"N"	s51AP$=	"OFF"
s51AC$=	"U3"	s51ATD=	15.00	s51ARS$=	"N"
s51BP$=	"OFF"	s51BC$=	"U3"	s51BTD=	15.00
s51BRS$=	"N"	s51CP$=	"OFF"	s51CC$=	"U3"
s51CTD=	15.00	s51CRS$=	"N"	s50G1P$=	"OFF"
s50G2P$=	"OFF"	s51GP$=	"OFF"	s51GC$=	"U3"
s51GTD=	15.00	s51GRS$=	"N"	s50Q1P$=	"OFF"
s50Q2P$=	"OFF"	s51QP$=	"OFF"	s51QC$=	"U3"
s51QTD=	15.00	s51QRS$=	"N"	CFD=	60.000
DMTC=	5	PDEMP=	5.00	GDEMP=	1.50
QDEMP=	1.50	SV5PU=	120.000	SV5DO=	0.000
SV6PU=	15.000	SV6DO=	0.000	SV7PU=	0.000
SV7DO=	0.000	SV8PU=	0.000	SV8DO=	0.000
SV9PU=	0.000	SV9DO=	0.000	SV10PU=	0.000
SV10DO=	0.000	SV11PU=	0.000	SV11DO=	0.000
SV12PU=	0.000	SV12DO=	0.000	SV13PU=	0.000
SV13DO=	0.000	SV14PU=	0.000	SV14DO=	0.000
NFREQ=	60	PHROT$=	"ABC"	DATE_F$=	"MDY"
TR1$=	"87A1 + 87B1 + 87C1 + 50A1 + 50B1 + 50C1"				
TR2=	0	TR3=	0		
ULTR1$=	"!87A2 * !87B2 * !87C2 * !50A2 * !50B2 * !50C2 "				
ULTR2=	1	ULTR3=	1	s51PTC=	1
s51ATC=	1	s51BTC=	1	s51CTC=	1
s51GTC=	1	s51QTC=	1	s52A=	0
CL=	0	ULCL$=	"TRIP1"	ER1$=	"87A1 + 87B1 + 87C1"
ER2$=	"87A2 + 87B2 + 87C2"				
SV1=	0	SV2=	0	SV3=	0
SV4=	0	SV5=	0	SV6=	0
SV7=	0	SV8=	0	SV9=	0
SV10=	0	SV11=	0	SV12=	0
SV13=	0	SV14=	0	OUT1$=	"TRIP1"
OUT2$=	"TRIP1"	OUT3=	0	OUT4=	0
DP1=	0	DP2=	0	DP3=	0
DP4=	0	DP5=	0	DP6=	0
DP7=	0	DP8=	0	P1_PROTO$=	"SEL"
P1_SPEED=	19200	P1_BITS=	8	P1_PARITY$=	"N"
P1_STOP=	1	P1_T_OUT=	15	P1_AUTO$=	"N"
P1_RTSCTS$=	"N"	P1_FASTOP$=	"N"	PF_PROTO$=	"SEL"
PF_SPEED=	19200	PF_BITS=	8	PF_PARITY$=	"N"
PF_STOP=	1	PF_T_OUT=	15	PF_AUTO$=	"N"
PF_RTSCTS$=	"N"	PF_FASTOP$=	"N"		

Global Defines:

```
CONTACT$="4"         'OUTPUT CONTACT TO MASK
SEL_AUTO=1           '0=MANUAL, 1=AUTO MASK, 2=MANUAL W/MESSAGES
SKIP_TST=1           'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1             'NO ERROR MESSAGE IF NO OPERATION
```

Device Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

BUS 1                              Date: 01/05/2024    Time: 08:46:04.074
STATION A

FID=SEL-587Z-R102-V0-Z001001-D20020903      CID=0C9F

SELF TESTS

W=Warn    F=Fail

       87A      87B      87C      IA       IB       IC       MOF
OS      2        2        3        2        2        2        0

       +5V_PS   +5V_REG  -5V_REG  +10V_PS  -10V_PS  VBAT
PS      4.96     5.03    -4.99     9.95    -10.04    3.36

       TEMP     RAM      ROM      CR_RAM   EEPROM
        26.5    OK       OK       OK       OK

 Relay Enabled

=>>
```

Device Test Results for: 87A1P PHASE A VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
200.000	200.000	0.00	PASS

Device Test Results for: 87A2P PHASE A VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
90.900	90.000	1.00	PASS

Device Test Results for: 87B1P PHASE B VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
196.000	200.000	-2.00	PASS

Device Test Results for: 87B2P PHASE B VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
88.200	90.000	-2.00	PASS

Device Test Results for: 87C1P PHASE C VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
198.000	200.000	-1.00	PASS

Device Test Results for: 87C2P PHASE C VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
88.200	90.000	-2.00	PASS

Routine	SEL-351.FST_LIB	**AFAL**	AL	**Test Date**	1/5/2024
Version	9.1			**Pass/Fail**	PASS

Device Data:

Customer:	City of Ann Arbor	Job_Number:	230858
SUBSTATION:	CEB	Relay_ID:	Bus 1 Main
PHASE_ZONE:	3 Phase	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-351	MODEL_STYLE:	035176A3A54XX1
IEEE_DEVICE:	MF	IL_IB:	n/a
SERIAL_NUMBER:	1123350225		
FIRMWARE: SEL-351-7-R512-V0-Z104104-D20120830		NERC_AUDITABLE:	0
MAINT_INTERVAL:	3	PREVIOUS_TESTDATE:	5/8/2020
CURRENT_TESTDATE:	1/5/2024	NEXT_TESTDATE:	1/5/2027
TESTSET_CALDATE:	2/15/2023	Tested_BY:	Steve Monte

Routine Notes:

Device Settings Used for Testing:

RID$=	"UTILITY MAIN BUS 1"				
TID$=	"52M1"	CTR=	120	CTRN=	120
PTR=	110.00	PTRS=	110.00	VNOM=	69.29
Z1MAG=	2.14	Z1ANG=	68.86	Z0MAG=	6.38
Z0ANG=	72.47	LL=	4.84	E50P=	1
E50N$=	"N"	E50G=	1	E50Q$=	"N"
E51P=	1	E51N$=	"N"	E51G=	1
E51Q$=	"N"	E50BF$=	"N"	EHBL2$=	"N"
E32$=	"N"	ELOAD$=	"N"	ESOTF$=	"N"
EVOLT$=	"Y"	E25$=	"Y"	EFLOC$=	"Y"
ELOP$=	"N"	ECOMM$=	"N"	E81=	4
E81R$=	"N"	E79$=	"N"	ESV=	10
EDEM$=	"THM"	EPWR=	4	ESSI$=	"N"
s50P1P=	100.00	s67P1D=	0.00	s50PP1P$=	"OFF"
s50G1P=	16.710	s67G1D=	12.00	s51PP=	2.45
s51PC$=	"C3"	s51PTD=	0.52	s51PRS$=	"N"
s51GP=	0.70	s51GC$=	"U1"	s51GTD=	1.57
s51GRS$=	"N"	s27P1P=	62.00	s27P2P$=	"OFF"
s59P1P=	76.00	s59P2P$=	"OFF"	s59N1P$=	"OFF"
s59N2P$=	"OFF"	s59QP=	5.54	s59V1P$=	"OFF"
s27SP=	10.00	s59S1P=	55.00	s59S2P$=	"OFF"
s27PP$=	"OFF"	s59PP$=	"OFF"	s25VLO=	62.00
s25VHI=	76.00	s25RCF=	1.00	s25SF=	0.050
s25ANG1=	15	s25ANG2=	15	SYNCP$=	"VA"
TCLOSD=	3.00	s27B81P=	40.00	s81D1P=	59.00
s81D1D=	180.00	s81D2P=	61.00	s81D2D=	180.00
s81D3P=	59.50	s81D3D=	6.00	s81D4P=	60.50
s81D4D=	6.00	DMTC=	5	PDEMP=	5.00
NDEMP=	1.500	GDEMP=	1.50	QDEMP=	1.50
TDURD=	9.00	CFD=	60.00	s3POD=	1.50
s50LP=	0.25	SV1PU=	180.00	SV1DO=	0.00
SV2PU=	0.00	SV2DO=	0.00	SV3PU=	180.00
SV3DO=	0.00	SV4PU=	0.00	SV4DO=	0.00
SV5PU=	0.00	SV5DO=	0.00	SV6PU=	6.00

Device Settings (Continued):

```
SV6DO=      0.00          SV7PU=      6.00          SV7DO=      0.00
SV8PU=      0.00          SV8DO=      0.00          SV9PU=      480.00
SV9DO=      0.00          SV10PU=     0.00          SV10DO=     0.00
PWR1P=      7.50          PWR1T$=     "-WATTS"      PWR1D=      600.00
PWR2P$=     "OFF"         PWR2T$=     "+WATTS"      PWR2D=      0.00
PWR3P$=     "OFF"         PWR3T$=     "+VARS"       PWR3D=      0.00
PWR4P$=     "OFF"         PWR4T$=     "-VARS"       PWR4D=      0.00
TR$=        "51PT + 51GT + 50P1 + SV8T + 67G1T + 67P1T + 50G1 "

TRQUAL=     0             TRCOMM=     0             TRSOTF=     0
DTT=        0             ULTR$=      "!(51P + 51G)"PT1=        0
LOG1=       0             PT2=        0             LOG2=       0
BT=         0             s52A$=      "IN101"       CL$=        "CC + LB4"
ULCL$=      "TRIP"        s79RI$=     "TRIP"        s79RIS$=    "52A + 79CY"
s79DTL$=    "OC + !IN102 + LB3"

s79DLS$=    "79LO"        s79SKP=     0             s79STL$=    "TRIP"
s79BRS=     0             s79SEQ=     0             s79CLS=     1
SET1$=      "OUT101 * SV8T"

RST1$=      "TRGTR * !OUT101"

SET2$=      "OUT102 * 81D4T"

RST2$=      "TRGTR * !OUT102"

SET3$=      "OUT102 * 81D3T"

RST3$=      "TRGTR * !OUT102"

SET4$=      "OUT102 * SV6T"

RST4$=      "TRGTR * !OUT102"

SET5$=      "OUT102 * SV7T"

RST5$=      "TRGTR * !OUT102"

SET6=       0             RST6=       0             SET7=       0
RST7=       0             SET8=       0             RST8=       0
SET9=       0             RST9=       0             SET10=      0
RST10=      0             SET11=      0             RST11=      0
SET12=      0             RST12=      0             SET13=      0
RST13=      0             SET14=      0             RST14=      0
SET15=      0             RST15=      0             SET16=      0
RST16=      0             s67P1TC=    1             s67P2TC=    1
s67P3TC=    1             s67P4TC=    1             s67N1TC=    1
s67N2TC=    1             s67N3TC=    1             s67N4TC=    1
s67G1TC=    1             s67G2TC=    1             s67G3TC=    1
s67G4TC=    1             s67Q1TC=    1             s67Q2TC=    1
s67Q3TC=    1             s67Q4TC=    1             s51ATC=     1
s51BTC=     1             s51CTC=     1             s51PTC=     1
s51NTC=     1             s51GTC=     1             s51G2TC=    1
s51QTC=     1             HBL2TC=     1             s81RTC$=    "!27B81"
BFI=        0             BFTR=       0             BFULTR=     0
LV1=        0             LV2=        0             LV3=        0
```

Device Settings (Continued):

```
LV4=        0           LV5=        0           LV6=        0
LV7=        0           LV8=        0           LV9=        0
LV10=       0           LV11=       0           LV12=       0
LV13=       0           LV14=       0           LV15=       0
LV16=       0           LV17=       0           LV18=       0
LV19=       0           LV20=       0           LV21=       0
LV22=       0           LV23=       0           LV24=       0
LV25=       0           LV26=       0           LV27=       0
LV28=       0           LV29=       0           LV30=       0
LV31=       0           LV32=       0           SV1$=       "59A1 + 59B1 + 59C1"
SV2$=       "27A1 * 27B1 * 27C1"

SV3$=       "27A1 + 27B1 + 27C1"

SV4$=       "50A1 + 50B1 + 50C1"

SV5$=       "25A1 + 27S * !SV1 * !SV3"

SV6$=       "27A1 + 27B1 + 27C1"

SV7$=       "59A1 + 59B1 + 59C1"

SV8$=       "(PWRA1 + PWRB1 + PWRC1) * !IN104"

SV9$=       "59Q"           SV10=       0           SV11=       0
SV12=       0               SV13=       0           SV14=       0
SV15=       0               SV16=       0           OUT101$=    "TRIP"
OUT102$=    "(SV6T + SV7T + 81D3T + 81D4T) * IN103"

OUT103$=    "SV1T + SV3T + 81D1T + 81D2T + SV9T"

OUT104$=    "SV5T"          OUT105$=    "SV5T"      OUT106=     0
OUT107=     0               ALRMOUT$=   "!(SALARM + HALARM)"

DP1$=       "IN101"         DP2$=       "SV1T + SV3T + 81D1 + 81D2 + SV9T"

DP3$=       "LT1"           DP4$=       "LT2"       DP5$=       "LT3"
DP6$=       "LT4"           DP7$=       "LT5"       DP8=        0
DP9=        0               DP10=       0           DP11=       0
DP12=       0               DP13=       0           DP14=       0
DP15=       0               DP16=       0           SS1=        1
SS2=        0               SS3=        0           SS4=        0
SS5=        0               SS6=        0           ER$=        "51P + 51G"
FAULT$=     "51P + 51G"     BSYNCH$=    "52A"       CLMON=      0
BKMON$=     "TRIP"          BKCLS$=     "CLOSE"     E32IV=      1
LOPBLK=     0
SALARM$=    "BADPASS + CHGPASS + SETCHG + GRPSW + ACCESSP + PASNVAL "

RSTTRGT=    0               RST_DEM=    0           RST_PDM=    0
RST_BK=     0               RST_HIS=    0           RST_ENE=    0
RST_MML=    0               RST_HAL=    0           RSTDNPE=    0
PMTRIG=     0               TREA1=      0           TREA2=      0
TREA3=      0               TREA4=      0           TMB1A=      0
TMB2A=      0               TMB3A=      0           TMB4A=      0
TMB5A=      0               TMB6A=      0           TMB7A=      0
TMB8A=      0               TMB1B=      0           TMB2B=      0
```

Device Settings (Continued):

TMB3B=	0	TMB4B=	0	TMB5B=	0
TMB6B=	0	TMB7B=	0	TMB8B=	0
PTCONN$=	"WYE"	VSCONN$=	"VS"	TGR=	0.00
NFREQ=	60	PHROT$=	"ABC"	DATE_F$=	"MDY"
FP_TO=	15	SCROLD=	2	FPNGD$=	"IG"
METHRES$=	"Y"	LER=	15	PRE=	4
FLTDISP$=	"MAX"	DCLOP$=	"OFF"	DCHIP$=	"OFF"
IN101D=	0.50	IN102D=	0.50	IN103D=	0.50
IN104D=	0.50	IN105D=	0.50	IN106D=	0.50
EBMON$=	"Y"	COSP1=	10000	COSP2=	150
COSP3=	12	KASP1=	1.20	KASP2=	8.00
KASP3=	20.00	ESTRT=	50	ESCLT=	120
MSTRT=	50	MSCLT=	120	EPMU$=	"N"
EVELOCK=	0	DNPSRC$=	"UTC"	BOOPTCC$=	"SET"
BOOPPUL$=	"SET"	IRIGC$=	"NONE"	UTC_OFF=	0.00
DST_BEGM$=	"NA"	P2_EPORT$=	"Y"	P2_PROTO$=	"SEL"
P2_MAXACC=	2	P2_SPEED=	2400	P2_BITS=	8
P2_PARITY$=	"N"	P2_STOP=	1	P2_RTSCTS$=	"N"
P2_T_OUT=	15	P2_AUTO$=	"N"	P2_FASTOP$=	"N"
P3_EPORT$=	"Y"	P3_PROTO$=	"SEL"	P3_MAXACC=	2
P3_SPEED=	2400	P3_BITS=	8	P3_PARITY$=	"N"
P3_STOP=	1	P3_RTSCTS$=	"N"	P3_T_OUT=	15
P3_AUTO$=	"N"	P3_FASTOP$=	"N"	PF_EPORT$=	"Y"
PF_PROTO$=	"SEL"	PF_MAXACC$=	"C"	PF_SPEED=	19200
PF_BITS=	8	PF_PARITY$=	"N"	PF_STOP=	1
PF_RTSCTS$=	"N"	PF_T_OUT=	15	PF_AUTO$=	"N"
PF_FASTOP$=	"N"				

Global Defines:

```
SET_GROUP$="1"      'SET GROUP TO TEST
CONTACT$="107"      'OUTPUT CONTACT TO MASK
SEL_AUTO=1          '0=MANUAL, 1=AUTO MASK, 2=MANUAL W/MESSAGES
SKIP_TST=1          'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1            'NO ERROR MESSAGE IF NO OPERATION
DIR_TEST_VOLTS=30   'TEST VOLTAGE FOR DIRECTIONAL ELEMENTS
NORM_VOLTS=65       'NORM VOLTAGE
NORM_FREQ=60        'NORMAL VOLTAGE FREQUENCY
ZONE_TEST_AMPS=2  'TEST CURRENT FOR LOAD ENCHROACHMENT TESTS
```

Device Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

UTILITY MAIN BUS 1                Date: 01/05/24    Time: 06:20:17.854
52M1

FID=SEL-351-7-R512-V0-Z104104-D20120830       CID=7CF9

SELF TESTS
```

(Continued) Device Test Results for: RELAY STATUS CHECK

W=Warn F=Fail

	IA	IB	IC	IN	VA	VB	VC	VS	MOF
OS	-2	-2	-2	-2	-2	-2	-2	-2	-2
OSH	-0	-0	-0	0					

	15V_PS	5V_REG	3.3V_REG
PS	14.93	4.96	3.30

RAM	ROM	FPGA	EEPROM	FLASH	A/D	USB_BRD	COM_BRD	IO_BRD
OK	OK	OK	OK	OK	OK	NA	NA	NA

TEMP	RTC	HMI
30.5	OK	OK

Relay Enabled

=>>

Device Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
65.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	6.9	6.9	0.0	216.0	215.8	-0.1	PASS
B-N	7.2	7.2	0.1	240.0	239.9	-0.1	PASS
C-N	7.4	7.4	0.0	264.0	263.8	-0.1	PASS

CALCULATED MEGA WATT	MEASURED MEGA WATT	% ERROR	CALCULATED MEGA VAR	MEASURED MEGA VAR	% ERROR	OK?
4.5	4.5	-0.0	2.6	2.6	-0.1	PASS

Device Test Results for: 27P1P PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.000	62.000	0.00	PASS

Device Test Results for: 27P1P THREE PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
61.380	62.000	-1.00	PASS

Device Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	100.000	100.000	0.00	PASS
B-N	100.000	100.000	0.00	PASS
C-N	100.000	100.000	0.00	PASS

Device Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
16.710	16.710	-0.00	PASS

Device Test Results for: 67G1D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(SEC)	TIME(CY)	RANGE	OK?
1.20	20.052	0.221	13.25	9.90 TO 14.10	PASS

Device Test Results for: 51PP PHASE TO PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	2.450	2.450	0.02	PASS
B-N	2.450	2.450	0.02	PASS
C-N	2.475	2.450	1.02	PASS

Device Test Results for: 51P PHASE TIME OVERCURRENT CURVE

51P PHASE TIME OVERCURRENT CURVE (PHASE A-N)

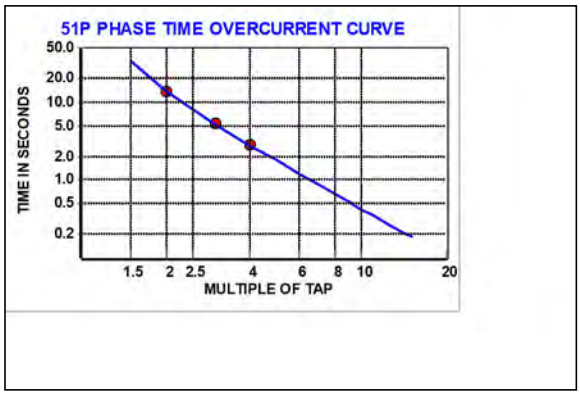
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.900	834.20	13.903	13.867	0.26	PASS
3.00	7.350	312.74	5.212	5.200	0.24	PASS
4.00	9.800	167.18	2.786	2.773	0.47	PASS

51P PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.900	833.94	13.899	13.867	0.23	PASS
3.00	7.350	313.07	5.218	5.200	0.34	PASS
4.00	9.800	167.11	2.785	2.773	0.43	PASS

51P PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.900	834.46	13.908	13.867	0.30	PASS
3.00	7.350	313.42	5.224	5.200	0.46	PASS
4.00	9.800	167.04	2.784	2.773	0.38	PASS

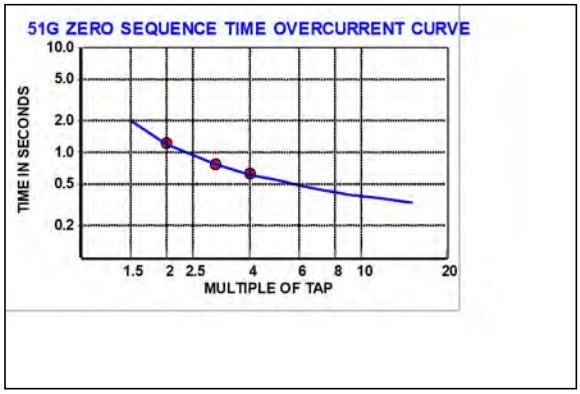


Device Test Results for: 51GP ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.707	0.700	1.00	PASS

Device Test Results for: 51G ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.400	72.94	1.216	1.205	0.87	PASS
3.00	2.100	46.33	0.772	0.770	0.22	PASS
4.00	2.800	37.39	0.623	0.616	1.13	PASS



Device Test Results for: 59P1P PHASE OVERVOLTAGE PICKUP

PICKUP	VOLTS	IDEAL	%ERROR	OK?
	76.000	76.000	0.00	PASS

Device Test Results for: 59P1P THREE PHASE OVERVOLTAGE PICKUP

PICKUP	VOLTS	IDEAL	%ERROR	OK?
	76.000	76.000	0.00	PASS

Device Test Results for: 59QP NEGATIVE SEQUENCE OVERVOLTAGE PICKUP

PICKUP	VOLTS	IDEAL	%ERROR	OK?
	5.540	5.540	-0.00	PASS

Device Test Results for: 27B81P UNDERVOLTAGE FRQEUENCY BLOCK

PICKUP	VOLTS	IDEAL	%ERROR	OK?
	40.000	40.000	0.00	PASS

Device Test Results for: 81D1P FRQEUENCY PICKUP

PICKUP	HZ	IDEAL	RANGE	OK?
	59.000	59.000	58.950 TO 59.050	PASS

Device Test Results for: 81D1D FRQEUENCY TIME DELAY

APPLIED VALUE	TIME(SEC)	TIME(CY)	RANGE	OK?
58.800	3.121	183.53	180.00 TO 184.50	PASS

Device Test Results for: 81D2P FRQEUENCY PICKUP

PICKUP HZ	IDEAL	RANGE	OK?
61.000	61.000	60.950 TO 61.050	PASS

Device Test Results for: 81D2D FRQEUENCY TIME DELAY

APPLIED VALUE	TIME(SEC)	TIME(CY)	RANGE	OK?
61.200	3.003	183.77	180.00 TO 184.50	PASS

Device Test Results for: 81D3P FRQEUENCY PICKUP

PICKUP HZ	IDEAL	RANGE	OK?
59.490	59.500	59.450 TO 59.550	PASS

Device Test Results for: 81D3D FRQEUENCY TIME DELAY

APPLIED VALUE	TIME(SEC)	TIME(CY)	RANGE	OK?
59.300	0.157	9.33	6.00 TO 10.50	PASS

Device Test Results for: 81D4P FRQEUENCY PICKUP

PICKUP HZ	IDEAL	RANGE	OK?
60.500	60.500	60.450 TO 60.550	PASS

Device Test Results for: 81D4D FRQEUENCY TIME DELAY

APPLIED VALUE	TIME(SEC)	TIME(CY)	RANGE	OK?
60.700	0.150	9.09	6.00 TO 10.50	PASS

Device Test Results for: 25VLO SOURCE VP SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.000	62.000	-0.00	PASS

Device Test Results for: 25VHI SOURCE VP SYNCHRONIZING PHASE HIGH VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
75.240	76.000	-1.00	PASS

Device Test Results for: 27SP SYNCHRONIZING PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
10.000	10.000	0.00	PASS

Device Test Results for: 59S1P SYNCHRONIZING PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
55.000	55.000	-0.00	PASS

Device Test Results for: 25VLO SOURCE VS SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.000	62.000	-0.00	PASS

Device Test Results for: 25VHI SOURCE VS SYNCHRONIZING PHASE HIGH VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
75.240	76.000	-1.00	PASS

Device Test Results for: 25ANG1 SYNCHRONIZING ANGLE 1

LAGGING ANGLE	IDEAL	RANGE	OK?
15.00	15.00	11.00 TO 19.00	PASS

LEADING ANGLE	IDEAL	RANGE	OK?
346.00	345.00	341.00 TO 349.00	PASS

Device Test Results for: 25ANG2 SYNCHRONIZING ANGLE 2

LAGGING ANGLE	IDEAL	RANGE	OK?
15.00	15.00	11.00 TO 19.00	PASS

LEADING ANGLE	IDEAL	RANGE	OK?
345.00	345.00	341.00 TO 349.00	PASS

Device Test Results for: 25SF SYNCHRONIZING SLIP FREQUENCY

DROPOUT HZ	IDEAL	RANGE	OK?
59.950	59.950	59.900 TO 60.000	PASS

Routine	SEL-587Z.FST_LIB	**AFAL**	AL	**Test Date**	1/4/2024
Version	9.0			**Pass/Fail**	PASS

Device Data:

Customer:	City of Ann Arbor	Job_Number:	230858
SUBSTATION:	CEB	Relay_ID:	Bus 2 Differntial
PHASE_ZONE:	3 Phase	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-587Z	MODEL_STYLE:	0587Z0X325512XX
IEEE_DEVICE:	87B	IL_IB:	N/A
SERIAL_NUMBER:	1132480473		
FIRMWARE: SEL-587Z-R102-V0-Z001001-D20020903		NERC_AUDITABLE:	0
MAINT_INTERVAL:	3	PREVIOUS_TESTDATE:	5/8/2020
CURRENT_TESTDATE:	1/4/2024	NEXT_TESTDATE:	1/4/2024
TESTSET_CALDATE:	2/15/2023	Tested_BY:	Steve Monte

Routine Notes:

Device Settings Used for Testing:

RID$=	"BUS 2"	TID$=	"STATION A"	CTR=	240
TDURD=	9.000	s87A1P=	200	s87A2P=	90
s87B1P=	200	s87B2P=	90	s87C1P=	200
s87C2P=	90	s50P1P$=	"OFF"	s50P2P$=	"OFF"
s50P3P$=	"OFF"	s50A1P$=	"OFF"	s50A2P$=	"OFF"
s50B1P$=	"OFF"	s50B2P$=	"OFF"	s50C1P$=	"OFF"
s50C2P$=	"OFF"	s51PP$=	"OFF"	s51PC$=	"U3"
s51PTD=	15.00	s51PRS$=	"N"	s51AP$=	"OFF"
s51AC$=	"U3"	s51ATD=	15.00	s51ARS$=	"N"
s51BP$=	"OFF"	s51BC$=	"U3"	s51BTD=	15.00
s51BRS$=	"N"	s51CP$=	"OFF"	s51CC$=	"U3"
s51CTD=	15.00	s51CRS$=	"N"	s50G1P$=	"OFF"
s50G2P$=	"OFF"	s51GP$=	"OFF"	s51GC$=	"U3"
s51GTD=	15.00	s51GRS$=	"N"	s50Q1P$=	"OFF"
s50Q2P$=	"OFF"	s51QP$=	"OFF"	s51QC$=	"U3"
s51QTD=	15.00	s51QRS$=	"N"	CFD=	60.000
DMTC=	5	PDEMP=	5.00	GDEMP=	1.50
QDEMP=	1.50	SV5PU=	120.000	SV5DO=	0.000
SV6PU=	15.000	SV6DO=	0.000	SV7PU=	0.000
SV7DO=	0.000	SV8PU=	0.000	SV8DO=	0.000
SV9PU=	0.000	SV9DO=	0.000	SV10PU=	0.000
SV10DO=	0.000	SV11PU=	0.000	SV11DO=	0.000
SV12PU=	0.000	SV12DO=	0.000	SV13PU=	0.000
SV13DO=	0.000	SV14PU=	0.000	SV14DO=	0.000
NFREQ=	60	PHROT$=	"ABC"	DATE_F$=	"MDY"
TR1$=	"87A1 + 87B1 + 87C1 + 50A1 + 50B1 + 50C1"				
TR2=	0	TR3=	0		
ULTR1$=	"!87A2 * !87B2 * !87C2 * !50A2 * !50B2 * !50C2 "				
ULTR2=	1	ULTR3=	1	s51PTC=	1
s51ATC=	1	s51BTC=	1	s51CTC=	1
s51GTC=	1	s51QTC=	1	s52A=	0
CL=	0	ULCL$=	"TRIP1"	ER1$=	"87A1 + 87B1 + 87C1"
ER2$=	"87A2 + 87B2 + 87C2"				
SV1=	0	SV2=	0	SV3=	0
SV4=	0	SV5=	0	SV6=	0
SV7=	0	SV8=	0	SV9=	0
SV10=	0	SV11=	0	SV12=	0
SV13=	0	SV14=	0	OUT1$=	"TRIP1"
OUT2=	0	OUT3=	0	OUT4=	0
DP1=	0	DP2=	0	DP3=	0
DP4=	0	DP5=	0	DP6=	0
DP7=	0	DP8=	0	P1_PROTO$=	"SEL"
P1_SPEED=	2400	P1_BITS=	8	P1_PARITY$=	"N"
P1_STOP=	1	P1_T_OUT=	15	P1_AUTO$=	"N"
P1_RTSCTS$=	"N"	P1_FASTOP$=	"N"	PF_PROTO$=	"SEL"
PF_SPEED=	19200	PF_BITS=	8	PF_PARITY$=	"N"
PF_STOP=	1	PF_T_OUT=	15	PF_AUTO$=	"N"
PF_RTSCTS$=	"N"	PF_FASTOP$=	"N"		

Global Defines:

```
CONTACT$="2"         'OUTPUT CONTACT TO MASK
SEL_AUTO=1           '0=MANUAL, 1=AUTO MASK, 2=MANUAL W/MESSAGES
SKIP_TST=1           'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1             'NO ERROR MESSAGE IF NO OPERATION
```

Device Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

BUS 2                              Date: 01/04/2024    Time: 08:40:10.592
STATION A

FID=SEL-587Z-R102-V0-Z001001-D20020903      CID=0C9F

SELF TESTS

W=Warn    F=Fail

       87A      87B      87C      IA       IB       IC       MOF
OS      3        3        3        3        2        3        0

       +5V_PS   +5V_REG  -5V_REG  +10V_PS  -10V_PS  VBAT
PS      4.99     4.99    -5.01     9.97    -10.04    3.48

       TEMP     RAM      ROM      CR_RAM   EEPROM
        31.7    OK       OK       OK       OK

 Relay Enabled

=>>
```

Device Test Results for: 87A1P PHASE A VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
196.000	200.000	-2.00	PASS

Device Test Results for: 87A2P PHASE A VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
90.000	90.000	0.00	PASS

Device Test Results for: 87B1P PHASE B VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
200.000	200.000	0.00	PASS

Device Test Results for: 87B2P PHASE B VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
90.000	90.000	0.00	PASS

Device Test Results for: 87C1P PHASE C VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
200.000	200.000	0.00	PASS

Device Test Results for: 87C2P PHASE C VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
90.000	90.000	0.00	PASS

Routine	SEL-351.FST_LIB	**AFAL**	AL	**Test Date**	1/4/2024
Version	9.1			**Pass/Fail**	PASS

Device Data:

Customer:	City of Ann Arbor	Job_Number:	230858
SUBSTATION:	CEB	Relay_ID:	Bus 2 Main
PHASE_ZONE:	3 Phase	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-351	MODEL_STYLE:	035176A3A54XX1
IEEE_DEVICE:	MF	IL_IB:	N/A
SERIAL_NUMBER:	1123350226		
FIRMWARE: SEL-351-7-R512-V0-Z104104-D20120830NERC_AUDITABLE:			0
MAINT_INTERVAL:	3	PREVIOUS_TESTDATE:	5/8/2020
CURRENT_TESTDATE:	1/4/2024	NEXT_TESTDATE:	1/4/2027
TESTSET_CALDATE:	2/15/2023	Tested_BY:	Steve Monte

Routine Notes:

Device Settings Used for Testing:

RID$=	"UTILITY MAIN BUS 2"				
TID$=	"52M2"	CTR=	120	CTRN=	120
PTR=	110.00	PTRS=	110.00	VNOM=	69.29
Z1MAG=	2.14	Z1ANG=	68.86	Z0MAG=	6.38
Z0ANG=	72.47	LL=	4.84	E50P=	1
E50N$=	"N"	E50G=	1	E50Q$=	"N"
E51P=	1	E51N$=	"N"	E51G=	1
E51Q$=	"N"	E50BF$=	"N"	EHBL2$=	"N"
E32$=	"N"	ELOAD$=	"N"	ESOTF$=	"N"
EVOLT$=	"Y"	E25$=	"Y"	EFLOC$=	"Y"
ELOP$=	"N"	ECOMM$=	"N"	E81=	4
E81R$=	"N"	E79$=	"N"	ESV=	10
EDEM$=	"THM"	EPWR=	4	ESSI$=	"N"
s50P1P=	100.00	s67P1D=	0.00	s50PP1P$=	"OFF"
s50G1P=	16.710	s67G1D=	12.00	s51PP=	2.45
s51PC$=	"C3"	s51PTD=	0.52	s51PRS$=	"N"
s51GP=	0.70	s51GC$=	"U1"	s51GTD=	1.57
s51GRS$=	"N"	s27P1P=	62.00	s27P2P$=	"OFF"
s59P1P=	76.00	s59P2P$=	"OFF"	s59N1P$=	"OFF"
s59N2P$=	"OFF"	s59QP=	5.54	s59V1P$=	"OFF"
s27SP=	10.00	s59S1P=	55.00	s59S2P$=	"OFF"
s27PP$=	"OFF"	s59PP$=	"OFF"	s25VLO=	62.00
s25VHI=	76.00	s25RCF=	1.00	s25SF=	0.050
s25ANG1=	15	s25ANG2=	15	SYNCP$=	"VA"
TCLOSD=	3.00	s27B81P=	40.00	s81D1P=	59.00
s81D1D=	180.00	s81D2P=	61.00	s81D2D=	180.00
s81D3P=	59.50	s81D3D=	6.00	s81D4P=	60.50
s81D4D=	6.00	DMTC=	5	PDEMP=	5.00
NDEMP=	1.500	GDEMP=	1.50	QDEMP=	1.50
TDURD=	9.00	CFD=	60.00	s3POD=	1.50
s50LP=	0.25	SV1PU=	180.00	SV1DO=	0.00
SV2PU=	0.00	SV2DO=	0.00	SV3PU=	180.00
SV3DO=	0.00	SV4PU=	0.00	SV4DO=	0.00
SV5PU=	0.00	SV5DO=	0.00	SV6PU=	6.00

Device Settings (Continued):

```
SV6DO=      0.00          SV7PU=      6.00          SV7DO=      0.00
SV8PU=      0.00          SV8DO=      0.00          SV9PU=      480.00
SV9DO=      0.00          SV10PU=     0.00          SV10DO=     0.00
PWR1P=      7.50          PWR1T$=     "-WATTS"      PWR1D=      600.00
PWR2P$=     "OFF"         PWR2T$=     "+WATTS"      PWR2D=      0.00
PWR3P$=     "OFF"         PWR3T$=     "+VARS"       PWR3D=      0.00
PWR4P$=     "OFF"         PWR4T$=     "-VARS"       PWR4D=      0.00
TR$=        "51PT + 51GT + 50P1 + SV8T + 67G1T + 67P1T + 50G1 "

TRQUAL=     0             TRCOMM=     0             TRSOTF=     0
DTT=        0             ULTR$=      "!(51P + 51G)"PT1=        0
LOG1=       0             PT2=        0             LOG2=       0
BT=         0             s52A$=      "IN101"       CL$=        "CC + LB4"
ULCL$=      "TRIP"        s79RI$=     "TRIP"        s79RIS$=    "52A + 79CY"
s79DTL$=    "OC + !IN102 + LB3"

s79DLS$=    "79LO"        s79SKP=     0             s79STL$=    "TRIP"
s79BRS=     0             s79SEQ=     0             s79CLS=     1
SET1$=      "OUT101 * SV8T"

RST1$=      "TRGTR * !OUT101"

SET2$=      "OUT102 * 81D4T"

RST2$=      "TRGTR * !OUT102"

SET3$=      "OUT102 * 81D3T"

RST3$=      "TRGTR * !OUT102"

SET4$=      "OUT102 * SV6T"

RST4$=      "TRGTR * !OUT102"

SET5$=      "OUT102 * SV7T"

RST5$=      "TRGTR * !OUT102"

SET6=       0             RST6=       0             SET7=       0
RST7=       0             SET8=       0             RST8=       0
SET9=       0             RST9=       0             SET10=      0
RST10=      0             SET11=      0             RST11=      0
SET12=      0             RST12=      0             SET13=      0
RST13=      0             SET14=      0             RST14=      0
SET15=      0             RST15=      0             SET16=      0
RST16=      0             s67P1TC=    1             s67P2TC=    1
s67P3TC=    1             s67P4TC=    1             s67N1TC=    1
s67N2TC=    1             s67N3TC=    1             s67N4TC=    1
s67G1TC=    1             s67G2TC=    1             s67G3TC=    1
s67G4TC=    1             s67Q1TC=    1             s67Q2TC=    1
s67Q3TC=    1             s67Q4TC=    1             s51ATC=     1
s51BTC=     1             s51CTC=     1             s51PTC=     1
s51NTC=     1             s51GTC=     1             s51G2TC=    1
s51QTC=     1             HBL2TC=     1             s81RTC$=    "!27B81"
BFI=        0             BFTR=       0             BFULTR=     0
LV1=        0             LV2=        0             LV3=        0
```

Device Settings (Continued):

```
LV4=        0           LV5=        0           LV6=        0
LV7=        0           LV8=        0           LV9=        0
LV10=       0           LV11=       0           LV12=       0
LV13=       0           LV14=       0           LV15=       0
LV16=       0           LV17=       0           LV18=       0
LV19=       0           LV20=       0           LV21=       0
LV22=       0           LV23=       0           LV24=       0
LV25=       0           LV26=       0           LV27=       0
LV28=       0           LV29=       0           LV30=       0
LV31=       0           LV32=       0           SV1$=       "59A1 + 59B1 + 59C1"
SV2$=       "27A1 * 27B1 * 27C1"

SV3$=       "27A1 + 27B1 + 27C1"

SV4$=       "50A1 + 50B1 + 50C1"

SV5$=       "25A1 + 27S * !SV1 * !SV3"

SV6$=       "27A1 + 27B1 + 27C1"

SV7$=       "59A1 + 59B1 + 59C1"

SV8$=       "(PWRA1 + PWRB1 + PWRC1) * !IN104"

SV9$=       "59Q"       SV10=       0           SV11=       0
SV12=       0           SV13=       0           SV14=       0
SV15=       0           SV16=       0           OUT101$=    "TRIP"
OUT102$=    "(SV6T + SV7T + 81D3T + 81D4T) * IN103"

OUT103$=    "SV5T"      OUT104$=    "SV5T"      OUT105$=    "SV1T + SV3T + 81D1T +
81D2T + SV9T"
OUT106=     0           OUT107=     0           ALRMOUT$=   "!(SALARM + HALARM)"
DP1$=       "IN101"     DP2$=       "SV1T + SV3T + 81D1 + 81D2 + SV9T"

DP3$=       "LT1"       DP4$=       "LT2"       DP5$=       "LT3"
DP6$=       "LT4"       DP7$=       "LT5"       DP8=        0
DP9=        0           DP10=       0           DP11=       0
DP12=       0           DP13=       0           DP14=       0
DP15=       0           DP16=       0           SS1=        1
SS2=        0           SS3=        0           SS4=        0
SS5=        0           SS6=        0           ER$=        "51P + 51G"
FAULT$=     "51P + 51G" BSYNCH$=    "52A"       CLMON=      0
BKMON$=     "TRIP"      BKCLS$=     "CLOSE"     E32IV=      1
LOPBLK=     0
SALARM$=    "BADPASS + CHGPASS + SETCHG + GRPSW + ACCESSP + PASNVAL "

RSTTRGT=    0           RST_DEM=    0           RST_PDM=    0
RST_BK=     0           RST_HIS=    0           RST_ENE=    0
RST_MML=    0           RST_HAL=    0           RSTDNPE=    0
PMTRIG=     0           TREA1=      0           TREA2=      0
TREA3=      0           TREA4=      0           TMB1A=      0
TMB2A=      0           TMB3A=      0           TMB4A=      0
TMB5A=      0           TMB6A=      0           TMB7A=      0
TMB8A=      0           TMB1B=      0           TMB2B=      0
TMB3B=      0           TMB4B=      0           TMB5B=      0
TMB6B=      0           TMB7B=      0           TMB8B=      0
```

Device Settings (Continued):

```
DTCONN$=    "NET"       VSCONN$=    "VS"        TGR=        0.00
NFREQ=      60          PHROT$=     "ABC"       DATE_F$=    "MDY"
FP_TO=      15          SCROLD=     2           FPNGD$=     "IG"
METHRES$=   "Y"         LER=        15          PRE=        4
FLTDISP$=   "MAX"       DCLOP$=     "OFF"       DCHIP$=     "OFF"
IN101D=     0.50        IN102D=     0.50        IN103D=     0.50
IN104D=     0.50        IN105D=     0.50        IN106D=     0.50
EBMON$=     "Y"         COSP1=      10000       COSP2=      150
COSP3=      12          KASP1=      1.20        KASP2=      8.00
KASP3=      20.00       ESTRT=      50          ESCLT=      120
MSTRT=      50          MSCLT=      120         EPMU$=      "N"
EVELOCK=    0           DNPSRC$=    "UTC"       BOOPTCC$=   "SET"
BOOPPUL$=   "SET"       IRIGC$=     "NONE"      UTC_OFF=    0.00
DST_BEGM$=  "NA"        P2_EPORT$=  "Y"         P2_PROTO$=  "SEL"
P2_MAXACC=  2           P2_SPEED=   2400        P2_BITS=    8
P2_PARITY$= "N"         P2_STOP=    1           P2_RTSCTS$= "N"
P2_T_OUT=   15          P2_AUTO$=   "N"         P2_FASTOP$= "N"
P3_EPORT$=  "Y"         P3_PROTO$=  "SEL"       P3_MAXACC=  2
P3_SPEED=   2400        P3_BITS=    8           P3_PARITY$= "N"
P3_STOP=    1           P3_RTSCTS$= "N"         P3_T_OUT=   15
P3_AUTO$=   "N"         P3_FASTOP$= "N"         PF_EPORT$=  "Y"
PF_PROTO$=  "SEL"       PF_MAXACC$= "C"         PF_SPEED=   19200
PF_BITS=    8           PF_PARITY$= "N"         PF_STOP=    1
PF_RTSCTS$= "N"         PF_T_OUT=   15          PF_AUTO$=   "N"
PF_FASTOP$= "N"
```

Global Defines:

```
SET_GROUP$="1"      'SET GROUP TO TEST
CONTACT$="107"      'OUTPUT CONTACT TO MASK
SEL_AUTO=1          '0=MANUAL, 1=AUTO MASK, 2=MANUAL W/MESSAGES
SKIP_TST=1          'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1            'NO ERROR MESSAGE IF NO OPERATION
DIR_TEST_VOLTS=30   'TEST VOLTAGE FOR DIRECTIONAL ELEMENTS
NORM_VOLTS=65       'NORM VOLTAGE
NORM_FREQ=60        'NORMAL VOLTAGE FREQUENCY
ZONE_TEST_AMPS=2  'TEST CURRENT FOR LOAD ENCHROACHMENT TESTS
```

Device Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

UTILITY MAIN BUS 2                Date: 01/04/24    Time: 05:14:53.590
52M2

FID=SEL-351-7-R512-V0-Z104104-D20120830       CID=7CF9

SELF TESTS

W=Warn    F=Fail
```

(Continued) Device Test Results for: RELAY STATUS CHECK

	IA	IB	IC	IN	VA	VB	VC	VS	MOF
OS	-3	-3	-3	-3	-3	-3	-3	-3	-3
OSH	-0	-0	-0	-0					

	15V_PS	5V_REG	3.3V_REG
PS	14.83	4.98	3.28

RAM	ROM	FPGA	EEPROM	FLASH	A/D	USB_BRD	COM_BRD	IO_BRD
OK	OK	OK	OK	OK	OK	NA	NA	NA

TEMP	RTC	HMI
33.5	OK	OK

Relay Enabled

=>>

Device Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
65.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	6.9	6.9	0.0	216.0	215.9	-0.1	PASS
B-N	7.2	7.2	0.0	240.0	239.9	-0.1	PASS
C-N	7.4	7.4	0.0	264.0	263.8	-0.1	PASS

CALCULATED MEGA WATT	MEASURED MEGA WATT	% ERROR	CALCULATED MEGA VAR	MEASURED MEGA VAR	% ERROR	OK?
4.5	4.5	0.0	2.6	2.6	-0.1	PASS

Device Test Results for: 27P1P PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.000	62.000	0.00	PASS

Device Test Results for: 27P1P THREE PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
61.380	62.000	-1.00	PASS

Device Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	100.000	100.000	0.00	PASS
B-N	100.000	100.000	0.00	PASS
C-N	100.000	100.000	0.00	PASS

Device Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	16.710	16.710	-0.00	PASS

Device Test Results for: 67G1D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(SEC)	TIME(CY)	RANGE	OK?
1.20	20.052	0.221	13.28	9.90 TO 14.10	PASS

Device Test Results for: 51PP PHASE TO PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		2.450	2.450	0.02	PASS
B-N		2.450	2.450	0.02	PASS
C-N		2.450	2.450	0.02	PASS

Device Test Results for: 51P PHASE TIME OVERCURRENT CURVE

51P PHASE TIME OVERCURRENT CURVE (PHASE A-N)

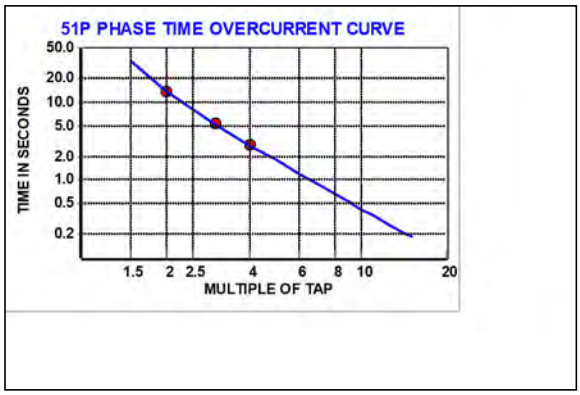
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.900	834.44	13.907	13.867	0.29	PASS
3.00	7.350	313.27	5.221	5.200	0.41	PASS
4.00	9.800	167.23	2.787	2.773	0.50	PASS

51P PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.900	834.43	13.907	13.867	0.29	PASS
3.00	7.350	312.98	5.216	5.200	0.31	PASS
4.00	9.800	167.42	2.790	2.773	0.62	PASS

51P PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.900	834.42	13.907	13.867	0.29	PASS
3.00	7.350	313.00	5.217	5.200	0.32	PASS
4.00	9.800	167.23	2.787	2.773	0.50	PASS

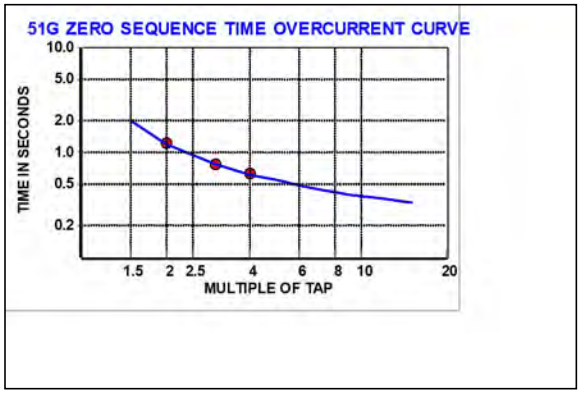


Device Test Results for: 51GP ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
0.700	0.700	0.00	PASS

Device Test Results for: 51G ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.400	73.10	1.218	1.205	1.10	PASS
3.00	2.100	46.51	0.775	0.770	0.61	PASS
4.00	2.800	37.42	0.624	0.616	1.21	PASS



Device Test Results for: 59P1P PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.000	76.000	0.00	PASS

Device Test Results for: 59P1P THREE PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.000	76.000	0.00	PASS

Device Test Results for: 59QP NEGATIVE SEQUENCE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
5.540	5.540	-0.00	PASS

Device Test Results for: 27B81P UNDERVOLTAGE FRQEUENCY BLOCK

PICKUP VOLTS	IDEAL	%ERROR	OK?
40.000	40.000	0.00	PASS

Device Test Results for: 81D1P FRQEUENCY PICKUP

PICKUP HZ	IDEAL	RANGE	OK?
59.000	59.000	58.950 TO 59.050	PASS

Device Test Results for: 81D1D FRQEUENCY TIME DELAY

APPLIED VALUE	TIME(SEC)	TIME(CY)	RANGE	OK?
58.800	3.117	183.27	180.00 TO 184.50	PASS

Device Test Results for: 81D2P FRQEUENCY PICKUP

PICKUP HZ	IDEAL	RANGE	OK?
61.000	61.000	60.950 TO 61.050	PASS

Device Test Results for: 81D2D FRQEUENCY TIME DELAY

APPLIED VALUE	TIME(SEC)	TIME(CY)	RANGE	OK?
61.200	3.004	183.82	180.00 TO 184.50	PASS

Device Test Results for: 81D3P FRQEUENCY PICKUP

PICKUP HZ	IDEAL	RANGE	OK?
59.490	59.500	59.450 TO 59.550	PASS

Device Test Results for: 81D3D FRQEUENCY TIME DELAY

APPLIED VALUE	TIME(SEC)	TIME(CY)	RANGE	OK?
59.300	0.155	9.21	6.00 TO 10.50	PASS

Device Test Results for: 81D4P FRQEUENCY PICKUP

PICKUP HZ	IDEAL	RANGE	OK?
60.500	60.500	60.450 TO 60.550	PASS

Device Test Results for: 81D4D FRQEUENCY TIME DELAY

APPLIED VALUE	TIME(SEC)	TIME(CY)	RANGE	OK?
60.700	0.151	9.17	6.00 TO 10.50	PASS

Device Test Results for: 25VLO SOURCE VP SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.000	62.000	-0.00	PASS

Device Test Results for: 25VHI SOURCE VP SYNCHRONIZING PHASE HIGH VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.000	76.000	-0.00	PASS

Device Test Results for: 27SP SYNCHRONIZING PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
10.000	10.000	0.00	PASS

Device Test Results for: 59S1P SYNCHRONIZING PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
55.000	55.000	-0.00	PASS

Device Test Results for: 25VLO SOURCE VS SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.000	62.000	-0.00	PASS

Device Test Results for: 25VHI SOURCE VS SYNCHRONIZING PHASE HIGH VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.000	76.000	-0.00	PASS

Device Test Results for: 25ANG1 SYNCHRONIZING ANGLE 1

LAGGING ANGLE	IDEAL	RANGE	OK?
14.00	15.00	11.00 TO 19.00	PASS

LEADING ANGLE	IDEAL	RANGE	OK?
346.00	345.00	341.00 TO 349.00	PASS

Device Test Results for: 25ANG2 SYNCHRONIZING ANGLE 2

LAGGING ANGLE	IDEAL	RANGE	OK?
15.00	15.00	11.00 TO 19.00	PASS

LEADING ANGLE	IDEAL	RANGE	OK?
346.00	345.00	341.00 TO 349.00	PASS

Device Test Results for: 25SF SYNCHRONIZING SLIP FREQUENCY

DROPOUT HZ	IDEAL	RANGE	OK?
59.950	59.950	59.900 TO 60.000	PASS

Routine	SEL-551.FST_LIB	**AFAL**	AL	**Test Date**	1/4/2024
Version	9.1			**Pass/Fail**	PASS

Device Data:

Customer:	City of Ann Arbor	Job_Number:	230858
SUBSTATION:	CEB	Relay_ID:	Sub 1-RSLS 52F21
PHASE_ZONE:	3 Phase	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	N/A
SERIAL_NUMBER:	113260135		
FIRMWARE: SEL-551-R514-VF-Z002002-D20110408		NERC_AUDITABLE:	0
MAINT_INTERVAL:	3	PREVIOUS_TESTDATE:	5/8/2020
CURRENT_TESTDATE:	1/4/2024	NEXT_TESTDATE:	1/4/2024
TESTSET_CALDATE:	2/15/2023	Tested_BY:	Steve Monte

Routine Notes:

Device Settings Used for Testing:

```
RID$=     "52F21"          TID$=     "SUB 1 RSLS"    CTR=      120
CTRN=     120              TDURD=    9.000           s50P1P=   13.0
s50P2P=   1.8              s50P3P$=  "OFF"           s50P4P$=  "OFF"
s50P5P$=  "OFF"            s50P6P$=  "OFF"           s50ABCP$= "OFF"
s51P1P=   0.7              s51P1C$=  "C3"            s51P1TD=  1.00
s51P1RS$= "N"              s51P2P$=  "OFF"           s51P2C$=  "U3"
s51P2TD=  15.00            s51P2RS$= "N"             s50N1P$=  "OFF"
s50N2P$=  "OFF"            s51N1P$=  "OFF"           s51N1C$=  "U4"
s51N1TD=  3.00             s51N1RS$= "N"             s50G1P=   5.4
s50G2P$=  "OFF"            s51G1P=   0.5             s51G1C$=  "U1"
s51G1TD=  0.50             s51G1RS$= "N"             s50Q1P$=  "OFF"
s50Q2P$=  "OFF"            s51Q1P$=  "OFF"           s51Q1C$=  "U3"
s51Q1TD=  15.00            s51Q1RS$= "N"             s51Q2P$=  "OFF"
s51Q2C$=  "U3"             s51Q2TD=  15.00           s51Q2RS$= "N"
s79OI1=   0.000            s79OI2=   600.000         s79OI3=   0.000
s79OI4=   0.000            s79RSD=   1800.000        s79RSLD=  300.000
CFD=      60.000           DMTC=     5               PDEMP=    5.00
NDEMP=    1.50             GDEMP=    1.50            QDEMP=    1.50
SV5PU=    0.000            SV5DO=    0.000           SV6PU=    0.000
SV6DO=    0.000            SV7PU=    0.000           SV7DO=    0.000
SV8PU=    0.000            SV8DO=    0.000           SV9PU=    0.000
SV9DO=    0.000            SV10PU=   0.000           SV10DO=   0.000
SV11PU=   0.000            SV11DO=   0.000           SV12PU=   0.000
SV12DO=   0.000            SV13PU=   0.000           SV13DO=   0.000
SV14PU=   0.000            SV14DO=   0.000           NFREQ=    60
PHROT$=   "ABC"            DATE_F$=  "MDY"
TR$=      "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "

ULTR$=    "!(51P1 + 51G1)"s51P1TC=  1               s51P2TC=  1
s51N1TC=  1                s51G1TC=  1               s51Q1TC=  1
s51Q2TC=  1                s52A$=    "IN1"           CL$=      "LB4"
ULCL$=    "TRIP"           s79RI$=   "TRIP"          s79RIS$=  "IN1"
s79DTL$=  "!LB1 + LB3"     s79DLS$=  "79LO"          s79SKP$=  "50P2 * SH0"
s79STL$=  "TRIP"           s79BRS$=  "(51P1 + 51G1) * (79RS + 79CY)"

s79SEQ=   0                ER1$=     "51P1 + 51G1 + 51N1"

ER2=      0                SV1=      0               SV2=      0
SV3=      0                SV4=      0               SV5=      0
SV6=      0                SV7=      0               SV8=      0
SV9=      0                SV10=     0               SV11=     0
SV12=     0                SV13=     0               SV14=     0
OUT1$=    "TRIP"           OUT2=     0               OUT3=     0
OUT4=     0                DP1$=     "IN1"           DP2$=     "LB2"
DP3=      0                DP4=      0               DP5=      0
DP6=      0                DP7=      0               DP8=      0
```

Global Defines:

```
CONTACT$="4"         'OUTPUT CONTACT TO MASK
SEL_AUTO=1           '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1           'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1             'NO ERROR MESSAGE IF NO OPERATION
```

Device Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

52F21                              Date: 01/04/24    Time: 09:55:49.088
SUB 1 RSLS

FID=SEL-551-R514-Vf-Z002002-D20110408      CID=CCFD

SELF TESTS

W=Warn    F=Fail

       IA       IB       IC       IN       MOF
OS      3        3        3        3        0

       +5V_PS   +5V_REG  -5V_REG  +10V_PS  -10V_PS  VBAT
PS      4.98     5.03    -4.98     9.82    -9.84     3.51

       TEMP     RAM      ROM      CR_RAM   EEPROM
        28.6    OK       OK       OK       OK

 Relay Enabled

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```

Device Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	216.0	0.0	PASS
B-N	0.0	0.0	0.0	240.0	242.0	0.8	PASS
C-N	0.0	0.0	0.0	264.0	264.0	0.0	PASS

Device Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	13.000	13.000	0.00	PASS
B-N	13.000	13.000	0.00	PASS
C-N	13.000	13.000	0.00	PASS

Device Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	1.800	1.800	0.00	PASS
B-N	1.800	1.800	0.00	PASS
C-N	1.800	1.800	0.00	PASS

Device Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.400	5.400	0.00	PASS

Device Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		0.700	0.700	0.00	PASS
B-N		0.714	0.700	2.00	PASS
C-N		0.721	0.700	3.00	PASS

Device Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

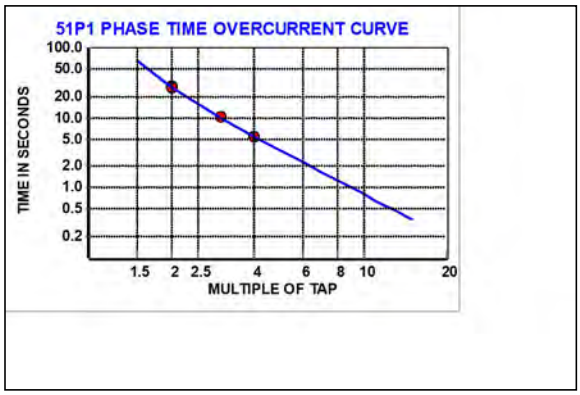
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.400	1634.38	27.240	26.667	2.15	PASS
3.00	2.100	608.30	10.138	10.000	1.38	PASS
4.00	2.800	323.86	5.398	5.333	1.20	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.400	1655.78	27.596	26.667	3.49	PASS
3.00	2.100	606.08	10.101	10.000	1.01	PASS
4.00	2.800	322.63	5.377	5.333	0.82	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.400	1630.75	27.179	26.667	1.92	PASS
3.00	2.100	608.05	10.134	10.000	1.34	PASS
4.00	2.800	323.06	5.384	5.333	0.96	PASS

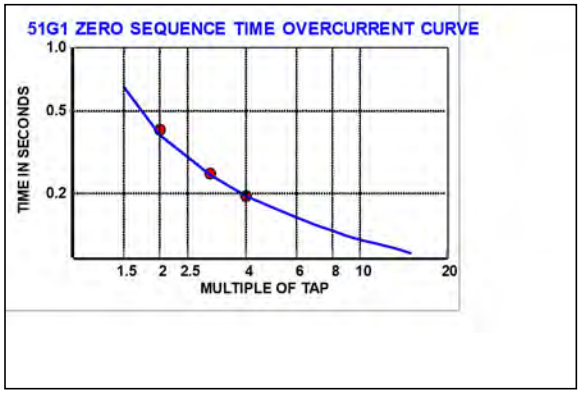


Device Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
0.485	0.500	-3.00	PASS

Device Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
2.00	1.000	24.26	0.404	0.340 TO 0.428	PASS
3.00	1.500	15.02	0.250	0.208 TO 0.283	PASS
4.00	2.000	11.81	0.197	0.161 TO 0.231	PASS



Routine	SEL-551.FST_LIB	**AFAL**	AL	**Test Date**	1/4/2024
Version	9.1			**Pass/Fail**	PASS

Device Data:

Customer:	City of Ann Arbor	Job_Number:	230858
SUBSTATION:	CEB	Relay_ID:	Sub 2 EQ 52F22
PHASE_ZONE:	3 Phase	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	N/A
SERIAL_NUMBER:	1132620123		
FIRMWARE: SEL-551-R514-VF-Z002002-D20110408		NERC_AUDITABLE:	0
MAINT_INTERVAL:	3	PREVIOUS_TESTDATE:	5/8/2020
CURRENT_TESTDATE:	1/4/2024	NEXT_TESTDATE:	1/4/2027
TESTSET_CALDATE:	2/15/2023	Tested_BY:	Steve Monte

Routine Notes:

Device Settings Used for Testing:

```
RID$=     "52F22"          TID$=     "SUB 2 EQ"       CTR=      120
CTRN=     120              TDURD=    9.000            s50P1P=   13.0
s50P2P=   1.3              s50P3P$=  "OFF"            s50P4P$=  "OFF"
s50P5P$=  "OFF"            s50P6P$=  "OFF"            s50ABCP$= "OFF"
s51P1P=   0.6              s51P1C$=  "C3"             s51P1TD=  1.00
s51P1RS$= "N"              s51P2P$=  "OFF"            s51P2C$=  "U3"
s51P2TD=  15.00            s51P2RS$= "N"              s50N1P$=  "OFF"
s50N2P$=  "OFF"            s51N1P$=  "OFF"            s51N1C$=  "U4"
s51N1TD=  3.00             s51N1RS$= "N"              s50G1P=   5.4
s50G2P$=  "OFF"            s51G1P=   0.5              s51G1C$=  "U1"
s51G1TD=  0.50             s51G1RS$= "N"              s50Q1P$=  "OFF"
s50Q2P$=  "OFF"            s51Q1P$=  "OFF"            s51Q1C$=  "U3"
s51Q1TD=  15.00            s51Q1RS$= "N"              s51Q2P$=  "OFF"
s51Q2C$=  "U3"             s51Q2TD=  15.00            s51Q2RS$= "N"
s79OI1=   0.000            s79OI2=   600.000          s79OI3=   0.000
s79OI4=   0.000            s79RSD=   1800.000         s79RSLD=  300.000
CFD=      60.000           DMTC=     5                PDEMP=    5.00
NDEMP=    1.50             GDEMP=    1.50             QDEMP=    1.50
SV5PU=    0.000            SV5DO=    0.000            SV6PU=    0.000
SV6DO=    0.000            SV7PU=    0.000            SV7DO=    0.000
SV8PU=    0.000            SV8DO=    0.000            SV9PU=    0.000
SV9DO=    0.000            SV10PU=   0.000            SV10DO=   0.000
SV11PU=   0.000            SV11DO=   0.000            SV12PU=   0.000
SV12DO=   0.000            SV13PU=   0.000            SV13DO=   0.000
SV14PU=   0.000            SV14DO=   0.000            NFREQ=    60
PHROT$=   "ABC"            DATE_F$=  "MDY"
TR$=      "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "

ULTR$=    "!(51P1 + 51G1)"s51P1TC=  1                s51P2TC=  1
s51N1TC=  1                s51G1TC=  1                s51Q1TC=  1
s51Q2TC=  1                s52A$=    "IN1"            CL$=      "LB4"
ULCL$=    "TRIP"           s79RI$=   "TRIP"           s79RIS$=  "IN1"
s79DTL$=  "!LB1 + LB3"     s79DLS$=  "79LO"           s79SKP$=  "50P2 * SH0"
s79STL$=  "TRIP"           s79BRS$=  "(51P1 + 51G1) * (79RS + 79CY)"

s79SEQ=   0                ER1$=     "51P1 + 51G1 + 51N1"

ER2=      0                SV1=      0                SV2=      0
SV3=      0                SV4=      0                SV5=      0
SV6=      0                SV7=      0                SV8=      0
SV9=      0                SV10=     0                SV11=     0
SV12=     0                SV13=     0                SV14=     0
OUT1$=    "TRIP"           OUT2=     0                OUT3=     0
OUT4=     0                DP1$=     "IN1"            DP2$=     "LB2"
DP3=      0                DP4=      0                DP5=      0
DP6=      0                DP7=      0                DP8=      0
```

Global Defines:

```
CONTACT$="4"         'OUTPUT CONTACT TO MASK
SEL_AUTO=1           '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1           'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1             'NO ERROR MESSAGE IF NO OPERATION
```

Device Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

52F22                              Date: 01/04/24    Time: 09:31:09.766
SUB 2 EQ

FID=SEL-551-R514-Vf-Z002002-D20110408      CID=CCFD

SELF TESTS

W=Warn    F=Fail

       IA        IB        IC        IN        MOF
OS      3         3         3         3         0

       +5V_PS    +5V_REG   -5V_REG   +10V_PS   -10V_PS   VBAT
PS      4.96      5.01     -5.17      9.79     -9.85      3.48

       TEMP      RAM       ROM       CR_RAM    EEPROM
        28.6     OK        OK        OK        OK

 Relay Enabled

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```

Device Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	216.0	0.0	PASS
B-N	0.0	0.0	0.0	240.0	241.0	0.4	PASS
C-N	0.0	0.0	0.0	264.0	262.0	-0.8	PASS

Device Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	13.000	13.000	0.00	PASS
B-N	13.000	13.000	0.00	PASS
C-N	13.000	13.000	0.00	PASS

Device Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	1.300	1.300	-0.00	PASS
B-N	1.287	1.300	-1.00	PASS
C-N	1.300	1.300	-0.00	PASS

Device Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.400	5.400	0.00	PASS

Device Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		0.594	0.600	-1.00	PASS
B-N		0.594	0.600	-1.00	PASS
C-N		0.588	0.600	-2.00	PASS

Device Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

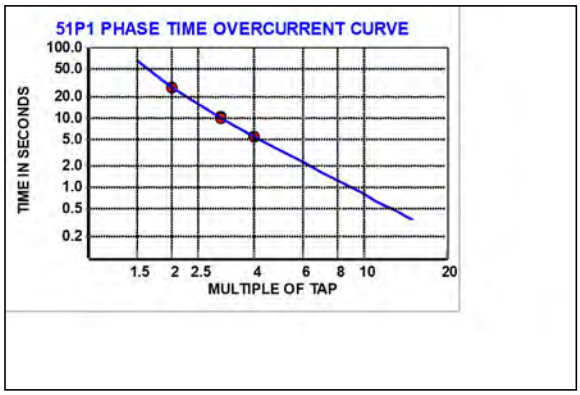
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1619.72	26.995	26.667	1.23	PASS
3.00	1.800	603.17	10.053	10.000	0.53	PASS
4.00	2.400	321.65	5.361	5.333	0.52	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1621.45	27.024	26.667	1.34	PASS
3.00	1.800	608.51	10.142	10.000	1.42	PASS
4.00	2.400	322.09	5.368	5.333	0.65	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1594.33	26.572	26.667	-0.35	PASS
3.00	1.800	595.34	9.922	10.000	-0.78	PASS
4.00	2.400	316.61	5.277	5.333	-1.06	PASS

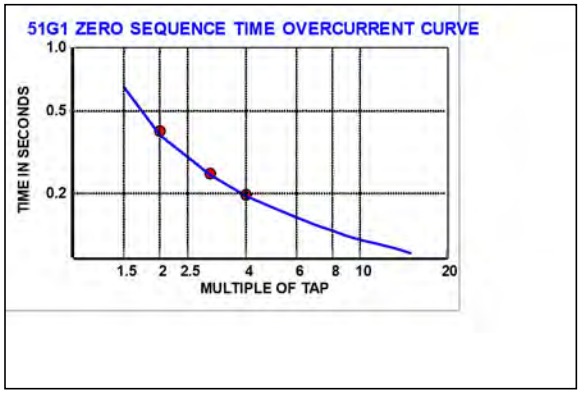


Device Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
0.510	0.500	2.00	PASS

Device Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.000	24.04	0.401	0.384	4.40	PASS
3.00	1.500	15.06	0.251	0.245	2.29	PASS
4.00	2.000	11.98	0.200	0.196	1.70	PASS



Routine	SEL-551.FST_LIB	**AFAL**	AL	**Test Date**	1/4/2024
Version	9.1			**Pass/Fail**	PASS

Device Data:

Customer:	City of Ann Arbor	Job_Number:	230858
SUBSTATION:	CEB	Relay_ID:	Sub 3-WBB 52F23
PHASE_ZONE:	3 Phase	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	
SERIAL_NUMBER:	1132620124		
FIRMWARE: SEL-551-R514-VF-Z002002-D20110408		NERC_AUDITABLE:	0
MAINT_INTERVAL:	3	PREVIOUS_TESTDATE:	5/8/2020
CURRENT_TESTDATE:	1/4/2024	NEXT_TESTDATE:	1/4/2024
TESTSET_CALDATE:	2/15/2023	Tested_BY:	Steve Monte

Routine Notes:

Device Settings Used for Testing:

```
RID$=     "52F23"          TID$=     "SUB 3 WBB"     CTR=      120
CTRN=     120              TDURD=    9.000           s50P1P=   16.5
s50P2P=   3.7              s50P3P$=  "OFF"           s50P4P$=  "OFF"
s50P5P$=  "OFF"            s50P6P$=  "OFF"           s50ABCP$= "OFF"
s51P1P=   1.2              s51P1C$=  "C3"            s51P1TD=  1.00
s51P1RS$= "N"              s51P2P$=  "OFF"           s51P2C$=  "U3"
s51P2TD=  15.00            s51P2RS$= "N"             s50N1P$=  "OFF"
s50N2P$=  "OFF"            s51N1P$=  "OFF"           s51N1C$=  "U4"
s51N1TD=  3.00             s51N1RS$= "N"             s50G1P=   5.4
s50G2P$=  "OFF"            s51G1P=   0.5             s51G1C$=  "U1"
s51G1TD=  0.50             s51G1RS$= "N"             s50Q1P$=  "OFF"
s50Q2P$=  "OFF"            s51Q1P$=  "OFF"           s51Q1C$=  "U3"
s51Q1TD=  15.00            s51Q1RS$= "N"             s51Q2P$=  "OFF"
s51Q2C$=  "U3"             s51Q2TD=  15.00           s51Q2RS$= "N"
s79OI1=   0.000            s79OI2=   600.000         s79OI3=   0.000
s79OI4=   0.000            s79RSD=   1800.000        s79RSLD=  300.000
CFD=      60.000           DMTC=     5               PDEMP=    5.00
NDEMP=    1.50             GDEMP=    1.50            QDEMP=    1.50
SV5PU=    0.000            SV5DO=    0.000           SV6PU=    0.000
SV6DO=    0.000            SV7PU=    0.000           SV7DO=    0.000
SV8PU=    0.000            SV8DO=    0.000           SV9PU=    0.000
SV9DO=    0.000            SV10PU=   0.000           SV10DO=   0.000
SV11PU=   0.000            SV11DO=   0.000           SV12PU=   0.000
SV12DO=   0.000            SV13PU=   0.000           SV13DO=   0.000
SV14PU=   0.000            SV14DO=   0.000           NFREQ=    60
PHROT$=   "ABC"            DATE_F$=  "MDY"
TR$=      "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "

ULTR$=    "!(51P1 + 51G1)"s51P1TC=  1               s51P2TC=  1
s51N1TC=  1                s51G1TC=  1               s51Q1TC=  1
s51Q2TC=  1                s52A$=    "IN1"           CL$=      "LB4"
ULCL$=    "TRIP"           s79RI$=   "TRIP"          s79RIS$=  "IN1"
s79DTL$=  "!LB1 + LB3"     s79DLS$=  "79LO"          s79SKP$=  "50P2 * SH0"
s79STL$=  "TRIP"           s79BRS$=  "(51P1 + 51G1) * (79RS + 79CY)"

s79SEQ=   0                ER1$=     "51P1 + 51G1 + 51N1"

ER2=      0                SV1=      0               SV2=      0
SV3=      0                SV4=      0               SV5=      0
SV6=      0                SV7=      0               SV8=      0
SV9=      0                SV10=     0               SV11=     0
SV12=     0                SV13=     0               SV14=     0
OUT1$=    "TRIP"           OUT2=     0               OUT3=     0
OUT4=     0                DP1$=     "IN1"           DP2$=     "LB2"
DP3=      0                DP4=      0               DP5=      0
DP6=      0                DP7=      0               DP8=      0
```

Global Defines:

```
CONTACT$="4"         'OUTPUT CONTACT TO MASK
SEL_AUTO=1           '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1           'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1             'NO ERROR MESSAGE IF NO OPERATION
```

Device Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

52F23                              Date: 01/04/24    Time: 11:16:28.833
SUB 3 WBB

FID=SEL-551-R514-Vf-Z002002-D20110408      CID=CCFD

SELF TESTS

W=Warn    F=Fail

       IA       IB       IC       IN       MOF
OS      3        3        3        3        0

       +5V_PS   +5V_REG  -5V_REG  +10V_PS  -10V_PS  VBAT
PS      4.96     5.01    -5.01     9.81    -9.89     3.49

       TEMP     RAM      ROM      CR_RAM   EEPROM
        26.5    OK       OK       OK       OK

 Relay Enabled

=>>
```

Device Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	216.0	0.0	PASS
B-N	0.0	0.0	0.0	240.0	240.0	0.0	PASS
C-N	0.0	0.0	0.0	264.0	265.0	0.4	PASS

Device Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	16.500	16.500	-0.00	PASS
B-N	16.665	16.500	1.00	PASS
C-N	16.500	16.500	-0.00	PASS

Device Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	3.700	3.700	-0.00	PASS
B-N	3.700	3.700	-0.00	PASS
C-N	3.700	3.700	-0.00	PASS

Device Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.400	5.400	0.00	PASS

Device Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		1.200	1.200	0.00	PASS
B-N		1.212	1.200	1.00	PASS
C-N		1.212	1.200	1.00	PASS

Device Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

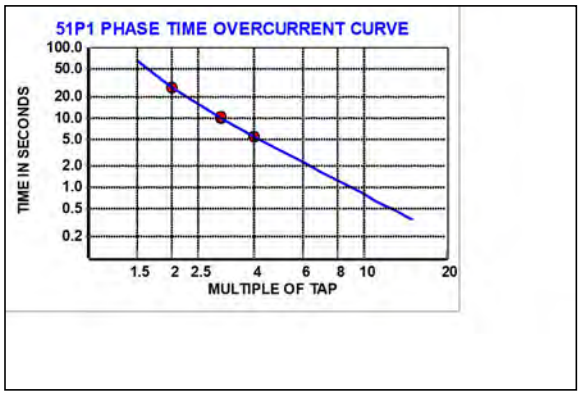
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.400	1620.77	27.013	26.667	1.30	PASS
3.00	3.600	601.25	10.021	10.000	0.21	PASS
4.00	4.800	320.84	5.347	5.333	0.26	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.400	1641.07	27.351	26.667	2.57	PASS
3.00	3.600	603.62	10.060	10.000	0.60	PASS
4.00	4.800	320.44	5.341	5.333	0.14	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.400	1636.08	27.268	26.667	2.26	PASS
3.00	3.600	605.55	10.092	10.000	0.92	PASS
4.00	4.800	320.38	5.340	5.333	0.12	PASS

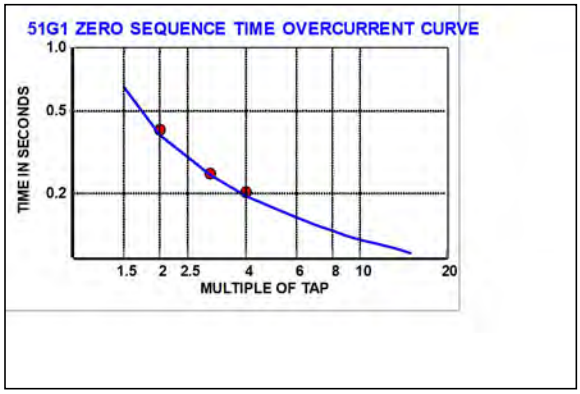


Device Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
0.495	0.500	-1.00	PASS

Device Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
2.00	1.000	24.29	0.405	0.340 TO 0.428	PASS
3.00	1.500	15.12	0.252	0.208 TO 0.283	PASS
4.00	2.000	12.19	0.203	0.161 TO 0.231	PASS



Routine	SEL-551.FST_LIB	**AFAL**	AL	**Test Date**	1/4/2024
Version	9.1			**Pass/Fail**	PASS

Device Data:

Customer:	City of Ann Arbor	Job_Number:	230858
SUBSTATION:	CEB	Relay_ID:	Sub 4-TF 52F24
PHASE_ZONE:	3 Phase	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	N/A
SERIAL_NUMBER:	1132620139		
FIRMWARE: SEL-551-R514-VF-Z002002-D20110408		NERC_AUDITABLE:	0
MAINT_INTERVAL:	3	PREVIOUS_TESTDATE:	5/8/2020
CURRENT_TESTDATE:	1/4/2024	NEXT_TESTDATE:	1/4/2027
TESTSET_CALDATE:	2/15/2023	Tested_BY:	Steve Monte

Routine Notes:

Device Settings Used for Testing:

```
RID$=     "52F24"          TID$=     "SUB 4 TF"       CTR=      120
CTRN=     120              TDURD=    9.000            s50P1P=   13.0
s50P2P=   1.8              s50P3P$=  "OFF"            s50P4P$=  "OFF"
s50P5P$=  "OFF"            s50P6P$=  "OFF"            s50ABCP$= "OFF"
s51P1P=   0.7              s51P1C$=  "C3"             s51P1TD=  1.00
s51P1RS$= "N"              s51P2P$=  "OFF"            s51P2C$=  "U3"
s51P2TD=  15.00            s51P2RS$= "N"              s50N1P$=  "OFF"
s50N2P$=  "OFF"            s51N1P$=  "OFF"            s51N1C$=  "U4"
s51N1TD=  3.00             s51N1RS$= "N"              s50G1P=   5.4
s50G2P$=  "OFF"            s51G1P=   0.5              s51G1C$=  "U1"
s51G1TD=  0.50             s51G1RS$= "N"              s50Q1P$=  "OFF"
s50Q2P$=  "OFF"            s51Q1P$=  "OFF"            s51Q1C$=  "U3"
s51Q1TD=  15.00            s51Q1RS$= "N"              s51Q2P$=  "OFF"
s51Q2C$=  "U3"             s51Q2TD=  15.00            s51Q2RS$= "N"
s79OI1=   0.000            s79OI2=   600.000          s79OI3=   0.000
s79OI4=   0.000            s79RSD=   1800.000         s79RSLD=  300.000
CFD=      60.000           DMTC=     5                PDEMP=    5.00
NDEMP=    1.50             GDEMP=    1.50             QDEMP=    1.50
SV5PU=    0.000            SV5DO=    0.000            SV6PU=    0.000
SV6DO=    0.000            SV7PU=    0.000            SV7DO=    0.000
SV8PU=    0.000            SV8DO=    0.000            SV9PU=    0.000
SV9DO=    0.000            SV10PU=   0.000            SV10DO=   0.000
SV11PU=   0.000            SV11DO=   0.000            SV12PU=   0.000
SV12DO=   0.000            SV13PU=   0.000            SV13DO=   0.000
SV14PU=   0.000            SV14DO=   0.000            NFREQ=    60
PHROT$=   "ABC"            DATE_F$=  "MDY"
TR$=      "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "

ULTR$=    "!(51P1 + 51G1)"s51P1TC=  1                s51P2TC=  1
s51N1TC=  1                s51G1TC=  1                s51Q1TC=  1
s51Q2TC=  1                s52A$=    "IN1"            CL$=      "LB4"
ULCL$=    "TRIP"           s79RI$=   "TRIP"           s79RIS$=  "IN1"
s79DTL$=  "!LB1 + LB3"     s79DLS$=  "79LO"           s79SKP$=  "50P2 * SH0"
s79STL$=  "TRIP"           s79BRS$=  "(51P1 + 51G1) * (79RS + 79CY)"

s79SEQ=   0                ER1$=     "51P1 + 51G1 + 51N1"

ER2=      0                SV1=      0                SV2=      0
SV3=      0                SV4=      0                SV5=      0
SV6=      0                SV7=      0                SV8=      0
SV9=      0                SV10=     0                SV11=     0
SV12=     0                SV13=     0                SV14=     0
OUT1$=    "TRIP"           OUT2=     0                OUT3=     0
OUT4=     0                DP1$=     "IN1"            DP2$=     "LB2"
DP3=      0                DP4=      0                DP5=      0
DP6=      0                DP7=      0                DP8=      0
```

Global Defines:

```
CONTACT$="4"         'OUTPUT CONTACT TO MASK
SEL_AUTO=1           '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1           'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1             'NO ERROR MESSAGE IF NO OPERATION
```

Device Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

52F24                              Date: 01/04/24    Time: 10:57:58.177
SUB 4 TF

FID=SEL-551-R514-Vf-Z002002-D20110408      CID=CCFD

SELF TESTS

W=Warn    F=Fail

       IA       IB       IC       IN       MOF
OS      3        3        3        3        0

       +5V_PS   +5V_REG  -5V_REG  +10V_PS  -10V_PS  VBAT
PS      4.98     5.01    -5.09     9.76    -9.82     3.49

       TEMP     RAM      ROM      CR_RAM   EEPROM
        26.5    OK       OK       OK       OK

 Relay Enabled

=>>
```

Device Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	217.0	0.5	PASS
B-N	0.0	0.0	0.0	240.0	240.0	0.0	PASS
C-N	0.0	0.0	0.0	264.0	264.0	0.0	PASS

Device Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	13.000	13.000	0.00	PASS
B-N	13.000	13.000	0.00	PASS
C-N	13.000	13.000	0.00	PASS

Device Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	1.782	1.800	-1.00	PASS
B-N	1.782	1.800	-1.00	PASS
C-N	1.800	1.800	0.00	PASS

Device Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.400	5.400	0.00	PASS

Device Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		0.665	0.700	-5.00	PASS
B-N		0.707	0.700	1.00	PASS
C-N		0.672	0.700	-4.00	PASS

Device Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

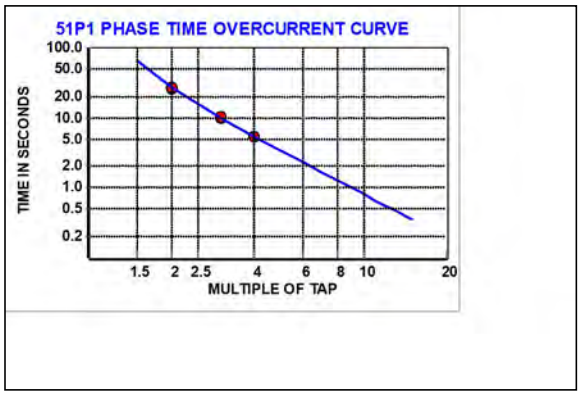
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.400	1567.24	26.121	26.667	-2.05	PASS
3.00	2.100	596.93	9.949	10.000	-0.51	PASS
4.00	2.800	322.07	5.368	5.333	0.65	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.400	1604.28	26.738	26.667	0.27	PASS
3.00	2.100	601.98	10.033	10.000	0.33	PASS
4.00	2.800	320.30	5.338	5.333	0.10	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.400	1618.55	26.976	26.667	1.16	PASS
3.00	2.100	606.62	10.110	10.000	1.10	PASS
4.00	2.800	322.47	5.374	5.333	0.77	PASS

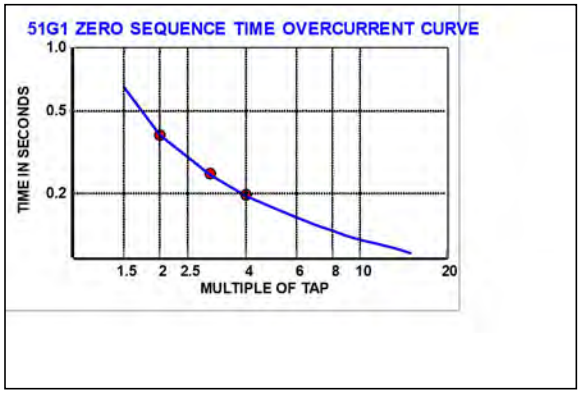


Device Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
0.505	0.500	1.00	PASS

Device Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.000	22.91	0.382	0.384	-0.52	PASS
3.00	1.500	14.96	0.249	0.245	1.60	PASS
4.00	2.000	11.87	0.198	0.196	0.78	PASS



Routine	SEL-551.FST_LIB	**AFAL**	AL	**Test Date**	1/4/2024
Version	9.1			**Pass/Fail**	PASS

Device Data:

Customer:	City of Ann Arbor	Job_Number:	230858
SUBSTATION:	CEB	Relay_ID:	Sub 5-SH 52F25
PHASE_ZONE:	3 Phase	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	N/A
SERIAL_NUMBER:	1132620132		
FIRMWARE: SEL-551-R514-VF-Z002002-D20110408		NERC_AUDITABLE:	0
MAINT_INTERVAL:	3	PREVIOUS_TESTDATE:	5/8/2020
CURRENT_TESTDATE:	1/4/2024	NEXT_TESTDATE:	1/4/2024
TESTSET_CALDATE:	2/15/2023	Tested_BY:	Steve Monte

Routine Notes:

Device Settings Used for Testing:

```
RID$=     "52F25"          TID$=     "SUB 5 SH"       CTR=      120
CTRN=     120              TDURD=    9.000            s50P1P=   16.5
s50P2P=   3.5              s50P3P$=  "OFF"            s50P4P$=  "OFF"
s50P5P$=  "OFF"            s50P6P$=  "OFF"            s50ABCP$= "OFF"
s51P1P=   1.2              s51P1C$=  "C3"             s51P1TD=  1.00
s51P1RS$= "N"              s51P2P$=  "OFF"            s51P2C$=  "U3"
s51P2TD=  15.00            s51P2RS$= "N"              s50N1P$=  "OFF"
s50N2P$=  "OFF"            s51N1P$=  "OFF"            s51N1C$=  "U4"
s51N1TD=  3.00             s51N1RS$= "N"              s50G1P=   5.4
s50G2P$=  "OFF"            s51G1P=   0.5              s51G1C$=  "U1"
s51G1TD=  0.50             s51G1RS$= "N"              s50Q1P$=  "OFF"
s50Q2P$=  "OFF"            s51Q1P$=  "OFF"            s51Q1C$=  "U3"
s51Q1TD=  15.00            s51Q1RS$= "N"              s51Q2P$=  "OFF"
s51Q2C$=  "U3"             s51Q2TD=  15.00            s51Q2RS$= "N"
s79OI1=   0.000            s79OI2=   600.000          s79OI3=   0.000
s79OI4=   0.000            s79RSD=   1800.000         s79RSLD=  300.000
CFD=      60.000           DMTC=     5                PDEMP=    5.00
NDEMP=    1.50             GDEMP=    1.50             QDEMP=    1.50
SV5PU=    0.000            SV5DO=    0.000            SV6PU=    0.000
SV6DO=    0.000            SV7PU=    0.000            SV7DO=    0.000
SV8PU=    0.000            SV8DO=    0.000            SV9PU=    0.000
SV9DO=    0.000            SV10PU=   0.000            SV10DO=   0.000
SV11PU=   0.000            SV11DO=   0.000            SV12PU=   0.000
SV12DO=   0.000            SV13PU=   0.000            SV13DO=   0.000
SV14PU=   0.000            SV14DO=   0.000            NFREQ=    60
PHROT$=   "ABC"            DATE_F$=  "MDY"
TR$=      "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "

ULTR$=    "!(51P1 + 51G1)"s51P1TC=  1                s51P2TC=  1
s51N1TC=  1                s51G1TC=  1                s51Q1TC=  1
s51Q2TC=  1                s52A$=    "IN1"            CL$=      "LB4"
ULCL$=    "TRIP"           s79RI$=   "TRIP"           s79RIS$=  "IN1"
s79DTL$=  "!LB1 + LB3"     s79DLS$=  "79LO"           s79SKP$=  "50P2 * SH0"
s79STL$=  "TRIP"           s79BRS$=  "(51P1 + 51G1) * (79RS + 79CY)"

s79SEQ=   0                ER1$=     "51P1 + 51G1 + 51N1"

ER2=      0                SV1=      0                SV2=      0
SV3=      0                SV4=      0                SV5=      0
SV6=      0                SV7=      0                SV8=      0
SV9=      0                SV10=     0                SV11=     0
SV12=     0                SV13=     0                SV14=     0
OUT1=     0                OUT2$=    "TRIP"           OUT3=     0
OUT4=     0                DP1$=     "IN1"            DP2$=     "LB2"
DP3=      0                DP4=      0                DP5=      0
DP6=      0                DP7=      0                DP8=      0
```

Global Defines:

```
CONTACT$="4"         'OUTPUT CONTACT TO MASK
SEL_AUTO=1           '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1           'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1             'NO ERROR MESSAGE IF NO OPERATION
```

Device Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

52F25                              Date: 01/04/24    Time: 12:02:38.690
SUB 5 SH

FID=SEL-551-R514-Vf-Z002002-D20110408      CID=CCFD

SELF TESTS

W=Warn    F=Fail

       IA       IB       IC       IN       MOF
OS      3        3        3        3        0

       +5V_PS   +5V_REG  -5V_REG  +10V_PS  -10V_PS  VBAT
PS      4.98     5.01    -4.96     9.84    -9.87     3.49

       TEMP     RAM      ROM      CR_RAM   EEPROM
        29.6    OK       OK       OK       OK

 Relay Enabled

=>>
```

Device Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	213.0	-1.4	PASS
B-N	0.0	0.0	0.0	240.0	236.0	-1.7	PASS
C-N	0.0	0.0	0.0	264.0	263.0	-0.4	PASS

Device Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	16.665	16.500	1.00	PASS
B-N	16.500	16.500	-0.00	PASS
C-N	16.500	16.500	-0.00	PASS

Device Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	3.500	3.500	0.00	PASS
B-N	3.500	3.500	0.00	PASS
C-N	3.500	3.500	0.00	PASS

Device Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.454	5.400	1.00	PASS

Device Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		1.212	1.200	1.00	PASS
B-N		1.212	1.200	1.00	PASS
C-N		1.212	1.200	1.00	PASS

Device Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

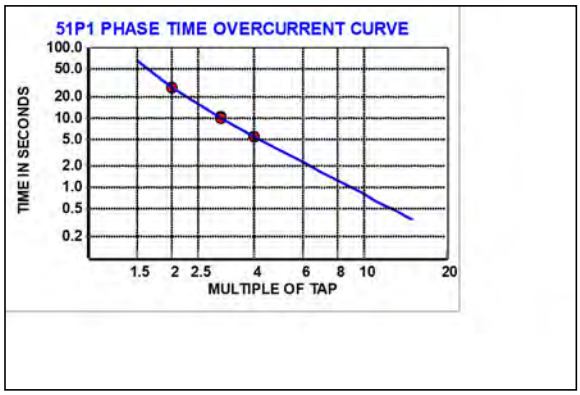
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.400	1634.90	27.248	26.667	2.18	PASS
3.00	3.600	605.26	10.088	10.000	0.88	PASS
4.00	4.800	323.30	5.388	5.333	1.03	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.400	1631.06	27.184	26.667	1.94	PASS
3.00	3.600	603.98	10.066	10.000	0.66	PASS
4.00	4.800	321.82	5.364	5.333	0.57	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.400	1600.09	26.668	26.667	0.01	PASS
3.00	3.600	597.50	9.958	10.000	-0.42	PASS
4.00	4.800	318.23	5.304	5.333	-0.55	PASS

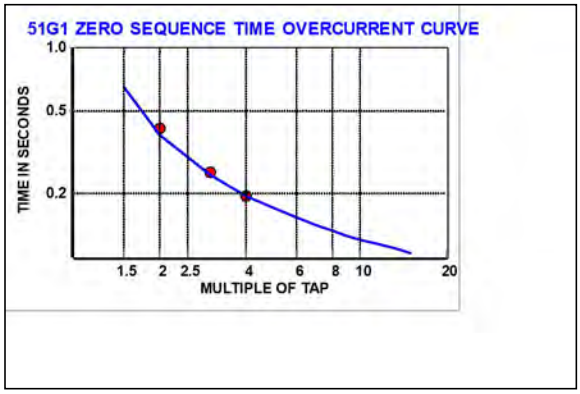


Device Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
0.490	0.500	-2.00	PASS

Device Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
2.00	1.000	24.56	0.409	0.340 TO 0.428	PASS
3.00	1.500	15.30	0.255	0.208 TO 0.283	PASS
4.00	2.000	11.75	0.196	0.161 TO 0.231	PASS



Routine	SEL-551.FST_LIB	**AFAL**	AL	**Test Date**	1/4/2024
Version	9.1			**Pass/Fail**	PASS

Device Data:

Customer:	City of Ann Arbor	Job_Number:	230858
SUBSTATION:	CEB	Relay_ID:	Sub 7-CEB 52F27
PHASE_ZONE:	3 Phase	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	N/A
SERIAL_NUMBER:	1133390347		
FIRMWARE: SEL-551-R514-VF-Z002002-D20110408		NERC_AUDITABLE:	0
MAINT_INTERVAL:	3	PREVIOUS_TESTDATE:	5/8/2022
CURRENT_TESTDATE:	1/4/2024	NEXT_TESTDATE:	1/4/2027
TESTSET_CALDATE:	2/15/2023	Tested_BY:	Steve Monte

Routine Notes:

Device Settings Used for Testing:

```
RID$=     "FDR-52F27"     TID$=     "SUB 7 CEB"     CTR=      120
CTRN=     120             TDURD=    9.000           s50P1P=   13.0
s50P2P=   3.2             s50P3P$=  "OFF"           s50P4P$=  "OFF"
s50P5P$=  "OFF"           s50P6P$=  "OFF"           s50ABCP$= "OFF"
s51P1P=   1.0             s51P1C$=  "C3"            s51P1TD=  1.00
s51P1RS$= "N"             s51P2P$=  "OFF"           s51P2C$=  "U3"
s51P2TD=  15.00           s51P2RS$= "N"             s50N1P$=  "OFF"
s50N2P$=  "OFF"           s51N1P$=  "OFF"           s51N1C$=  "U4"
s51N1TD=  3.00            s51N1RS$= "N"             s50G1P=   5.4
s50G2P$=  "OFF"           s51G1P=   0.5             s51G1C$=  "U1"
s51G1TD=  0.50            s51G1RS$= "N"             s50Q1P$=  "OFF"
s50Q2P$=  "OFF"           s51Q1P$=  "OFF"           s51Q1C$=  "U3"
s51Q1TD=  15.00           s51Q1RS$= "N"             s51Q2P$=  "OFF"
s51Q2C$=  "U3"            s51Q2TD=  15.00           s51Q2RS$= "N"
s79OI1=   0.000           s79OI2=   600.000         s79OI3=   0.000
s79OI4=   0.000           s79RSD=   1800.000        s79RSLD=  300.000
CFD=      60.000          DMTC=     5               PDEMP=    5.00
NDEMP=    1.50            GDEMP=    1.50            QDEMP=    1.50
SV5PU=    0.000           SV5DO=    0.000           SV6PU=    0.000
SV6DO=    0.000           SV7PU=    0.000           SV7DO=    0.000
SV8PU=    0.000           SV8DO=    0.000           SV9PU=    0.000
SV9DO=    0.000           SV10PU=   0.000           SV10DO=   0.000
SV11PU=   0.000           SV11DO=   0.000           SV12PU=   0.000
SV12DO=   0.000           SV13PU=   0.000           SV13DO=   0.000
SV14PU=   0.000           SV14DO=   0.000           NFREQ=    60
PHROT$=   "ABC"           DATE_F$=  "MDY"
TR$=      "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "

ULTR$=    "!(51P1 + 51G1)"s51P1TC=  1               s51P2TC=  1
s51N1TC=  1               s51G1TC=  1               s51Q1TC=  1
s51Q2TC=  1               s52A$=    "IN1"           CL$=      "LB4"
ULCL$=    "TRIP"          s79RI$=   "TRIP"          s79RIS$=  "IN1"
s79DTL$=  "!LB1 + LB3"    s79DLS$=  "79LO"          s79SKP$=  "50P2 * SH0"
s79STL$=  "TRIP"          s79BRS$=  "(51P1 + 51G1) * (79RS + 79CY)"

s79SEQ=   0               ER1$=     "51P1 + 51G1 + 51N1"

ER2=      0               SV1=      0               SV2=      0
SV3=      0               SV4=      0               SV5=      0
SV6=      0               SV7=      0               SV8=      0
SV9=      0               SV10=     0               SV11=     0
SV12=     0               SV13=     0               SV14=     0
OUT1$=    "TRIP"          OUT2=     0               OUT3=     0
OUT4=     0               DP1$=     "IN1"           DP2$=     "LB2"
DP3=      0               DP4=      0               DP5=      0
DP6=      0               DP7=      0               DP8=      0
```

Global Defines:

```
CONTACT$="4"        'OUTPUT CONTACT TO MASK
SEL_AUTO=1          '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1          'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1            'NO ERROR MESSAGE IF NO OPERATION
```

Device Test Results for: RELAY STATUS CHECK

N/A

Additional Data:
STA

FDR-52F27 Date: 01/04/24 Time: 10:37:59.211
SUB 7 CEB

FID=SEL-551-R514-Vf-Z002002-D20110408 CID=CCFD

SELF TESTS

W=Warn F=Fail

	IA	IB	IC	IN	MOF
OS	3	3	2	3	0

	+5V_PS	+5V_REG	-5V_REG	+10V_PS	-10V_PS	VBAT
PS	4.98	5.03	-4.98	9.94	-9.99	3.53

TEMP	RAM	ROM	CR_RAM	EEPROM
28.6	OK	OK	OK	OK

Relay Enabled

=>>

Device Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	218.0	0.9	PASS
B-N	0.0	0.0	0.0	240.0	241.0	0.4	PASS
C-N	0.0	0.0	0.0	264.0	263.0	-0.4	PASS

Device Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	13.000	13.000	0.00	PASS
B-N	13.000	13.000	0.00	PASS
C-N	13.000	13.000	0.00	PASS

Device Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	3.200	3.200	0.00	PASS
B-N	3.168	3.200	-1.00	PASS
C-N	3.200	3.200	0.00	PASS

Device Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.400	5.400	0.00	PASS

Device Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		1.010	1.000	1.00	PASS
B-N		0.980	1.000	-2.00	PASS
C-N		1.000	1.000	0.00	PASS

Device Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

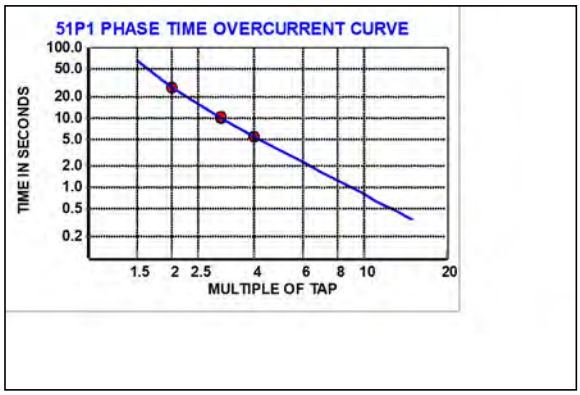
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.000	1609.46	26.824	26.667	0.59	PASS
3.00	3.000	601.53	10.026	10.000	0.26	PASS
4.00	4.000	320.73	5.346	5.333	0.23	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.000	1591.55	26.526	26.667	-0.53	PASS
3.00	3.000	597.82	9.964	10.000	-0.36	PASS
4.00	4.000	322.54	5.376	5.333	0.79	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.000	1596.31	26.605	26.667	-0.23	PASS
3.00	3.000	604.91	10.082	10.000	0.82	PASS
4.00	4.000	322.04	5.367	5.333	0.64	PASS

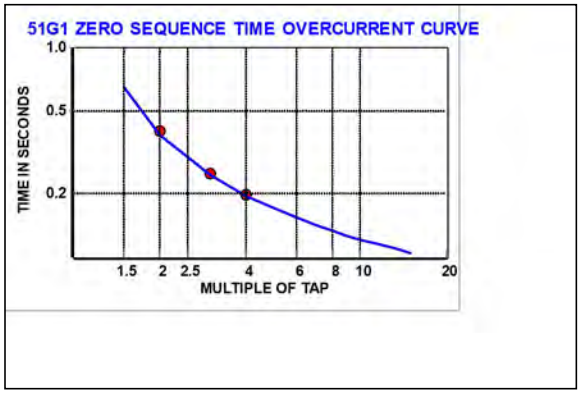


Device Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	RANGE			OK?
	0.470	0.500	0.375	TO	0.625	PASS

Device Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.000	24.06	0.401	0.384	4.48	PASS
3.00	1.500	14.98	0.250	0.245	1.72	PASS
4.00	2.000	11.95	0.199	0.196	1.45	PASS



Test Results Report

Powered by: ENOSERV

Lib Routine: IAV-51A.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 2.0 **Test Date:** 02/14/2024

Relay Data:

Customer:	CITY OF ANN ARBOR	Job_Number:	230858
SUBSTATION:	4	Relay_ID:	DEV 64-1
PHASE_ZONE:	1 Phase	RELAY_MANF:	GE
RELAY_TYPE:	IAV-51A	MODEL_STYLE:	
IEEE_DEVICE:	59	IL_IB:	GEH-1814
SERIAL_NUMBER:	NA	FIRMWARE:	NA
NERC_AUDITABLE:	0	MAINT_INTERVAL:	0
PREVIOUS_TESTDATE:		CURRENT_TESTDATE:	
NEXT_TESTDATE:		TESTSET_CALDATE:	
Tested_BY:			

Global Defines:

[Suppressed]

Routine Notes:

Relay Settings Used for Testing:

[Suppressed]

Relay Test Results for: TOV UNIT PICKUP TEST

Test Set Quantities

		VA/IB	IA/VC	VB/IC
INITIAL OP	[Mag]	38.20	0.00	0.00
Max Dur(cy)	[Ang]	0.0°	0.0°	0.0°
N/A				
	[Mag]	0.00	0.00	0.00
	[Ang]	0.0°	0.0°	0.0°
FINAL OP	[Mag]	40.19	0.00	0.00
Max Dur(cy)	[Ang]	0.0°	0.0°	0.0°
N/A				
	[Mag]	0.00	0.00	0.00
	[Ang]	0.0°	0.0°	0.0°

DROPOUT	PICKUP	IDEAL	RANGE	OK?
38.200	40.191	40.000	38.000 TO 42.000	PASS

Relay Test Results for: TOV TIMING TEST

Relay Test Results for: TOV TIMING TEST

Test Set Quantities

		VA/IB	IA/VC	VB/IC
OPERATION	[Mag]	52.00	0.00	0.00
Max Dur(cy)	[Ang]	0.0°	0.0°	0.0°
N/A				
	[Mag]	0.00	0.00	0.00
	[Ang]	0.0°	0.0°	0.0°

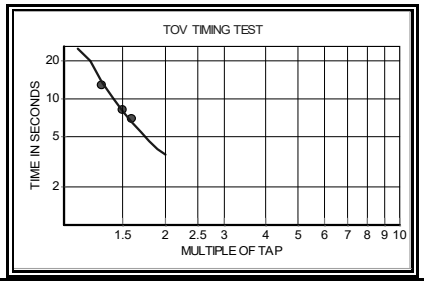
Test Set Quantities

		VA/IB	IA/VC	VB/IC
OPERATION	[Mag]	60.00	0.00	0.00
Max Dur(cy)	[Ang]	0.0°	0.0°	0.0°
N/A				
	[Mag]	0.00	0.00	0.00
	[Ang]	0.0°	0.0°	0.0°

Test Set Quantities

		VA/IB	IA/VC	VB/IC
OPERATION	[Mag]	64.00	0.00	0.00
Max Dur(cy)	[Ang]	0.0°	0.0°	0.0°
N/A				
	[Mag]	0.00	0.00	0.00
	[Ang]	0.0°	0.0°	0.0°

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
1.30	52.000	758.12	12.635	13.419	-5.84	PASS
1.50	60.000	487.48	8.125	7.916	2.64	PASS
1.60	64.000	413.84	6.897	6.560	5.14	PASS



Relay Test Results for: TARGET TEST

Relay Test Results for: TARGET TEST

Test Set Quantities

		VA/IB	IA/VC	VB/IC
OPERATION	[Mag]	0.00	0.16	0.00
Max Dur(cy)	[Ang]	0.0°	0.0°	0.0°
N/A				
	[Mag]	0.00	0.00	0.00
	[Ang]	0.0°	0.0°	0.0°

Test Set Quantities

		VA/IB	IA/VC	VB/IC
OPERATION	[Mag]	0.00	0.12	0.00
Max Dur(cy)	[Ang]	0.0°	0.0°	0.0°
N/A				
	[Mag]	0.00	0.00	0.00
	[Ang]	0.0°	0.0°	0.0°

PICKUP CURRENT		RANGE			OK?
0.160	0.100	TO	0.240		PASS
DROPOUT CURRENT		RANGE			OK?
0.120	0.000	TO	0.240		PASS

Test Results Report

Powered by: ENOSERV

Lib Routine: IAV-51A.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 2.0 **Test Date:** 02/14/2024

Relay Data:

Customer:	CITY OF ANN ARBOR	Job_Number:	230858
SUBSTATION:	4	Relay_ID:	DEV 64-2
PHASE_ZONE:	1 PHASE	RELAY_MANF:	GE
RELAY_TYPE:	IAV-51A	MODEL_STYLE:	12IAV51D2A
IEEE_DEVICE:	59	IL_IB:	GEK-45404
SERIAL_NUMBER:	NA	FIRMWARE:	NA
NERC_AUDITABLE:	0	MAINT_INTERVAL:	0
PREVIOUS_TESTDATE:		CURRENT_TESTDATE:	
NEXT_TESTDATE:		TESTSET_CALDATE:	2/13/2024
Tested_BY:	K. MONTE		

Global Defines:

[Suppressed]

Routine Notes:

Relay Settings Used for Testing:

[Suppressed]

Relay Test Results for: TOV UNIT PICKUP TEST

Test Set Quantities

		VA/IB	IA/VC	VB/IC
INITIAL OP	[Mag]	40.00	0.00	0.00
Max Dur(cy)	[Ang]	0.0°	0.0°	0.0°
N/A				
	[Mag]	0.00	0.00	0.00
	[Ang]	0.0°	0.0°	0.0°
FINAL OP	[Mag]	40.20	0.00	0.00
Max Dur(cy)	[Ang]	0.0°	0.0°	0.0°
N/A				
	[Mag]	0.00	0.00	0.00
	[Ang]	0.0°	0.0°	0.0°

DROPOUT	PICKUP	IDEAL	RANGE	OK?
40.000	40.200	40.000	38.000 TO 42.000	PASS

Relay Test Results for: TOV TIMING TEST

Relay Test Results for: TOV TIMING TEST

Test Set Quantities

		VA/IB	IA/VC	VB/IC
OPERATION	[Mag]	48.00	0.00	0.00
Max Dur(cy)	[Ang]	0.0°	0.0°	0.0°
N/A				
	[Mag]	0.00	0.00	0.00
	[Ang]	0.0°	0.0°	0.0°

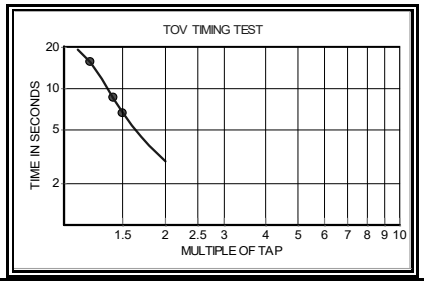
Test Set Quantities

		VA/IB	IA/VC	VB/IC
OPERATION	[Mag]	56.00	0.00	0.00
Max Dur(cy)	[Ang]	0.0°	0.0°	0.0°
N/A				
	[Mag]	0.00	0.00	0.00
	[Ang]	0.0°	0.0°	0.0°

Test Set Quantities

		VA/IB	IA/VC	VB/IC
OPERATION	[Mag]	60.00	0.00	0.00
Max Dur(cy)	[Ang]	0.0°	0.0°	0.0°
N/A				
	[Mag]	0.00	0.00	0.00
	[Ang]	0.0°	0.0°	0.0°

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
1.20	48.000	954.05	15.901	15.867	0.21	PASS
1.40	56.000	516.06	8.601	8.470	1.55	PASS
1.50	60.000	394.64	6.577	6.773	-2.89	PASS



Relay Test Results for: TARGET TEST

Relay Test Results for: TARGET TEST

Test Set Quantities

		VA/IB	IA/VC	VB/IC
OPERATION	[Mag]	0.00	0.16	0.00
Max Dur(cy)	[Ang]	0.0°	0.0°	0.0°
N/A				
	[Mag]	0.00	0.00	0.00
	[Ang]	0.0°	0.0°	0.0°

Test Set Quantities

		VA/IB	IA/VC	VB/IC
OPERATION	[Mag]	0.00	0.03	0.00
Max Dur(cy)	[Ang]	0.0°	0.0°	0.0°
N/A				
	[Mag]	0.00	0.00	0.00
	[Ang]	0.0°	0.0°	0.0°

PICKUP CURRENT			RANGE			OK?
	0.160		0.100	TO	0.240	PASS
DROPOUT CURRENT			RANGE			OK?
	0.030		0.000	TO	0.240	PASS

Comment Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Customer CITY OF ANN ARBOR
User CITY OF ANN ARBOR

Plant: <None>
Substation: ADMIN
Position: LP-ADM-1-XFMR
Equipment: 56750 - XFMR MAINTENANCE AND INSP_R05-23
Date: 2/14/2024

Comments: EXCITATION CURRENT - A 9.2mA B - 10.8mA C- 11.2mA
UNABLE TO ISOLATE TRANSFORMER FROM GROUND SO COULD NOT GET A SECONDARY TO GROUND READING.

Plant: <None>
Substation: ADMIN
Position: LP-ADM-2-XFMR
Equipment: 56750 - XFMR MAINTENANCE AND INSP_R05-23
Date: 2/14/2024

Comments: INSULATION RESISTANCE TEST RESULTS INCLUDE PRIMARY AND SECONDARY CABLES. TRANSFORMER IS A SINGLE PHASE

Plant: <None>
Substation: ADMIN
Position: MCC-ADM-A
Equipment: 30100 - MOTOR CONTROL CENTER INSULATION
Date: 2/14/2024

Comments: NO NEUTRAL

Plant: <None>
Substation: ADMIN
Position: MCC-ADM-A 480V BREAKER
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 2/14/2024

Comments: INSULATION RESISTANCE TEST RESULTS INCLUDE CABLE GOING TO TRANSFER SWITCH

Plant: <None>
Substation: ADMIN
Position: PP-ADM-1 XFMR
Equipment: 56750 - XFMR MAINTENANCE AND INSP_R05-23
Date: 2/14/2024

Comments: RESULTS INCLUDE PRIMARY CABLE AND SECONDARY CABLE
EXCITATION CURRENT - A 13.9mA B - 10.9mA C- 13.8mA

Comment Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Plant: <None>
Substation: BATTERIES
Position: 120 V DC
Equipment: 10200 - BATTERY CHARGER INSPECTION
Date: 12/22/2023

Comments: AC RIPLE 1.4mV

Plant: <None>
Substation: GENERATOR SWITCHGEAR
Position: SWITCHGEAR
Equipment: 50976 - SWITCHGEAR INSP AND TEST_R03-23
Date: 12/21/2023

Comments: CABLE 52G1 A-G 603,000 MEG OHM B-G 663,000 MEG OHMS C-G 603,000 MEG OHMS A-B 1,484,000 MEG OHMS B-C 1,403,000 MEG OHMS C-A 1,407,000 MEG OHMS. CABLE 52G2 A-G 519,000 MEG OHM B-G 526,000 MEG OHMS C-G 519,000 MEG OHMS A-B 1,208,000 MEG OHMS B-C 1,248,000 MEG OHMS C-A 1,268,000 MEG OHMS

Plant: <None>
Substation: SUBSTATION 1
Position: 480V SWITCHGEAR BUS A
Equipment: 50976 - SWITCHGEAR INSP AND TEST_R02-23
Date: 2/12/2024

Comments: UNABLE TO INSPECT DUE TO BUS BEING ENERGIZED. CUSTOMER WAS UNABLE TO DEENERGIZE LOAD ON MCC-C.

Plant: <None>
Substation: SUBSTATION 1
Position: 480V SWITCHGEAR BUS B
Equipment: 50976 - SWITCHGEAR INSP AND TEST_R02-23
Date: 2/12/2024

Comments: SURGE LOGIC FUNCTIONING NORMALLY

Comment Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Plant: <None>
Substation: SUBSTATION 1
Position: MAIN A 480V BREAKER
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 2/12/2024

Comments: ALL BREAKERS TESTED WITH AS FOUND SETTINGS. PASSED SECONDARY INJECTION.

Plant: <None>
Substation: SUBSTATION 1
Position: MAIN B 480V BREAKER
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 2/12/2024

Comments: ALL BREAKERS TESTED WITH AS FOUND SETTINGS. PASSED SECONDARY INJECTION.

Plant: <None>
Substation: SUBSTATION 1
Position: MCC-C 480V BREAKER
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 2/12/2024

Comments: CUSTOMER WAS UNABLE TO LOSE LOAD ON MCC-C SO BREAKER COULD NOT BE DEENERGIZED AND TESTED

Plant: <None>
Substation: SUBSTATION 1
Position: MCC-D 480V BREAKER
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 2/12/2024

Comments: ALL BREAKERS TESTED WITH AS FOUND SETTINGS. PASSED SECONDARY INJECTION.

Plant: <None>
Substation: SUBSTATION 1
Position: MCC-RLS-A
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 11/22/2023

Comments: BREAKER PASSED ALL SECONDARY INJECTION TESTS.
INSULATION RESISTANCE PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO MCC-1 CONNECTED.

Comment Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Plant: <None>
Substation: SUBSTATION 1
Position: MCC-RLS-A 480V BREAKER
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 2/12/2024

Comments: ALL BREAKERS TESTED WITH AS FOUND SETTINGS. PASSED SECONDARY INJECTION.

Plant: <None>
Substation: SUBSTATION 1
Position: MCC-RLS-B
Equipment: 15930 - MOLDED CASE CIRCUIT BREAKER_R02-23
Date: 11/22/2023

Comments: UNABLE TO SECONDARY INJECT.
INSULATION RESISTANCE PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO MCC-1 CONNECTED.

Plant: <None>
Substation: SUBSTATION 1
Position: MCC-RLS-B 480V BREAKER
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 2/12/2024

Comments: ALL BREAKERS TESTED WITH AS FOUND SETTINGS. PASSED SECONDARY INJECTION.

Plant: <None>
Substation: SUBSTATION 1
Position: PRIMARY SWITCH A
Equipment: 29000 - LOADBREAK DISCONNECT_R03-23
Date: 2/12/2024

Comments: ARRESTER INFO: 12.7 kV MCOV, 15 kV RATED.
PRIMARY CABLE INSULATION RESISTANCES: A-G - 34,200 MEGAOHMS; B-G - 31,900 MEGAOHMS;
C-G - 33,900 MEGAOHMS; A-B - 59,800 MEGAOHMS; B-C - 58,400 MEGAOHMS; C-A - 61,400 MEGAOHMS.

Comment Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Plant: <None>
Substation: SUBSTATION 1
Position: PRIMARY SWITCH B
Equipment: 29000 - LOADBREAK DISCONNECT_R03-23
Date: 2/12/2024

Comments: ARRESTER INFO: 12.7 kV MCOV, 15 kV RATED.
PRIMARY CABLE INSULATION RESISTANCES: A-G - 33,900 MEGAOHMS; B-G - 32,600 MEGAOHMS;
C-G - 30,100 MEGAOHMS; A-B - 64,600 MEGAOHMS; B-C - 58,700 MEGAOHMS; C-A - 70,500 MEGAOHMS.

Plant: <None>
Substation: SUBSTATION 1
Position: SPARE A 480V BREAKER
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 2/12/2024

Comments: ALL BREAKERS TESTED WITH AS FOUND SETTINGS. PASSED SECONDARY INJECTION.

Plant: <None>
Substation: SUBSTATION 1
Position: SPARE B 480V BREAKER
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 2/12/2024

Comments: ALL BREAKERS TESTED WITH AS FOUND SETTINGS. PASSED SECONDARY INJECTION.

Plant: <None>
Substation: SUBSTATION 1
Position: TIE 480V BREAKER
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 2/12/2024

Comments: ALL BREAKERS TESTED WITH AS FOUND SETTINGS. PASSED SECONDARY INJECTION.

Plant: <None>
Substation: SUBSTATION 1
Position: XFMR 1
Equipment: 56750 - XFMR MAINTENANCE AND INSP_R05-23
Date: 2/13/2024

Comments: EXCITATION CURRENT A - 2.0 MILLIAMPS; B- 1.0 MILLIAMPS; C - 1.0 MILLAMPS.

Comment Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Plant: <None>
Substation: SUBSTATION 1
Position: XFMR 2
Equipment: 56750 - XFMR MAINTENANCE AND INSP_R05-23
Date: 2/12/2024

Comments: EXCITATION CURRENT A - 1.0 MILLIAMPS; B- 0.9 MILLIAMPS; C - 1.0 MILLAMPS.

Plant: <None>
Substation: SUBSTATION 2
Position: 480V SWITCHGEAR BUS A
Equipment: 50976 - SWITCHGEAR INSP AND TEST_R02-23
Date: 11/21/2023

Comments: SURGE LOGIC FUNCTIONING NORMALLY

Plant: <None>
Substation: SUBSTATION 2
Position: 480V SWITCHGEAR BUS B
Equipment: 50976 - SWITCHGEAR INSP AND TEST_R02-23
Date: 11/20/2023

Comments: SURGE LOGIC FUNCTIONING NORMALLY

Plant: <None>
Substation: SUBSTATION 2
Position: MAIN A 480V BREAKER
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 11/21/2023

Comments: ALL BREAKERS TESTED WITH AS FOUND SETTINGS. PASSED SECONDARY INJECTION.

Plant: <None>
Substation: SUBSTATION 2
Position: MAIN B 480V BREAKER
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 11/20/2023

Comments: ALL BREAKERS TESTED WITH AS FOUND SETTINGS. PASSED SECONDARY INJECTION.

Comment Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Plant: <None>
Substation: SUBSTATION 2
Position: MCC-E
Equipment: 50400 - SWITCHBOARD BUSS CONNECTION TEST
Date: 11/21/2023

Comments: RB DRAIN PUMP # 4 FUSE FAILED. FUSES WERE REPLACED

Plant: <None>
Substation: SUBSTATION 2
Position: MCC-E 480V BREAKER
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 11/21/2023

Comments: ALL BREAKERS TESTING WITH AS FOUND SETTINGS. PASS SECONDARY INJECTION.

Plant: <None>
Substation: SUBSTATION 2
Position: MCC-F
Equipment: 50400 - SWITCHBOARD BUSS CONNECTION TEST
Date: 11/20/2023

Comments: BASIN HOIST WAS LOCKED OUT.
AIR COMPRESSOR NUMBER 2 HAS A BAD FUSE ON C PHASE. FUSE WAS REPLACED.
BYPASS GATE NUMBER 1- B AND C FUSES WERE BAD. FUSES WERE REPLACED

Plant: <None>
Substation: SUBSTATION 2
Position: MCC-F 480V BREAKER
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 11/20/2023

Comments: ALL BREAKERS TESTING WITH AS FOUND SETTINGS. PASS SECONDARY INJECTION

Plant: <None>
Substation: SUBSTATION 2
Position: PRIMARY SWITCH MAIN A
Equipment: 29000 - LOADBREAK DISCONNECT_R03-23
Date: 11/21/2023

Comments: ARRESTER INFO: 12.7 kV MCOV, 15 kV RATED.
PRIMARY CABLE INSULATION RESISTANCES: A-G - 35,100 MEGAOHMS; B-G - 27,100 MEGAOHMS;
C-G - 34,500 MEGAOHMS; A-B - 59,900 MEGAOHMS; B-C - 53,300 MEGAOHMS; C-A - 58,500 MEGAOHMS.

Comment Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Plant: <None>
Substation: SUBSTATION 2
Position: PRIMARY SWITCH MAIN B
Equipment: 29000 - LOADBREAK DISCONNECT_R03-23
Date: 11/20/2023

Comments: ARRESTER INFO: 12.7 kV MCOV, 15 kV RATED. A AND B ARRESTERS FOUND LOOSE, CORRECTED.
PRIMARY CABLE INSULATION RESISTANCES: A-G - 28,000 MEGAOHMS; B-G - 33,000 MEGAOHMS;
C-G - 29,100 MEGAOHMS; A-B - 64,000 MEGAOHMS; B-C - 56,900 MEGAOHMS; C-A - 52,900 MEGAOHMS.

Plant: <None>
Substation: SUBSTATION 2
Position: SPARE 480V BREAKER
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 11/21/2023

Comments: ALL BREAKER TESTING WITH AS FOUND SETTINGS. PASS SECONDARY INJECTION

Plant: <None>
Substation: SUBSTATION 2
Position: XFMR 1
Equipment: 56750 - XFMR MAINTENANCE AND INSP_R05-23
Date: 11/20/2023

Comments: EXCITATION CURRENT A - 2.4 MILLIAMPS; B- 1.9 MILLIAMPS; C - 2.1 MILLAMPS.

Plant: <None>
Substation: SUBSTATION 2
Position: XFMR 2
Equipment: 56750 - XFMR MAINTENANCE AND INSP_R05-23
Date: 11/20/2023

Comments: EXCITATION CURRENT A - 2.1 MILLIAMPS; B- 1.6 MILLIAMPS; C - 1.9 MILLAMPS.

Plant: <None>
Substation: SUBSTATION 3
Position: 480V SWITCHGEAR BUS A
Equipment: 50976 - SWITCHGEAR INSP AND TEST_R02-23
Date: 11/28/2023

Comments: SURGE LOGIC FUNCTIONING NORMALLY

Comment Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Plant: <None>
Substation: SUBSTATION 3 Date: 11/27/2023
Position: 480V SWITCHGEAR BUS B
Equipment: 50976 - SWITCHGEAR INSP AND TEST_R02-23

Comments: SURGE LOGIC FUNCTIONING NORMALLY

Plant: <None>
Substation: SUBSTATION 3 Date: 11/28/2023
Position: MCC-WBB-A
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23

Comments: BREAKER PASSED ALL SECONDARY INJECTION TESTS.
BREAKER COULD NOT BE CLOSED SO ALL TESTS WERE PERFORMED IN THE OPEN POSITION

Plant: <None>
Substation: SUBSTATION 3 Date: 11/28/2023
Position: MCC-WPB-A
Equipment: 15930 - MOLDED CASE CIRCUIT BREAKER_R02-23

Comments: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE PHASE TO PHASE AND PHASE TO GROUND
TESTED WITH CABLE TO MCC-1 CONNECTED.

Plant: <None>
Substation: SUBSTATION 3 Date: 11/27/2023
Position: MCC-WPB-B
Equipment: 15930 - MOLDED CASE CIRCUIT BREAKER_R02-23

Comments: UNABLE TO SECONDARY INJECT.
INSULATION RESISTANCE PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO MCC-1 CONNECTED.

Comment Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Plant: <None>
Substation: SUBSTATION 3
Position: PRIMARY SWITCH MAIN A
Equipment: 29000 - LOADBREAK DISCONNECT_R03-23
Date: 11/28/2023

Comments: ARRESTER INFO: 12.7 kV MCOV, 15 kV RATED.
PRIMARY CABLE INSULATION RESISTANCES: A-G - 153,500 MEGAOHMS; B-G - 149,700 MEGAOHMS;
C-G - 147,500 MEGAOHMS; A-B - 305,000 MEGAOHMS; B-C - 305,000 MEGAOHMS; C-A - 327,000 MEGAOHMS.

Plant: <None>
Substation: SUBSTATION 3
Position: PRIMARY SWITCH MAIN B
Equipment: 29000 - LOADBREAK DISCONNECT_R03-23
Date: 11/27/2023

Comments: ARRESTER INFO: 12.7 kV MCOV, 15 kV RATED.
PRIMARY CABLE INSULATION RESISTANCES: A-G - 136,500 MEGAOHMS; B-G - 91,700 MEGAOHMS;
C-G - 132,000 MEGAOHMS; A-B - 270,000 MEGAOHMS; B-C - 73,500 MEGAOHMS; C-A - 189,200 MEGAOHMS.

Plant: <None>
Substation: SUBSTATION 3
Position: XFMR 1
Equipment: 56750 - XFMR MAINTENANCE AND INSP_R05-23
Date: 11/28/2023

Comments: EXCITATION CURRENT A - 5.3 MILLIAMPS; B- 4.3 MILLIAMPS; C - 5.1 MILLAMPS.

Plant: <None>
Substation: SUBSTATION 3
Position: XFMR 3
Equipment: 56750 - XFMR MAINTENANCE AND INSP_R05-23
Date: 11/27/2023

Comments: EXCITATION CURRENT A - 5.1 MILLIAMPS; B - 3.7 MILLIAMPS; C - 4.6 MILLAMPS.

Plant: <None>
Substation: SUBSTATION 4
Position: 480V SWITCHGEAR BUS B
Equipment: 50976 - SWITCHGEAR INSP AND TEST_R02-23
Date: 12/20/2023

Comments: NO NAMEPLATE ON GEAR.

Comment Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Plant: <None>
Substation: SUBSTATION 4
Position: MCC-M
Equipment: 30100 - MOTOR CONTROL CENTER INSULATION
Date: 12/19/2023

Comments: INSULATION RESISTANCE TESTED WITH CABLES BACK TO SUB 4 CONNECTED.

Plant: <None>
Substation: SUBSTATION 4
Position: MCC-N
Equipment: 30100 - MOTOR CONTROL CENTER INSULATION
Date: 12/20/2023

Comments: INSULATION RESISTANCE TESTED WITH CABLES BACK TO SUB 4 CONNECTED.

Plant: <None>
Substation: SUBSTATION 4
Position: MCC-P
Equipment: 30100 - MOTOR CONTROL CENTER INSULATION
Date: 12/19/2023

Comments: INSULATION RESISTANCE INCLUDES CABLES

Plant: <None>
Substation: SUBSTATION 4
Position: MCC-Q
Equipment: 30100 - MOTOR CONTROL CENTER INSULATION
Date: 12/19/2023

Comments: INSULATION RESISTANCE INCLUDES CABLES

Plant: <None>
Substation: SUBSTATION 4
Position: MCC-Q
Equipment: 50400 - SWITCHBOARD BUSS CONNECTION TEST
Date: 12/19/2023

Comments: FLOOR DRAIN SUMP PUMP NO.2 BUCKET'S CONTACT RESISTANCE IS OUT OF SPECIFICATION. THIS PROBLEM WAS CORRECTED.

Comment Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Plant: <None>
Substation: SUBSTATION 4 Date: 12/19/2023
Position: PRIMARY SWITCH MAIN A
Equipment: 29000 - LOADBREAK DISCONNECT_R03-23

Comments: PRIMARY CABLE INSULATION RESISTANCES: A-G - 204,000 MEGAOHMS; B-G - 196,600 MEGAOHMS; C-G - 249,000 MEGAOHMS;
A-B - 406,000 MEGAOHMS; B-C - 476,000 MEGAOHMS; C-A - 452,000 MEGAOHMS.
B PHASE ARRESTER READING IS LOWER THAN OTHER PHASES. MAY NEED A REPLACEMENT.

Plant: <None>
Substation: SUBSTATION 4 Date: 12/19/2023
Position: PRIMARY SWITCH MAIN B
Equipment: 29000 - LOADBREAK DISCONNECT_R03-23

Comments: PRIMARY CABLE INSULATION RESISTANCES: A-G - 211,000 MEGAOHMS; B-G - 201,000 MEGAOHMS; C-G - 208,000 MEGAOHMS;
A-B - 437,000 MEGAOHMS; B-C - 436,000 MEGAOHMS; C-A - 455,000 MEGAOHMS.
A PHASE ARRESTER READING IS LOWER THAN OTHER PHASES. MAY NEED A REPLACEMENT.

Plant: <None>
Substation: SUBSTATION 4 Date: 12/20/2023
Position: UV-2A FEEDER
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23

Comments: UNABLE TO SECONDARY INJECT. MAY REQUIRE PRIMARY INJECTION TO TEST TRIP UNIT.
BREAKER WAS PRIMARY INJECTED

Plant: <None>
Substation: SUBSTATION 4 Date: 12/20/2023
Position: UV-2B FEEDER
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23

Comments: UNABLE TO SECONDARY INJECT. MAY REQUIRE PRIMARY INJECTION TO TEST TRIP UNIT.
BREAKER WAS PRIMARY INJECTED

Comment Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Plant: <None>
Substation: SUBSTATION 4
Position: XFMR 1
Equipment: 56750 - XFMR MAINTENANCE AND INSP_R05-23
Date: 12/19/2023

Comments: EXCITATION CURRENT A - 1.0 MILLIAMPS; B- 0.9 MILLIAMPS; C - 1.0 MILLAMPS.

Plant: <None>
Substation: SUBSTATION 4
Position: XFMR 2
Equipment: 56750 - XFMR MAINTENANCE AND INSP_R05-23
Date: 12/20/2023

Comments: NEUTRAL BAR IS CONNECTED DIRECTLY TO GROUND AND CONNECTED TO A HIGH RESISTANCE GROUND EFFECTIVELY BYPASSING THE HIGH RESISTANCE GROUND.
EXCITATION CURRENT A - 0.6 MILLIAMPS; B- 0.5 MILLIAMPS; C - 0.6 MILLAMPS.

Plant: <None>
Substation: SUBSTATION 5
Position: MAIN A
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 12/15/2023

Comments: BREAKER IS A DOUBLE WIDE. LISTED BELOW IS OTHER PHASES INSULATION RESISTANCE.
L - L : A - 3,000,000 , B - 3,000,000 , C - 3,000,000
P - P : A - B - 3,000,000 , B - C - 3,000,000 , C - A - 3,000,000
P - G : A - G - 3,000,000 , B - G , 3,000,000 , C - G , 3,000,000
CONTACT RESISTANCE - A: 17 B:18 C:19

Plant: <None>
Substation: SUBSTATION 5
Position: MAIN B
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 12/14/2023

Comments: BREAKER IS DOUBLE WIDE. WILL HAVE 2 INSULATION RESISTANCE READINGS. SECOND SIDE DESIGNATED BELOW
L-L : A2 - 3,000,000 , B2 - 3,000,000 , C2 - 3,000,000
P-F : A2 -G - 3,000,000 , B2 - G 3,000,000 , C2 - G - 3,000,000
P-P : A2 - B2 - 3,000,000 , B2 - C2 - 3,000,000 , C2 - A2 -C2 - 3,000,000
CONTACT RESISTANCE - A2 - 23 , B2 - 22 , C2 - 21

Comment Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Plant: <None>
Substation: SUBSTATION 5
Position: MCC 51A FEEDER
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 12/15/2023

Comments: TURNED DOWN INSTANTANEOUS AND SHORT TIME SETTINGS FOR TEST SET RESTRICTIONS

Plant: <None>
Substation: SUBSTATION 5
Position: MCC-51-A
Equipment: 15930 - MOLDED CASE CIRCUIT BREAKER_R02-23
Date: 12/15/2023

Comments: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE FOR MAIN PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO SUB-5 CONNECTED. ATS BREAKER INSULATION RESISTANCE PHASE TO PHASE AND PHASE TO GROUND TESTED FROM THE LINE SIDE WITH BREAKER OPEN DUE TO PTs IN THE ATS.

Plant: <None>
Substation: SUBSTATION 5
Position: MCC-51-B
Equipment: 15930 - MOLDED CASE CIRCUIT BREAKER_R02-23
Date: 12/14/2023

Comments: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE FOR MAIN PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO SUB-5 CONNECTED. ATS BREAKER INSULATION RESISTANCE PHASE TO PHASE AND PHASE TO GROUND TESTED FROM THE LINE SIDE WITH BREAKER OPEN DUE TO PTs IN THE ATS.

Plant: <None>
Substation: SUBSTATION 5
Position: MCC-52-A
Equipment: 15930 - MOLDED CASE CIRCUIT BREAKER_R02-23
Date: 12/18/2023

Comments: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE FOR MAIN PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO SUB-5 CONNECTED. ATS BREAKER INSULATION RESISTANCE PHASE TO PHASE AND PHASE TO GROUND TESTED FROM THE LINE SIDE WITH BREAKER OPEN DUE TO PTs IN THE ATS.

Comment Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Plant: <None>
Substation: SUBSTATION 5
Position: MCC-52-B
Equipment: 15930 - MOLDED CASE CIRCUIT BREAKER_R02-23
Date: 12/18/2023

Comments: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE FOR MAIN PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO SUB-5 CONNECTED. ATS BREAKER INSULATION RESISTANCE PHASE TO PHASE AND PHASE TO GROUND TESTED FROM THE LINE SIDE WITH BREAKER OPEN DUE TO PTs IN THE ATS.

Plant: <None>
Substation: SUBSTATION 5
Position: MCC-53-A
Equipment: 15930 - MOLDED CASE CIRCUIT BREAKER_R02-23
Date: 12/18/2023

Comments: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE FOR MAIN PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO SUB-5 CONNECTED.TESTED WITH CABLE TO SUB-5 CONNECTED.

Plant: <None>
Substation: SUBSTATION 5
Position: MCC-53-B
Equipment: 15930 - MOLDED CASE CIRCUIT BREAKER_R02-23
Date: 12/18/2023

Comments: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE FOR MAIN PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO SUB-5 CONNECTED.

Plant: <None>
Substation: SUBSTATION 5
Position: MCC-54-A
Equipment: 15930 - MOLDED CASE CIRCUIT BREAKER_R02-23
Date: 12/22/2023

Comments: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE FOR MAIN PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO SUB-5 CONNECTED.

Comment Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Plant: <None>
Substation: SUBSTATION 5
Position: MCC-54-B
Equipment: 15930 - MOLDED CASE CIRCUIT BREAKER_R02-23
Date: 12/22/2023

Comments: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE FOR MAIN PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO SUB-5 CONNECTED.

Plant: <None>
Substation: SUBSTATION 5
Position: MCC-55-A
Equipment: 15930 - MOLDED CASE CIRCUIT BREAKER_R02-23
Date: 12/22/2023

Comments: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE FOR MAIN PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO SUB-5 CONNECTED.

Plant: <None>
Substation: SUBSTATION 5
Position: MCC-55-B
Equipment: 15930 - MOLDED CASE CIRCUIT BREAKER_R02-23
Date: 12/22/2023

Comments: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE FOR MAIN PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO SUB-5 CONNECTED.

Plant: <None>
Substation: SUBSTATION 5
Position: MCC-56-A
Equipment: 15930 - MOLDED CASE CIRCUIT BREAKER_R02-23
Date: 12/12/2023

Comments: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO SUB 5 CONNECTED.

Plant: <None>
Substation: SUBSTATION 5
Position: MCC-56-A
Equipment: 30100 - MOTOR CONTROL CENTER INSULATION
Date: 12/12/2023

Comments: SOME CONTROL WIRING FOUND LOOSE AND IT WAS CORRECTED.

Comment Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Plant: <None>
Substation: SUBSTATION 5
Position: MCC-56-A
Equipment: 50400 - SWITCHBOARD BUSS CONNECTION TEST
Date: 12/12/2023

Comments: DUE TO CONSTRUCTION OF MCC BUCKETS, CONTACT RESTANCES ARE READ THROUGH MOLDED CASE BREAKERS. SPARE BREAKER WAS FOUND ON. PREMIER POWER LEFT OFF.

Plant: <None>
Substation: SUBSTATION 5
Position: MCC-56-B
Equipment: 15930 - MOLDED CASE CIRCUIT BREAKER_R02-23
Date: 12/12/2023

Comments: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE PHASE TO PHASE AND PHASE TO GROUND TESTED WITH CABLE TO SUB 5 CONNECTED.

Plant: <None>
Substation: SUBSTATION 5
Position: MCC-56-B
Equipment: 30100 - MOTOR CONTROL CENTER INSULATION
Date: 12/12/2023

Comments: SOME CONTROL WIRING FOUND LOOSE AND IT WAS CORRECTED.

Plant: <None>
Substation: SUBSTATION 5
Position: MCC-56-B
Equipment: 50400 - SWITCHBOARD BUSS CONNECTION TEST
Date: 12/12/2023

Comments: DUE TO CONSTRUCTION OF MCC BUCKETS, CONTACT RESTANCES ARE READ THROUGH MOLDED CASE BREAKERS. SPARE BREAKER WAS FOUND ON. PREMIER POWER LEFT OFF.

Plant: <None>
Substation: SUBSTATION 5
Position: PRIMARY SWITCH MAIN A
Equipment: 29000 - LOADBREAK DISCONNECT_R03-23
Date: 12/15/2023

Comments: PRIMARY CABLE INSULATION RESISTANCES: A-G - 59,500 MEGAOHMS; B-G - 65,100 MEGAOHMS; C-G - 52,600 MEGAOHMS; A-B - 121,300 MEGAOHMS; B-C - 128,900 MEGAOHMS; C-A - 125,100 MEGAOHMS.

Comment Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Plant: <None>
Substation: SUBSTATION 5 Date: 12/14/2023
Position: PRIMARY SWITCH MAIN B
Equipment: 29000 - LOADBREAK DISCONNECT_R03-23

Comments: PRIMARY CABLE INSULATION RESISTANCES: A-G - 63,800 MEGAOHMS; B-G - 70,200 MEGAOHMS; C-G - 71,000 MEGAOHMS;
A-B - 137,400 MEGAOHMS; B-C - 146,500 MEGAOHMS; C-A - 149,100 MEGAOHMS.
STORED ENERGY SPRING HAS MISSING PARTS, WASHER AND COTTER PIN. REPLACED IN THE FIELD.

Plant: <None>
Substation: SUBSTATION 5 Date: 12/15/2023
Position: TIE
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23

Comments: BREAKER IS A DOUBLE WIDE LISTED BELOW IS OTHER PHASES INSULATION RESISTANCE
L - L : A - 3,000,000 , B - 3,000,000 , C - 3,000,000
P - P : A - B - 3,000,000 , B - C - 3,000,000 , C - A - 3,000,000
P - G : A - G - 3,000,000 , B - G , 3,000,000 , C - G , 3,000,000
CONTACT RESISTANCE - A : 74.9 B: 59.8 C: 48.7

Plant: <None>
Substation: SUBSTATION 5 Date: 12/15/2023
Position: XFMR 1
Equipment: 56750 - XFMR MAINTENANCE AND INSP_R05-23

Comments: EXCITATION CURRENT A - 3.3 MILLIAMPS; B- 2.7 MILLIAMPS; C - 3.4 MILLAMPS.

Plant: <None>
Substation: SUBSTATION 5 Date: 12/14/2023
Position: XFMR 2
Equipment: 56750 - XFMR MAINTENANCE AND INSP_R05-23

Comments: EXCITATION CURRENT A - 2.5 MILLIAMPS; B- 1.8 MILLIAMPS; C - 2.3 MILLAMPS.

Comment Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Plant: <None>
Substation: SUBSTATION 6
Position: 480V SWITCHGEAR BUS A
Equipment: 50976 - SWITCHGEAR INSP AND TEST_R02-23
Date: 12/1/2023

Comments: SURGE LOGIC FUNCTIONING NORMALLY

Plant: <None>
Substation: SUBSTATION 6
Position: 480V SWITCHGEAR BUS B
Equipment: 50976 - SWITCHGEAR INSP AND TEST_R02-23
Date: 11/29/2023

Comments: SURGE LOGIC FUNCTIONING NORMALLY

Plant: <None>
Substation: SUBSTATION 6
Position: MAIN A 480V BREAKER
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 12/1/2023

Comments: ALL BREAKERS TESTING WITH AS FOUND SETTINGS. PASS SECONDARY INJECTION

Plant: <None>
Substation: SUBSTATION 6
Position: MAIN B 480V BREAKER
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 11/29/2023

Comments: ALL BREAKERS TESTING WITH AS FOUND SETTINGS. PASS SECONDARY INJECTION

Plant: <None>
Substation: SUBSTATION 6
Position: MCC-EBB-A
Equipment: 30100 - MOTOR CONTROL CENTER INSULATION
Date: 12/1/2023

Comments: INCLUDES FEEDER CABLES

Comment Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Plant: <None>
Substation: SUBSTATION 6
Position: MCC-EBB-A
Equipment: 50400 - SWITCHBOARD BUSS CONNECTION TEST
Date: 12/1/2023

Comments: PP-EBB-A HAD LOOSE BOLT CONNECTING 400A LJ BREAKER TO THE BUS WITH VERY HIGH RESISTANCE.
REMOVED THE BOLT, CHASED THE THREADS AND REINSTALLED BUT THE BOLTS WERE TOO LONG.
PLACED A WASHER UNDER THE BOLT HEAD AND NOW IT HAS PROPER RESISTANCE

Plant: <None>
Substation: SUBSTATION 6
Position: MCC-EBB-A 480V BREAKER
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 12/1/2023

Comments: ALL BREAKERS TESTING WITH AS FOUND SETTINGS. PASS SECONDARY INJECTION

Plant: <None>
Substation: SUBSTATION 6
Position: MCC-EBB-B 480V BREAKER
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 11/29/2023

Comments: ALL BREAKERS TESTING WITH AS FOUND SETTINGS. PASS SECONDARY INJECTION

Plant: <None>
Substation: SUBSTATION 6
Position: MCC-EPB-A
Equipment: 15930 - MOLDED CASE CIRCUIT BREAKER_R02-23
Date: 12/11/2023

Comments: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE PHASE TO PHASE AND PHASE TO GROUND
TESTED WITH CABLE TO SUB 6 CONNECTED.

Plant: <None>
Substation: SUBSTATION 6
Position: MCC-EPB-A
Equipment: 30100 - MOTOR CONTROL CENTER INSULATION
Date: 12/11/2023

Comments: SOME CONTROL WIRING FOUND LOOSE AND WAS CORRECTED.

Comment Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Plant: <None>
Substation: SUBSTATION 6
Position: MCC-EPB-A 480V BREAKER
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 12/1/2023

Comments: ALL BREAKERS TESTING WITH AS FOUND SETTINGS. PASS SECONDARY INJECTION

Plant: <None>
Substation: SUBSTATION 6
Position: MCC-EPB-B
Equipment: 15930 - MOLDED CASE CIRCUIT BREAKER_R02-23
Date: 11/28/2023

Comments: UNABLE TO SECONDARY INJECT. INSULATION RESISTANCE PHASE TO PHASE AND PHASE TO GROUND
TESTED WITH CABLE TO SUB 6 CONNECTED.

Plant: <None>
Substation: SUBSTATION 6
Position: MCC-EPB-B 480V BREAKER
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 11/29/2023

Comments: ALL BREAKERS TESTING WITH AS FOUND SETTINGS. PASS SECONDARY INJECTION

Plant: <None>
Substation: SUBSTATION 6
Position: SPARE A 480V BREAKER
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 12/1/2023

Comments: ALL BREAKERS TESTING WITH AS FOUND SETTINGS. PASS SECONDARY INJECTION

Plant: <None>
Substation: SUBSTATION 6
Position: SPARE B 480V BREAKER
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 11/29/2023

Comments: ALL BREAKERS TESTING WITH AS FOUND SETTINGS. PASS SECONDARY INJECTION

Comment Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Plant: <None>
Substation: SUBSTATION 6
Position: TIE 480V BREAKER
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 11/29/2023

Comments: ALL BREAKERS TESTING WITH AS FOUND SETTINGS. PASS SECONDARY INJECTION

Plant: <None>
Substation: SUBSTATION 6
Position: XFMR 1
Equipment: 56750 - XFMR MAINTENANCE AND INSP_R05-23 (2)
Date: 12/1/2023

Comments: CABLE INSULATION RESISTANCE PHASE TO PHASE A-B=99900 MOHMS, B-C=120900 MOHMS, A-C=97800 MOHMS
PHASE TO GROUND A-G=3180 MOHMS, B-G=6630 MOHMS, C-G= 5990 MOHMS
EXCITATION CURRENT A - 17.4 MILLIAMPS; B- 14.5 MILLIAMPS; C - 15.2 MILLAMPS.
NAME PLATE CAPACITANCE OF CAPACITORS: A - .5 MICROFARADS; B - . 5 MICROFARADS; C - .5 MICROFARADS
CAPACITANCE OF CAPACITORS: A - .5 MICROFARADS: B - .5 MICROFARADS; C - .5 MICROFARADS
CAPACITOR RESISTANCE: A - 84.0 MEGAOHMS; B - 84.3 MEGAOHMS; C - 83.5 MEGAOHMS

Plant: <None>
Substation: SUBSTATION 6
Position: XFMR 2
Equipment: 56750 - XFMR MAINTENANCE AND INSP_R05-23
Date: 11/29/2023

Comments: EXCITATION CURRENT A - 17.1 MILLIAMPS; B- 13.5 MILLIAMPS; C - 15.8 MILLAMPS.
CABLE INSULATION RESISTANCE PHASE TO PHASE A-B=120300 MOHMS, B-C=164600 MOHMS, A-C=194900 MOHMS
PHASE TO GROUND A-G=4170 MOHMS, B-G=6110 MOHMS, A-C= 22500 MOHMS
NAME PLATE CAPACITANCE OF CAPACITORS: A - .5 MICROFARADS; B - . 5 MICROFARADS; C - .5 MICROFARADS
CAPACITANCE OF CAPACITORS: A - .5 MICROFARADS: B - .5 MICROFARADS; C - .5 MICROFARADS
CAPACITOR RESISTANCE: A - 83.9 MEGAOHMS; B - 84.1 MEGAOHMS; C - 83.7 MEGAOHMS

Plant: <None>
Substation: SUBSTATION 7
Position: 480V SWITCHGEAR BUS A
Equipment: 50976 - SWITCHGEAR INSP AND TEST_R02-23
Date: 12/13/2023

Comments: SURGE LOGIC FUNCTIONING NORMALLY

Comment Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Plant: <None>
Substation: SUBSTATION 7
Position: 480V SWITCHGEAR BUS B
Equipment: 50976 - SWITCHGEAR INSP AND TEST_R02-23
Date: 12/13/2023

Comments: SURGE LOGIC FUNCTIONING NORMALLY

Plant: <None>
Substation: SUBSTATION 7
Position: MCC-CEB-A&B
Equipment: 15930 - MOLDED CASE CIRCUIT BREAKER_R02-23
Date: 12/12/2023

Comments: UNABLE TO SECONDARY INJECT.

Plant: <None>
Substation: SUBSTATION 7
Position: MCC-CEB-A&B
Equipment: 30100 - MOTOR CONTROL CENTER INSULATION
Date: 12/12/2023

Comments: SOME CONTROL WIRING WAS FOUND LOOSE AND IT WAS CORRECTED.
INSULATION RESISTANCE TESTED WITH CABLE TO SUB 7 CONNECTED.

Plant: <None>
Substation: SUBSTATION 7
Position: XFMR 1
Equipment: 56750 - XFMR MAINTENANCE AND INSP_R05-23
Date: 12/13/2023

Comments: EXCITATION CURRENT A - 1.9 MILLIAMPS; B- 1.5 MILLIAMPS; C - 1.9 MILLAMPS.
CABLE INSULATION RESISTANCE: A-G - 197,800 MEGAOHMS; B-G - 249,000 MEGAOHMS; C-G - 253,000 MEGAOHMS; A-B - 893,000 MEGAOHMS; B-C - 934,000 MEGAOHMS; C-A - 876,000 MEGAOHMS.
CAPACITOR RESISTANCES: A - 137.7 MEGAOHMS; B - 137.8 MEGAOHMS; C - 138.6 MEGAOHMS.
NAME PLATE CAPACITANCE OF CAPACITORS: A - 0.25 MICROFARADS; B - 0.25 MICROFARADS; C - 0.25 MICROFARADS.
CAPACITANCE OF CAPACITORS: A - 0.252 MICROFARADS; B - 0.250 MICROFARADS; C - 0.250 MICROFARADS.

Comment Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Plant: <None>
Substation: SUBSTATION 7
Position: XFMR 2
Equipment: 56750 - XFMR MAINTENANCE AND INSP_R05-23
Date: 12/13/2023

Comments: EXCITATION CURRENT A - 1.8 MILLIAMPS; B- 1.5 MILLIAMPS; C - 1.8 MILLAMPS.
CABLE INSULATION RESISTANCE: A-G - 132,000 MEGAOHMS; B-G - 222,000 MEGAOHMS; C-G - 139,800 MEGAOHMS; A-B - 1,135,000 MEGAOHMS; B-C - 959,000 MEGAOHMS; C-A - 798,000 MEGAOHMS.
CAPACITOR RESISTANCES: A - 138.5 MEGAOHMS; B - 140.2 MEGAOHMS; C - 140 MEGAOHMS.
NAME PLATE CAPACITANCE OF CAPACITORS: A - 0.25 MICROFARADS; B - 0.25 MICROFARADS; C - 0.25 MICROFARADS.
CAPACITANCE OF CAPACITORS: A - 0.256 MICROFARADS; B - 0.254 MICROFARADS; C - 0.253 MICROFARADS.

Plant: <None>
Substation: SUBSTATION 8
Position: 4160V SWITCHGEAR
Equipment: 50000 - MV SWITCHBOARD INSULATION
Date: 11/29/2023

Comments: HIGH POTENTIAL TEST DONE AT 14 kVAC PHASE TO GROUND WITH PHASES NOT UNDER TEST GROUNDED: B-BUS:
A-G - 1.8 MILLIAMPS; B-G - 1.6 MILLIAMPS; C-G - 1.6 MILLIAMPS; A-BUS: A-G - 2.0 MILLIAMPS; B-G - 1.9 MILLIAMPS; C-G - 1.7 MILLIAMPS.
B-BUS TESTED 11/29/2023; A-BUS TESTED 12/1/2023.

Plant: <None>
Substation: SUBSTATION 8
Position: 4160V SWITCHGEAR
Equipment: 50400 - SWITCHBOARD BUSS CONNECTION TEST
Date: 11/29/2023

Comments: B-BUS TESTED 11/29/2023; A-BUS TESTED 12/1/2023.

Plant: <None>
Substation: SUBSTATION 8
Position: A-BUS CPT
Equipment: 27400 - CONTROL POWER TRANSFORMER TEST
Date: 12/1/2023

Comments: SECONDARY IS AN 80A BREAKER

Comment Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Plant: <None>
Substation: SUBSTATION 8
Position: B-BUS CPT
Equipment: 27400 - CONTROL POWER TRANSFORMER TEST
Date: 11/29/2023

Comments: SECONDARY IS AN 80A BREAKER

Plant: <None>
Substation: SUBSTATION 8
Position: FEEDER SPARE A
Equipment: 16100 - VACUUM CIRCUIT BREAKER_R01-23
Date: 12/1/2023

Comments: E-GAP A - 0.17IN B - 0.17IN C - 0.17IN

Plant: <None>
Substation: SUBSTATION 8
Position: FEEDER SPARE B
Equipment: 16100 - VACUUM CIRCUIT BREAKER_R01-23
Date: 11/29/2023

Comments: E-GAP : A - 0.2 IN B - 0.2 IN C - 0.2 IN

Plant: <None>
Substation: SUBSTATION 8
Position: FEEDER SUB 6A
Equipment: 16100 - VACUUM CIRCUIT BREAKER_R01-23
Date: 12/1/2023

Comments: E-GAP A - 0.17IN B - 0.17IN C - 0.17IN

Plant: <None>
Substation: SUBSTATION 8
Position: FEEDER SUB 6B
Equipment: 16100 - VACUUM CIRCUIT BREAKER_R01-23
Date: 11/29/2023

Comments: E-GAP : A - 0.2 IN B - 0.2 IN C - 0.2 IN

Comment Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Plant: <None>
Substation: SUBSTATION 8
Position: MAIN A
Equipment: 16100 - VACUUM CIRCUIT BREAKER_R01-23
Date: 12/1/2023

Comments: E-GAP A - 0.17IN B - 0.17IN C - 0.17IN

Plant: <None>
Substation: SUBSTATION 8
Position: MAIN B
Equipment: 16100 - VACUUM CIRCUIT BREAKER_R01-23
Date: 11/29/2023

Comments: E-GAP : A - 0.2 IN B - 0.2 IN C - 0.2 IN

Plant: <None>
Substation: SUBSTATION 8
Position: PAB E2 FEEDER
Equipment: 16100 - VACUUM CIRCUIT BREAKER_R01-23
Date: 11/29/2023

Comments: E-GAP : A - 0.2 IN B - 0.2 IN C - 0.2 IN

Plant: <None>
Substation: SUBSTATION 8
Position: PAB E2 STARTER
Equipment: 31000 - MOTOR STARTER TEST_R01-23
Date: 11/29/2023

Comments: NO ACCESS TO CT TO GET NAMEPLATE DATA

Plant: <None>
Substation: SUBSTATION 8
Position: PAB E3 FEEDER
Equipment: 16100 - VACUUM CIRCUIT BREAKER_R01-23
Date: 12/1/2023

Comments: E-GAP A - 0.17IN B - 0.17IN C - 0.17IN

Comment Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Plant: <None>
Substation: SUBSTATION 8
Position: PAB-E1 FEEDER
Equipment: 16100 - VACUUM CIRCUIT BREAKER_R01-23
Date: 12/1/2023

Comments: E-GAP A - 0.17IN B - 0.17IN C - 0.17IN

Plant: <None>
Substation: SUBSTATION 8
Position: PRIMARY SWITCH MAIN A
Equipment: 29000 - LOADBREAK DISCONNECT_R03-23
Date: 12/1/2023

Comments: ARRESTER INFO: 12.7 kV MCOV, 15 kV RATED.
PRIMARY CABLE INSULATION RESISTANCES: A-G - 217,000 MEGAOHMS; B-G - 221,000 MEGAOHMS; C-G - 210,000 MEGAOHMS;
A-B - 407,000 MEGAOHMS; B-C - 443,000 MEGAOHMS; C-A - 418,000 MEGAOHMS.

Plant: <None>
Substation: SUBSTATION 8
Position: PRIMARY SWITCH MAIN B
Equipment: 29000 - LOADBREAK DISCONNECT_R03-23
Date: 11/29/2023

Comments: ARRESTER INFO: 12.7 kV MCOV, 15 kV RATED.
PRIMARY CABLE INSULATION RESISTANCES: A-G - 163,500 MEGAOHMS; B-G - 180,500 MEGAOHMS; C-G - 240,000 MEGAOHMS;
A-B - 378,000 MEGAOHMS; B-C - 356,000 MEGAOHMS; C-A - 718,000 MEGAOHMS.

Plant: <None>
Substation: SUBSTATION 8
Position: TIE
Equipment: 16100 - VACUUM CIRCUIT BREAKER_R01-23
Date: 12/1/2023

Comments: E-GAP A - 0.17IN B - 0.17IN C - 0.17IN

Plant: <None>
Substation: SUBSTATION 8
Position: XFMR 1
Equipment: 56750 - XFMR MAINTENANCE AND INSP_R05-23
Date: 12/1/2023

Comments: EXCITATION CURRENT A -1.2 MILLIAMPS; B- 0.8 MILLIAMPS; C - 1.3 MILLAMPS.

Comment Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Plant: <None>
Substation: SUBSTATION 8
Position: XFMR 2
Equipment: 56750 - XFMR MAINTENANCE AND INSP_R05-23

Date: 11/29/2023

Comments: EXCITATION CURRENT A - 6.2 MILLIAMPS; B- 4.6 MILLIAMPS; C - 6.0 MILLAMPS.

Deficiency Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Customer CITY OF ANN ARBOR
User CITY OF ANN ARBOR

Plant: <None>
Substation: SUBSTATION 2
Position: MAIN B 480V BREAKER
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 11/20/2023

Deficiencies: RATING PLUG IS STRIPPED WHERE THE BOLT GOES IN. RECOMMEND REPLACE.

Plant: <None>
Substation: SUBSTATION 2
Position: MCC-E
Equipment: 30100 - MOTOR CONTROL CENTER INSULATION
Date: 11/21/2023

Deficiencies: BUS DOES NOT MEET NETA STANDARDS FOR INSULATION RESISTANCE. DUE TO PROXIMITY AND LIMITED ACCESS TO THE BUS COMPARTMENTS AS WELL AS CONSTRUCTION OF BUS. PREMIER POWER MAINTENANCE IS RECOMMENDING REPLACEMENT OF MCC CENTER.

Plant: <None>
Substation: SUBSTATION 2
Position: PRIMARY SWITCH MAIN B
Equipment: 29000 - LOADBREAK DISCONNECT_R03-23
Date: 11/20/2023

Deficiencies: A PHASE ARRESTER READING LOWER THAN OTHER PHASES. MAY NEED REPLACEMENT.

Plant: <None>
Substation: SUBSTATION 3
Position: MCC-WBB-B
Equipment: 30100 - MOTOR CONTROL CENTER INSULATION
Date: 11/27/2023

Deficiencies: ONE OF THE SPARES HAS BURNT TERMINALS. LABELED APPROPRIATELY. THIS SPARE SHOULD BE FIXED OR REMOVED FROM MCC.

Plant: <None>
Substation: SUBSTATION 3
Position: PRIMARY SWITCH MAIN A
Equipment: 29000 - LOADBREAK DISCONNECT_R03-23
Date: 11/28/2023

Deficiencies: A PHASE ARRESTER READING IS LOWER THAN OTHER PHASES. MAY NEED A REPLACEMENT.

Deficiency Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Plant: <None>
Substation: SUBSTATION 3
Position: PRIMARY SWITCH MAIN B
Equipment: 29000 - LOADBREAK DISCONNECT_R03-23
Date: 11/27/2023

Deficiencies: A PHASE ARRESTER READING IS LOWER THAN OTHER PHASES. MAY NEED A REPLACEMENT.

Plant: <None>
Substation: SUBSTATION 4
Position: MCC-N
Equipment: 30100 - MOTOR CONTROL CENTER INSULATION
Date: 12/20/2023

Deficiencies: PEW PUMP NO. 3 AND SECONDARY EFFL. PUMP NO.6 ARE BOTH MISSING THE LINE SHIELD FOR THE MOLDED CASE SWITCHES. RECOMMEND REPLACING WITH GP-03

Plant: <None>
Substation: SUBSTATION 4
Position: MCC-N
Equipment: 50400 - SWITCHBOARD BUSS CONNECTION TEST
Date: 12/19/2023

Deficiencies: PEW PUMP NO. 3 AND SECONDARY EFFL. PUMP NO.6 ARE MISSING THE LINE SHEILD FOR MOLDED CASE SWITCH. RECOMMEND REPLACING WITH GP-03 GLASTIC

Plant: <None>
Substation: SUBSTATION 5
Position: FEEDER F2H SPARE
Equipment: 15200 - LOW VOLTAGE POWER CIRCUIT BREAKER TEST_R02-23
Date: 12/15/2023

Deficiencies: TRIP UNIT FAILED. RECOMMEND REPLACING TRIP UNIT

Plant: <None>
Substation: SUBSTATION 5
Position: MCC-52-B
Equipment: 15930 - MOLDED CASE CIRCUIT BREAKER_R02-23
Date: 12/18/2023

Deficiencies: ATS BREAKER COVER MISSING A SCREW. RECOMMEND REPLACE.

Deficiency Summary
Job #230858

7262 Kensington Road
Brighton, MI 48116
317-879-0660

Plant: <None>
Substation: SUBSTATION 5
Position: XFMR 2
Equipment: 56750 - XFMR MAINTENANCE AND INSP_R05-23

Date: 12/14/2023

Deficiencies: 1 BAD FAN. FRONT OF THE TRANSFORMER, CENTER PHASE, RIGHT FAN. RECOMMEND REPLACE.

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Table of Contents
Job #AACI207024-1

NETA ACCREDITED COMPANY

Customer Ann Arbor, City of
User Ann Arbor WWTP
Plant

Substation	Position	Equipment	Page
!1	MAIN A & B METERS	!18500 - DEFICIENCIES LOCATED	1
!13.2 kV	52T & 52 1B	!18500 - DEFICIENCIES LOCATED	2
!13.2 kV	BUS 1 DIFF. RELAY	!18500 - DEFICIENCIES LOCATED	3
!13.2 kV	BUS 2	!18500 - DEFICIENCIES LOCATED	4
!2	MAIN A LINE METER	!18500 - DEFICIENCIES LOCATED	5
!4	LIGHTING PANEL N	!18500 - DEFICIENCIES LOCATED	6
!4	MAIN BREAKER MB-1	!18500 - DEFICIENCIES LOCATED	7
!4	MAIN BREAKER MB-2	!18500 - DEFICIENCIES LOCATED	8
!4	MCC-N	!18500 - DEFICIENCIES LOCATED	9
!4	MCC-N & MCC-M	!18500 - DEFICIENCIES LOCATED	10
!4	MCC-Q (SEC. 5) LP-Q	!18500 - DEFICIENCIES LOCATED	11
!4	SUB 4	!18500 - DEFICIENCIES LOCATED	12
!4	SUB 4 PANEL METERS	!18500 - DEFICIENCIES LOCATED	13
!5	F2H 800A SPARE	!18500 - DEFICIENCIES LOCATED	14
!8	MAIN A RELAY	!18500 - DEFICIENCIES LOCATED	15
!8	PAB-E3	!18500 - DEFICIENCIES LOCATED	16
1	MAIN	15000 - LOW VOLT. PWR. CKT. BKR. TEST	17
1	MAIN (A)	15001 - LOW VOLT PWR CKT BKR TEST(2PG)	18
1	MAIN (B)	15001 - LOW VOLT PWR CKT BKR TEST(2PG)	19
1	MCC RLS A & B TIE	15951 - MOLDED CASE CIRCUIT BREAKER	20
1	MCC-C	15000 - LOW VOLT. PWR. CKT. BKR. TEST	21
1	MCC-C	30101 - MOTOR CONTROL CENTER INSULATION	22
1	MCC-C (01)	15600 - FUSE DISCONNECT INSP. TEST	23
1	MCC-C (02)	15600 - FUSE DISCONNECT INSP. TEST	24
1	MCC-C (03)	15600 - FUSE DISCONNECT INSP. TEST	25
1	MCC-D	15000 - LOW VOLT. PWR. CKT. BKR. TEST	26
1	MCC-D	30101 - MOTOR CONTROL CENTER INSULATION	27
1	MCC-D (01)	15600 - FUSE DISCONNECT INSP. TEST	28
1	MCC-D (02)	15600 - FUSE DISCONNECT INSP. TEST	29
1	MCC-D (03)	15600 - FUSE DISCONNECT INSP. TEST	30
1	MCC-D (04)	15600 - FUSE DISCONNECT INSP. TEST	31
1	MCC-RLS-A	15000 - LOW VOLT. PWR. CKT. BKR. TEST	32
1	MCC-RLS-A	30101 - MOTOR CONTROL CENTER INSULATION	33
1	MCC-RLS-A (01)	15600 - FUSE DISCONNECT INSP. TEST	34
1	MCC-RLS-A (02)	15600 - FUSE DISCONNECT INSP. TEST	35
1	MCC-RLS-B	15000 - LOW VOLT. PWR. CKT. BKR. TEST	36
1	MCC-RLS-B	30101 - MOTOR CONTROL CENTER INSULATION	37
1	MCC-RLS-B (01)	15600 - FUSE DISCONNECT INSP. TEST	38

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Dexter, Michigan
(734) 424-1200
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(937) 439-9660

Table of Contents
Job #AACI207024-1

NETA ACCREDITED COMPANY

Substation	Position	Equipment	Page
1	MCC-RLS-B (02)	15600 - FUSE DISCONNECT INSP. TEST	39
1	MCC-RLS-B MAIN	15951 - MOLDED CASE CIRCUIT BREAKER	40
1	SECTION 4 (SPARE)	15001 - LOW VOLT PWR CKT BKR TEST(2PG)	41
1	SPARE (SECTION 1)	15000 - LOW VOLT. PWR. CKT. BKR. TEST	42
1	SUB 1	50100 - LV SWITCHBOARD INSULATION (2PG)	43
1	SUB 1	50400 - SWITCHBOARD BUS CONNECTION TEST	44
1	SUB 1 (A)	29000C - LOADBREAK DISCONNECT	45
1	SUB 1 (B)	29000C - LOADBREAK DISCONNECT	46
1	SUB 1 A + B	65500 - LIGHTNING ARRESTER TEST	47
1	SUB 1 TRANSFORMER 1	56000 - TRANS. DIELECTRIC ABSORPTION	48
1	SUB 1 TRANSFORMER 1	56200B- TRANSFORMER INSPECTION	49
1	SUB 1 TRANSFORMER 1	56300 - TRANSFORMER TURNS RATIO	50
1	SUB 1 TRANSFORMER 2	56000 - TRANS. DIELECTRIC ABSORPTION	51
1	SUB 1 TRANSFORMER 2	56200B- TRANSFORMER INSPECTION	52
1	SUB 1 TRANSFORMER 2	56300 - TRANSFORMER TURNS RATIO	53
1	TIE	15000 - LOW VOLT. PWR. CKT. BKR. TEST	54
13.2 kV	52F 1SP	16100 - VACUUM CIRCUIT BREAKER (2)	55
13.2 kV	52F2SP	16100 - VACUUM CIRCUIT BREAKER	56
13.2 kV	BATTERY BANK	10050 - BATTERY INSPECTION	57
13.2 kV	BATTERY BANK	10107 - BATTERY INSPECT MAINTENANCE FREE	58
13.2 kV	BATTERY BANK	10201 - BATTERY CONNECTION RESISTANCE	59
13.2 kV	BUS #1 & #2	50001 - MV SWITCHBOARD INSULATION	60
13.2 kV	BUS #1 & #2	50050 - MV SWITCHBOARD HIPOT	61
13.2 kV	BUS #1 & #2	50400 - SWITCHBOARD BUS CONNECTION TEST	62
13.2 kV	BUS 1 - BUS 2 ISOLATION BREAKER (52 1B)	16100 - VACUUM CIRCUIT BREAKER	63
13.2 kV	BUS 1 - BUS 2 TIE BREAKER (52 T)	16100 - VACUUM CIRCUIT BREAKER	64
13.2 kV	BUS 1 - BUS 3 TIE BREAKER (52 GT1)	16100 - VACUUM CIRCUIT BREAKER	65
13.2 kV	BUS 1 MAIN BREAKER (52 M1)	16100 - VACUUM CIRCUIT BREAKER (2)	66
13.2 kV	BUS 2 - BUS 3 TIE BREAKER (52 GT2)	16100 - VACUUM CIRCUIT BREAKER (2)	67
13.2 kV	BUS 2 - MAIN BREAKER (52M 2)	16100 - VACUUM CIRCUIT BREAKER	68
13.2 kV	SUB 1 - RSLS (52F 21)	16100 - VACUUM CIRCUIT BREAKER	69
13.2 kV	SUB 2 - EQ (52F 12)	16100 - VACUUM CIRCUIT BREAKER	70
13.2 kV	SUB 2 - EQ (52F 22)	16100 - VACUUM CIRCUIT BREAKER (2)	71
13.2 kV	SUB 3 - WBB (52F 23)	16100 - VACUUM CIRCUIT BREAKER (2)	72
13.2 kV	SUB 4 -TF (52F 14)	16100 - VACUUM CIRCUIT BREAKER	73
13.2 kV	SUB 4 -TF (52F 24)	16100 - VACUUM CIRCUIT BREAKER	74
13.2 kV	SUB 5 - SH (52F 25)	16100 - VACUUM CIRCUIT BREAKER	75
13.2 kV	SUB 7 - CEB (52F 27)	16100 - VACUUM CIRCUIT BREAKER (2)	76
13.2 kV	SUB 7 -CEB (52F 17)	16100 - VACUUM CIRCUIT BREAKER	77
13.2 kV	SUB 8 - EBB (52F 28)	16100 - VACUUM CIRCUIT BREAKER	78
13.2 kV	SUB 8 -EBB (52F 18)	16100 - VACUUM CIRCUIT BREAKER	79

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Dexter, Michigan
(734) 424-1200
Centerville, Ohio
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Table of Contents
Job #AACI207024-1

NETA ACCREDITED COMPANY

Substation	Position	Equipment	Page
13.2 kV	UNIT SUB 1- RSLS (52F 11)	16100 - VACUUM CIRCUIT BREAKER (2)	80
13.2 kV	UNIT SUB 3- WBB (52F 13)	16100 - VACUUM CIRCUIT BREAKER	81
13.2 kV	UNIT SUB 5 -SH (52F 15)	16100 - VACUUM CIRCUIT BREAKER (2)	82
13.2 kV	VT2 (X,Y & Z)	27200 - VOLTAGE TRANSFORMER TEST	83
13.2 kV	VT2 X, Y & Z	27200 - VOLTAGE TRANSFORMER TEST	84
2	MAIN A	15000 - LOW VOLT. PWR. CKT. BKR. TEST	85
2	MAIN B	15000 - LOW VOLT. PWR. CKT. BKR. TEST	86
2	MCC-E	15000 - LOW VOLT. PWR. CKT. BKR. TEST	87
2	MCC-E	30101 - MOTOR CONTROL CENTER INSULATION	88
2	MCC-E (01)	15600 - FUSE DISCONNECT INSP. TEST	89
2	MCC-E (02)	15600 - FUSE DISCONNECT INSP. TEST	90
2	MCC-E (03)	15600 - FUSE DISCONNECT INSP. TEST	91
2	MCC-E (04)	15600 - FUSE DISCONNECT INSP. TEST	92
2	MCC-E (05)	15600 - FUSE DISCONNECT INSP. TEST	93
2	MCC-E (06)	15600 - FUSE DISCONNECT INSP. TEST	94
2	MCC-E (07)	15600 - FUSE DISCONNECT INSP. TEST	95
2	MCC-E (08)	15600 - FUSE DISCONNECT INSP. TEST	96
2	MCC-E (09)	15600 - FUSE DISCONNECT INSP. TEST (2) (2)	97
2	MCC-F	15000 - LOW VOLT. PWR. CKT. BKR. TEST	98
2	MCC-F	30101 - MOTOR CONTROL CENTER INSULATION	99
2	MCC-F (01)	15600 - FUSE DISCONNECT INSP. TEST	100
2	MCC-F (02)	15600 - FUSE DISCONNECT INSP. TEST	101
2	MCC-F (03)	15600 - FUSE DISCONNECT INSP. TEST	102
2	MCC-F (04)	15600 - FUSE DISCONNECT INSP. TEST	103
2	MCC-F (05)	15600 - FUSE DISCONNECT INSP. TEST	104
2	MCC-F (06)	15600 - FUSE DISCONNECT INSP. TEST	105
2	MCC-F (07)	15600 - FUSE DISCONNECT INSP. TEST	106
2	MCC-F (08)	15600 - FUSE DISCONNECT INSP. TEST	107
2	N/A	50400 - SWITCHBOARD BUS CONNECTION TEST	108
2	SPARE	15000 - LOW VOLT. PWR. CKT. BKR. TEST	109
2	SUB 2 LV BUS	50100 - LV SWITCHBOARD INSULATION (2PG)	110
2	SUB 2 MAIN A	29000C - LOADBREAK DISCONNECT	111
2	SUB 2 MAIN A & B	65500 - LIGHTNING ARRESTER TEST	112
2	SUB 2 MAIN B	29000C - LOADBREAK DISCONNECT	113
2	TIE	15000 - LOW VOLT. PWR. CKT. BKR. TEST	114
2	TRANSFORMER 1	56000 - TRANS. DIELECTRIC ABSORPTION	115
2	TRANSFORMER 1	56200B- TRANSFORMER INSPECTION	116
2	TRANSFORMER 1	56300 - TRANSFORMER TURNS RATIO	117
2	TRANSFORMER 2	56000 - TRANS. DIELECTRIC ABSORPTION	118
2	TRANSFORMER 2	56200B- TRANSFORMER INSPECTION	119
2	TRANSFORMER 2	56300 - TRANSFORMER TURNS RATIO	120

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

Table of Contents
Job #AACI207024-1

NETA ACCREDITED COMPANY

Substation	Position	Equipment	Page
3	ISOLATION BREAKER	15000 - LOW VOLT. PWR. CKT. BKR. TEST	121
3	MAIN A	15000 - LOW VOLT. PWR. CKT. BKR. TEST	122
3	MAIN A	29000C - LOADBREAK DISCONNECT	123
3	MAIN A & B	65500 - LIGHTNING ARRESTER TEST	124
3	MAIN B	15000 - LOW VOLT. PWR. CKT. BKR. TEST	125
3	MAIN B	29000C - LOADBREAK DISCONNECT	126
3	MCC-WBB-A	15000 - LOW VOLT. PWR. CKT. BKR. TEST	127
3	MCC-WBB-A	30101 - MOTOR CONTROL CENTER INSULATION	128
3	MCC-WBB-A (01)	15600 - FUSE DISCONNECT INSP. TEST	129
3	MCC-WBB-A (02)	15600 - FUSE DISCONNECT INSP. TEST	130
3	MCC-WBB-A (03)	15600 - FUSE DISCONNECT INSP. TEST	131
3	MCC-WBB-B	15000 - LOW VOLT. PWR. CKT. BKR. TEST	132
3	MCC-WBB-B	30101 - MOTOR CONTROL CENTER INSULATION	133
3	MCC-WBB-B (01)	15600 - FUSE DISCONNECT INSP. TEST	134
3	MCC-WBB-B (02)	15600 - FUSE DISCONNECT INSP. TEST	135
3	MCC-WBB-B (03)	15600 - FUSE DISCONNECT INSP. TEST	137
3	MCC-WPB-A	15000 - LOW VOLT. PWR. CKT. BKR. TEST	138
3	MCC-WPB-A	30101 - MOTOR CONTROL CENTER INSULATION	139
3	MCC-WPB-A (01)	15600 - FUSE DISCONNECT INSP. TEST	140
3	MCC-WPB-A (02)	15600 - FUSE DISCONNECT INSP. TEST	141
3	MCC-WPB-A (03)	15600 - FUSE DISCONNECT INSP. TEST	142
3	MCC-WPB-A (MAIN)	15952 - MOLDED CASE CKT BKR SOLID STATE	143
3	MCC-WPB-A (TIE BREAKER)	15952 - MOLDED CASE CKT BKR SOLID STATE	144
3	MCC-WPB-B	15000 - LOW VOLT. PWR. CKT. BKR. TEST	145
3	MCC-WPB-B	30101 - MOTOR CONTROL CENTER INSULATION	146
3	MCC-WPB-B (01)	15600 - FUSE DISCONNECT INSP. TEST	147
3	MCC-WPB-B (02)	15600 - FUSE DISCONNECT INSP. TEST	149
3	MCC-WPB-B (03)	15600 - FUSE DISCONNECT INSP. TEST	150
3	MCC-WPB-B MAIN	15952 - MOLDED CASE CKT BKR SOLID STATE	151
3	SPARE A	15000 - LOW VOLT. PWR. CKT. BKR. TEST	152
3	SPARE B	15000 - LOW VOLT. PWR. CKT. BKR. TEST	153
3	SUB 3 TRANSFORMER 1	56000 - TRANS. DIELECTRIC ABSORPTION	154
3	SUB 3 TRANSFORMER 1	56200B- TRANSFORMER INSPECTION	155
3	SUB 3 TRANSFORMER 1	56300 - TRANSFORMER TURNS RATIO	156
3	SUB 3 TRANSFORMER 2	56000 - TRANS. DIELECTRIC ABSORPTION	157
3	SUB 3 TRANSFORMER 2	56200B- TRANSFORMER INSPECTION	158
3	SUB 3 TRANSFORMER 2	56300 - TRANSFORMER TURNS RATIO	159
3	SWBD A & B	50100 - LV SWITCHBOARD INSULATION	160
3	SWBD A & B	50400 - SWITCHBOARD BUS CONNECTION TEST	161
3	TIE	15000 - LOW VOLT. PWR. CKT. BKR. TEST	162
3	TIE MCC -WBB -A/B	15001 - LOW VOLT PWR CKT BKR TEST(2PG)	163

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

Table of Contents
Job #AACI207024-1

NETA ACCREDITED COMPANY

Substation	Position	Equipment	Page
4	BANK UNV-2B FB-7	15000 - LOW VOLT. PWR. CKT. BKR. TEST	164
4	BANK UV-2A FB-8	15000 - LOW VOLT. PWR. CKT. BKR. TEST	165
4	DEV 60-1	49000B - VOLTAGE RELAY	166
4	DEV 60-2	49000B - VOLTAGE RELAY	167
4	DEV 64-1	49000B - VOLTAGE RELAY	168
4	DEV 64-2	49000B - VOLTAGE RELAY	169
4	FB-5	15000 - LOW VOLT. PWR. CKT. BKR. TEST	170
4	MAIN A LOADBREAK	29000C - LOADBREAK DISCONNECT	171
4	MAIN BRKR MB-1	15000 - LOW VOLT. PWR. CKT. BKR. TEST	172
4	MAIN BRKR MB-2	15000 - LOW VOLT. PWR. CKT. BKR. TEST	173
4	MAIN BRKR MB-2	15000 - LOW VOLT. PWR. CKT. BKR. TEST (2)	174
4	MAIN MB-1	15000 - LOW VOLT. PWR. CKT. BKR. TEST	175
4	MCC-M	30101 - MOTOR CONTROL CENTER INSULATION	176
4	MCC-M (01)	15600 - FUSE DISCONNECT INSP. TEST	177
4	MCC-M (02)	15600 - FUSE DISCONNECT INSP. TEST	178
4	MCC-M (03)	15600 - FUSE DISCONNECT INSP. TEST	179
4	MCC-M FB-1	15000 - LOW VOLT. PWR. CKT. BKR. TEST	180
4	MCC-N	30101 - MOTOR CONTROL CENTER INSULATION	181
4	MCC-N (01)	15600 - FUSE DISCONNECT INSP. TEST	182
4	MCC-N (02)	15600 - FUSE DISCONNECT INSP. TEST	183
4	MCC-N (03)	15600 - FUSE DISCONNECT INSP. TEST	184
4	MCC-N FB-11	15000 - LOW VOLT. PWR. CKT. BKR. TEST	185
4	MCC-P	30101 - MOTOR CONTROL CENTER INSULATION	186
4	MCC-P (01)	15600 - FUSE DISCONNECT INSP. TEST	187
4	MCC-P (02)	15600 - FUSE DISCONNECT INSP. TEST	188
4	MCC-P (03)	15600 - FUSE DISCONNECT INSP. TEST	189
4	MCC-P FB-12	15000 - LOW VOLT. PWR. CKT. BKR. TEST	190
4	MCC-Q	30101 - MOTOR CONTROL CENTER INSULATION	191
4	MCC-Q (01)	15600 - FUSE DISCONNECT INSP. TEST	192
4	MCC-Q (02)	15600 - FUSE DISCONNECT INSP. TEST	193
4	MCC-Q (03)	15600 - FUSE DISCONNECT INSP. TEST	194
4	MCC-Q FB-2	15000 - LOW VOLT. PWR. CKT. BKR. TEST	195
4	PT-UV-2A	56000 - TRANS. DIELECTRIC ABSORPTION	196
4	PT-UV-2A	56300 - TRANSFORMER TURNS RATIO	197
4	PT-UV-2B	56000 - TRANS. DIELECTRIC ABSORPTION	198
4	PT-UV-2B	56300 - TRANSFORMER TURNS RATIO	199
4	SUB 4 MAIN A LOADBREAK	65500 - LIGHTNING ARRESTER TEST	200
4	SUB 4 MAIN B	29000C - LOADBREAK DISCONNECT	201
4	SUB 4 MAIN B	65500 - LIGHTNING ARRESTER TEST	202
4	SUB 4 TRANSFORMER 2	56000 - TRANS. DIELECTRIC ABSORPTION	203
4	SUB 4 TRANSFORMER 2	56200B- TRANSFORMER INSPECTION	204

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

Table of Contents
Job #AACI207024-1

NETA ACCREDITED COMPANY

Substation	Position	Equipment	Page
4	SUB 4 TRANSFORMER 2	56300 - TRANSFORMER TURNS RATIO	205
4	SUB 4A & SUB 4B	50100 - LV SWITCHBOARD INSULATION	206
4	SUB 4A & SUB 4B	50400 - SWITCHBOARD BUS CONNECTION TEST	207
4	TRANSFORMER 1	56000 - TRANS. DIELECTRIC ABSORPTION	208
4	TRANSFORMER 1	56200B- TRANSFORMER INSPECTION	209
4	TRANSFORMER 1	56300 - TRANSFORMER TURNS RATIO	210
5	52-4 BUS A	29000C - LOADBREAK DISCONNECT	211
5	52-4 BUS A	65500 - LIGHTNING ARRESTER TEST	212
5	52-4 BUS A TRANSFORMER	56000 - TRANS. DIELECTRIC ABSORPTION	213
5	52-4 BUS A TRANSFORMER	56200B- TRANSFORMER INSPECTION	214
5	52-4 BUS A TRANSFORMER	56325 - TRANS TURNS RATIO (NC)	215
5	52-7 BUS B	29000C - LOADBREAK DISCONNECT	216
5	52-7 BUS-B	65500 - LIGHTNING ARRESTER TEST	217
5	52-7B TRANSFORMER	56000 - TRANS. DIELECTRIC ABSORPTION	218
5	52-7B TRANSFORMER	56200B- TRANSFORMER INSPECTION	219
5	52-7B TRANSFORMER	56325 - TRANS TURNS RATIO (NC)	220
5	F2H 800A SPARE	15000 - LOW VOLT. PWR. CKT. BKR. TEST	221
5	F3D MCC-53	15000 - LOW VOLT. PWR. CKT. BKR. TEST	222
5	F3D MCC-53	15000 - LOW VOLT. PWR. CKT. BKR. TEST (2)	223
5	F4A MCC-54 BUS A	15000 - LOW VOLT. PWR. CKT. BKR. TEST	224
5	F4B MCC-55 BUS A	15000 - LOW VOLT. PWR. CKT. BKR. TEST	225
5	F4D MCC-56 BUS A	15000 - LOW VOLT. PWR. CKT. BKR. TEST	226
5	F5A 800A SPARE	15000 - LOW VOLT. PWR. CKT. BKR. TEST	227
5	F5H 800A SPARE	15000 - LOW VOLT. PWR. CKT. BKR. TEST	228
5	F6A MCC-54 BUS B	15000 - LOW VOLT. PWR. CKT. BKR. TEST	229
5	F6B MCC-55 BUS B	15000 - LOW VOLT. PWR. CKT. BKR. TEST	230
5	F6C CFG-2	15000 - LOW VOLT. PWR. CKT. BKR. TEST	231
5	F6D MCC-56 BUS B	15000 - LOW VOLT. PWR. CKT. BKR. TEST	232
5	F7A MCC-51 BUS B	15000 - LOW VOLT. PWR. CKT. BKR. TEST (2)	233
5	F7B MCC-52 BUS B	15000 - LOW VOLT. PWR. CKT. BKR. TEST	234
5	F7C CFG-3	15000 - LOW VOLT. PWR. CKT. BKR. TEST	235
5	F7D MCC-53 BUS B	15000 - LOW VOLT. PWR. CKT. BKR. TEST	236
5	F8B 800A SPARE	15000 - LOW VOLT. PWR. CKT. BKR. TEST	237
5	FEEDER F3A	15000 - LOW VOLT. PWR. CKT. BKR. TEST	238
5	FEEDER F3B	15000 - LOW VOLT. PWR. CKT. BKR. TEST	239
5	FEEDER F4C	15000 - LOW VOLT. PWR. CKT. BKR. TEST	240
5	M8C BUS B MAIN	15000 - LOW VOLT. PWR. CKT. BKR. TEST	241
5	MCC-51A	30101 - MOTOR CONTROL CENTER INSULATION	242
5	MCC-51A (01)	15600 - FUSE DISCONNECT INSP. TEST	243
5	MCC-51A (02)	15600 - FUSE DISCONNECT INSP. TEST	244
5	MCC-51A (MAIN)	15952 - MOLDED CASE CKT BKR SOLID STATE	245

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

Table of Contents
Job #AACI207024-1

NETA ACCREDITED COMPANY

Substation	Position	Equipment	Page
5	MCC-51B	15600 - FUSE DISCONNECT INSP. TEST	246
5	MCC-51B	30101 - MOTOR CONTROL CENTER INSULATION	247
5	MCC-51B (MAIN)	15952 - MOLDED CASE CKT BKR SOLID STATE	248
5	MCC-52A	30101 - MOTOR CONTROL CENTER INSULATION	249
5	MCC-52A (01)	15600 - FUSE DISCONNECT INSP. TEST	250
5	MCC-52A (02)	15600 - FUSE DISCONNECT INSP. TEST	251
5	MCC-52A (MAIN)	15952 - MOLDED CASE CKT BKR SOLID STATE	252
5	MCC-52B	30101 - MOTOR CONTROL CENTER INSULATION	253
5	MCC-52B (01)	15600 - FUSE DISCONNECT INSP. TEST	254
5	MCC-52B (02)	15600 - FUSE DISCONNECT INSP. TEST	255
5	MCC-52B (MAIN)	15952 - MOLDED CASE CKT BKR SOLID STATE	256
5	MCC-53A	30101 - MOTOR CONTROL CENTER INSULATION	257
5	MCC-53A (01)	15600 - FUSE DISCONNECT INSP. TEST	258
5	MCC-53A (02)	15600 - FUSE DISCONNECT INSP. TEST	259
5	MCC-53A (03)	15600 - FUSE DISCONNECT INSP. TEST	260
5	MCC-53A (MAIN)	15952 - MOLDED CASE CKT BKR SOLID STATE	261
5	MCC-53B	30101 - MOTOR CONTROL CENTER INSULATION	262
5	MCC-53B (01)	15600 - FUSE DISCONNECT INSP. TEST	263
5	MCC-53B (02)	15600 - FUSE DISCONNECT INSP. TEST	264
5	MCC-53B (MAIN)	15952 - MOLDED CASE CKT BKR SOLID STATE	265
5	MCC-54A	30101 - MOTOR CONTROL CENTER INSULATION	266
5	MCC-54A (01)	15600 - FUSE DISCONNECT INSP. TEST	267
5	MCC-54A (02)	15600 - FUSE DISCONNECT INSP. TEST	268
5	MCC-54A (MAIN)	15952 - MOLDED CASE CKT BKR SOLID STATE	269
5	MCC-54B	30101 - MOTOR CONTROL CENTER INSULATION	270
5	MCC-54B (01)	15600 - FUSE DISCONNECT INSP. TEST	271
5	MCC-54B (02)	15600 - FUSE DISCONNECT INSP. TEST	272
5	MCC-54B (MAIN)	15952 - MOLDED CASE CKT BKR SOLID STATE	273
5	MCC-55A	30101 - MOTOR CONTROL CENTER INSULATION	274
5	MCC-55A (01)	15600 - FUSE DISCONNECT INSP. TEST	275
5	MCC-55A (02)	15600 - FUSE DISCONNECT INSP. TEST	276
5	MCC-55A (MAIN)	15952 - MOLDED CASE CKT BKR SOLID STATE	277
5	MCC-55B	30101 - MOTOR CONTROL CENTER INSULATION	278
5	MCC-55B (01)	15600 - FUSE DISCONNECT INSP. TEST	279
5	MCC-55B (02)	15600 - FUSE DISCONNECT INSP. TEST	280
5	MCC-55B MAIN	15000 - LOW VOLT. PWR. CKT. BKR. TEST	281
5	MCC-56A	15600 - FUSE DISCONNECT INSP. TEST	282
5	MCC-56A	30101 - MOTOR CONTROL CENTER INSULATION	283
5	MCC-56A (MAIN)	15952 - MOLDED CASE CKT BKR SOLID STATE	284
5	MCC-56B	30101 - MOTOR CONTROL CENTER INSULATION	285
5	MCC-56B (01)	15600 - FUSE DISCONNECT INSP. TEST	286

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Table of Contents
Job #AACI207024-1

NETA ACCREDITED COMPANY

Substation	Position	Equipment	Page
5	MCC-56B (02)	15600 - FUSE DISCONNECT INSP. TEST	287
5	MCC-56B (MAIN)	15952 - MOLDED CASE CKT BKR SOLID STATE	288
5	SUB 5 BUS A	50100 - LV SWITCHBOARD INSULATION	289
5	SUB 5 BUS A	50400 - SWITCHBOARD BUS CONNECTION TEST	290
5	SUB 5 BUS B	50100 - LV SWITCHBOARD INSULATION	291
5	SUB 5 BUS B	50400 - SWITCHBOARD BUS CONNECTION TEST	292
5	TIE T5B	15000 - LOW VOLT. PWR. CKT. BKR. TEST	293
6	MAIN A	15001 - LOW VOLT PWR CKT BKR TEST	294
6	MAIN B	15001 - LOW VOLT PWR CKT BKR TEST (2)	295
6	MCC-EBB-A	15001 - LOW VOLT PWR CKT BKR TEST	296
6	MCC-EBB-A	30101 - MOTOR CONTROL CENTER INSULATION	297
6	MCC-EBB-A (01)	15600 - FUSE DISCONNECT INSP. TEST	298
6	MCC-EBB-A (02)	15600 - FUSE DISCONNECT INSP. TEST	299
6	MCC-EBB-A (03)	15600 - FUSE DISCONNECT INSP. TEST	300
6	MCC-EBB-B	15001 - LOW VOLT PWR CKT BKR TEST	301
6	MCC-EBB-B	30101 - MOTOR CONTROL CENTER INSULATION	302
6	MCC-EBB-B (01)	15600 - FUSE DISCONNECT INSP. TEST	303
6	MCC-EBB-B (02)	15600 - FUSE DISCONNECT INSP. TEST	304
6	MCC-EBB-B (03)	15600 - FUSE DISCONNECT INSP. TEST	305
6	MCC-EPB-A	15001 - LOW VOLT PWR CKT BKR TEST	306
6	MCC-EPB-A	30101 - MOTOR CONTROL CENTER INSULATION	307
6	MCC-EPB-A (01)	15600 - FUSE DISCONNECT INSP. TEST	308
6	MCC-EPB-A (02)	15600 - FUSE DISCONNECT INSP. TEST	309
6	MCC-EPB-A (03)	15600 - FUSE DISCONNECT INSP. TEST	310
6	MCC-EPB-A (04)	15600 - FUSE DISCONNECT INSP. TEST	311
6	MCC-EPB-A (05)	15600 - FUSE DISCONNECT INSP. TEST	312
6	MCC-EPB-A MAIN	15952 - MOLDED CASE CKT BKR SOLID STATE	313
6	MCC-EPB-B	15001 - LOW VOLT PWR CKT BKR TEST	314
6	MCC-EPB-B	30101 - MOTOR CONTROL CENTER INSULATION	315
6	MCC-EPB-B (01)	15600 - FUSE DISCONNECT INSP. TEST	316
6	MCC-EPB-B (02)	15600 - FUSE DISCONNECT INSP. TEST	317
6	MCC-EPB-B (03)	15600 - FUSE DISCONNECT INSP. TEST	318
6	MCC-EPB-B (04)	15600 - FUSE DISCONNECT INSP. TEST	319
6	MCC-EPB-B (05)	15600 - FUSE DISCONNECT INSP. TEST	320
6	MCC-EPB-B MAIN	15952 - MOLDED CASE CKT BKR SOLID STATE	321
6	SEC. 1-4	50100 - LV SWITCHBOARD INSULATION (2PG)	322
6	SEC. 1-4	50400 - SWITCHBOARD BUS CONNECTION TEST	323
6	SPARE A	15001 - LOW VOLT PWR CKT BKR TEST	324
6	SPARE B	15001 - LOW VOLT PWR CKT BKR TEST	325
6	SUB 6 TRANSFORMER 1	56000 - TRANS. DIELECTRIC ABSORPTION	326
6	SUB 6 TRANSFORMER 1	56200B- TRANSFORMER INSPECTION	327

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Dexter, Michigan
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Table of Contents
Job #AACI207024-1

NETA ACCREDITED COMPANY

Substation	Position	Equipment	Page
6	SUB 6 TRANSFORMER 1	56300 - TRANSFORMER TURNS RATIO	328
6	SUB 6 TRANSFORMER 1 & 2	34001 - CAPACITOR BANK TEST	329
6	SUB 6 TRANSFORMER 1 & 2	65500 - LIGHTNING ARRESTER TEST	330
6	SUB 6 TRANSFORMER 2	56000 - TRANS. DIELECTRIC ABSORPTION	331
6	SUB 6 TRANSFORMER 2	56200B- TRANSFORMER INSPECTION	332
6	SUB 6 TRANSFORMER 2	56300 - TRANSFORMER TURNS RATIO	333
6	TIE	15001 - LOW VOLT PWR CKT BKR TEST	334
7	ATS-ADM-1	15000 - LOW VOLT. PWR. CKT. BKR. TEST (2)	335
7	ATS-ADM-1	15000 - LOW VOLT. PWR. CKT. BKR. TEST	336
7	ISOLATION TIE	15001 - LOW VOLT PWR CKT BKR TEST(2PG)	337
7	MAIN A	15001 - LOW VOLT PWR CKT BKR TEST(2PG)	338
7	MAIN B	15000 - LOW VOLT. PWR. CKT. BKR. TEST	339
7	MCC-ADM-1	30101 - MOTOR CONTROL CENTER INSULATION	340
7	MCC-ADM-1 MAIN	15000 - LOW VOLT. PWR. CKT. BKR. TEST	341
7	MCC-ADM-A (01)	15600 - FUSE DISCONNECT INSP. TEST	342
7	MCC-ADM-A (02)	15600 - FUSE DISCONNECT INSP. TEST	343
7	MCC-ADM-A (03)	15600 - FUSE DISCONNECT INSP. TEST	344
7	MCC-CEB-A	15001 - LOW VOLT PWR CKT BKR TEST(2PG)	345
7	MCC-CEB-A & B	30101 - MOTOR CONTROL CENTER INSULATION	346
7	MCC-CEB-A (01)	15600 - FUSE DISCONNECT INSP. TEST	347
7	MCC-CEB-A (02)	15600 - FUSE DISCONNECT INSP. TEST	348
7	MCC-CEB-B	15001 - LOW VOLT PWR CKT BKR TEST(2PG)	349
7	MCC-CEB-B	15600 - FUSE DISCONNECT INSP. TEST	350
7	MCC-CEB-B	30101 - MOTOR CONTROL CENTER INSULATION	351
7	MCC-CEB-B (ISO. BRKR)	15952 - MOLDED CASE CKT BKR SOLID STATE	352
7	PP-MTB	15001 - LOW VOLT PWR CKT BKR TEST(2PG)	353
7	PT-UA-1A	56000 - TRANS. DIELECTRIC ABSORPTION	354
7	PT-UA-1A	56325 - TRANS TURNS RATIO (NC)	355
7	PT-UV-1B	56000 - TRANS. DIELECTRIC ABSORPTION	356
7	PT-UV-1B	56300 - TRANSFORMER TURNS RATIO	357
7	SUB 7	50100 - LV SWITCHBOARD INSULATION (2PG)	358
7	SUB 7	50400 - SWITCHBOARD BUS CONNECTION TEST	359
7	SUB 7 TRANSFORMER 1	56000 - TRANS. DIELECTRIC ABSORPTION	360
7	SUB 7 TRANSFORMER 1	56200B- TRANSFORMER INSPECTION	361
7	SUB 7 TRANSFORMER 1	56300 - TRANSFORMER TURNS RATIO	362
7	SUB 7 TRANSFORMER 1	65500 - LIGHTNING ARRESTER TEST	363
7	SUB 7 TRANSFORMER 1	80111 - CAPACITOR TEST FORM	364
7	SUB 7 TRANSFORMER 2	56000 - TRANS. DIELECTRIC ABSORPTION	365
7	SUB 7 TRANSFORMER 2	56200B- TRANSFORMER INSPECTION	366
7	SUB 7 TRANSFORMER 2	56300 - TRANSFORMER TURNS RATIO	367
7	SUB 7 TRANSFORMER 2	65500 - LIGHTNING ARRESTER TEST	368

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Dexter, Michigan
(734) 424-1200
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Table of Contents
Job #AACI207024-1

NETA ACCREDITED COMPANY

Substation	Position	Equipment	Page
7	SUB 7 TRANSFORMER 2	80111 - CAPACITOR TEST FORM	369
7	TIE	15001 - LOW VOLT PWR CKT BKR TEST(2PG)	370
7	TIE BREAKER	15952 - MOLDED CASE CKT BKR SOLID STATE	371
7	UV -1A	15001 - LOW VOLT PWR CKT BKR TEST(2PG)	372
7	UV-1B	15001 - LOW VOLT PWR CKT BKR TEST(2PG)	373
8	8A-XFMR 1	56000 - TRANS. DIELECTRIC ABSORPTION	374
8	8A-XFMR 1	56200B- TRANSFORMER INSPECTION	375
8	8A-XFMR 1	56300 - TRANSFORMER TURNS RATIO	376
8	8B-XFMR 2	56000 - TRANS. DIELECTRIC ABSORPTION	377
8	8B-XFMR 2	56200B- TRANSFORMER INSPECTION	378
8	8B-XFMR 2	56300 - TRANSFORMER TURNS RATIO	379
8	A BUS	50400 - SWITCHBOARD BUS CONNECTION TEST	380
8	BLOWER 1	16100 - VACUUM CIRCUIT BREAKER	381
8	BLOWER 2	16100 - VACUUM CIRCUIT BREAKER	382
8	BLOWER 3	16100 - VACUUM CIRCUIT BREAKER	383
8	CPT-A / CPT-B	27451 - CONTROL POWER TRANS TEST (NC)	384
8	ISOLATION	16100 - VACUUM CIRCUIT BREAKER	385
8	MAIN A	16100 - VACUUM CIRCUIT BREAKER	386
8	MAIN A	29000C - LOADBREAK DISCONNECT	387
8	MAIN A	65500 - LIGHTNING ARRESTER TEST	388
8	MAIN B	16100 - VACUUM CIRCUIT BREAKER	389
8	MAIN B	29000C - LOADBREAK DISCONNECT	390
8	MAIN B	45000G2 - OVERCURRENT RELAY W/GRND	391
8	PAB-E1	29000C - LOADBREAK DISCONNECT	392
8	PAB-E1	31300 - MEDIUM VOLTGE VACUUM MOTOR START	393
8	PAB-E1 BLOWER NO.1	45000G2 - OVERCURRENT RELAY W/GRND	394
8	PAB-E2	29000C - LOADBREAK DISCONNECT	395
8	PAB-E2	31300 - MEDIUM VOLTGE VACUUM MOTOR START	396
8	PAB-E2 BLOWER NO.2	45000G2 - OVERCURRENT RELAY W/GRND	397
8	PAB-E3	29000C - LOADBREAK DISCONNECT	398
8	PAB-E3	31300 - MEDIUM VOLTGE VACUUM MOTOR START	399
8	PAB-E3 BLOWER NO.3	45000G2 - OVERCURRENT RELAY W/GRND	400
8	SPARE A	16100 - VACUUM CIRCUIT BREAKER (2) (2) (2)	401
8	SPARE A	45000G2 - OVERCURRENT RELAY W/GRND	402
8	SPARE B	16100 - VACUUM CIRCUIT BREAKER	403
8	SPARE B	45000G2 - OVERCURRENT RELAY W/GRND	404
8	SUB 6A	16100 - VACUUM CIRCUIT BREAKER	405
8	SUB 6A	45000G2 - OVERCURRENT RELAY W/GRND	406
8	SUB 6B	16100 - VACUUM CIRCUIT BREAKER	407
8	SUB 6B	45000G2 - OVERCURRENT RELAY W/GRND	408
8	SUB 8	50001 - MV SWITCHBOARD INSULATION	409

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
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Table of Contents
Job #AACI207024-1

Substation	Position	Equipment	Page
8	SUB 8	50050 - MV SWITCHBOARD HIPOT	410
8	SUB 8-4160 MAIN	65500 - LIGHTNING ARRESTER TEST	411
8	TIE	16100 - VACUUM CIRCUIT BREAKER	412
8	VT B-2	27200 - VOLTAGE TRANSFORMER TEST	413
8	VT-A	27200 - VOLTAGE TRANSFORMER TEST	414
GEN	BUS #3	27200 - VOLTAGE TRANSFORMER TEST	415
GEN	BUS #3	50001 - MV SWITCHBOARD INSULATION	416
GEN	BUS #3	50050 - MV SWITCHBOARD HIPOT	417
GEN	BUS #3	50400 - SWITCHBOARD BUS CONNECTION TEST	418
GEN	GEN #1 & #2	65500 - LIGHTNING ARRESTER TEST	419
GEN	GEN 1	27200 - VOLTAGE TRANSFORMER TEST	420
GEN	GEN 2	27200 - VOLTAGE TRANSFORMER TEST	421
GEN	GENERATOR 1 (52-G1)	16100 - VACUUM CIRCUIT BREAKER	422
GEN	GENERATOR 2 (52-G2)	16100 - VACUUM CIRCUIT BREAKER	423
GEN	LOAD BANK (52LB)	16100 - VACUUM CIRCUIT BREAKER	424
RTS	RELAY FILES	RTS RELAY REPORT	425

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DEFICIENCIES LOCATED

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 1

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE

DATE 2/24/2020 TEMPERATURE 70 °F HUMIDITY 60 % EQPT. LOCATION RSLS ELECTRICAL

SUBSTATION !1 POSITION MAIN A & B METERS

DEFICIENCIES LOCATED: CT CIRCUIT SHORTING SCREWS ARE STILL IN PLACE, NOT REQUIRING CURRENT TO FLOW THROUGH METER.

EQUIPMENT / SERVICES IMPACTED: CURRENT AND POWER SHOWN IN METERS ARE NOT ACCURATE.

RECOMMENDED REPAIR: VERIFY CT CIRCUIT IS COMPLETE TO METER AND REMOVE SHORTING SCREWS.

REPAIRS COMPLETED _____ YES X NO DATE: 2/24/2020

COMMENTS:

DEFICIENCIES: CT CIRCUIT SHORTING SCREWS ARE STILL IN PLACE, NOT REQUIRING CURRENT TO FLOW THROUGH METERS, CAUSING CURRENT AND POWER SHOWN ON METERS TO BE INACCURATE. VERIFY CT CIRCUIT IS COMPLETE TO METER AND REMOVE SHORTING SCREWS.

☐ ACCEPTABLE ☑ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: D. FLEMING Tested By: _____

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DEFICIENCIES LOCATED

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CUSTOMER Ann Arbor, City of PAGE 2

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE

DATE 5/8/2020 TEMPERATURE 70 °F HUMIDITY 60 % EQPT. LOCATION CEB

SUBSTATION !13.2 kV POSITION 52T & 52 1B

DEFICIENCIES LOCATED: TRIP/CLOSE BREAKER CONTROL HANDLES AT DIGITAL MASTER CONTROL PANEL DISPLAYS A GREEN LIGHT INDICATING THE BREAKER IS OPEN. THIS LIGHT IS STILL LIT AFTER REMOVING BREAKER FROM ITS CUBICLE. IN THIS INSTANCE, ALL LIGHTS SHOULD GO OUT.

EQUIPMENT / SERVICES IMPACTED: A FALSE INDICATIOR IS GIVEN THAT THE BREAKER IS IN ITS CUBICLE AND READY TO CLOSE, WHEN IN FACT IT IS NOT EVEN IN ITS CUBICLE. AS THESE ARE TIE BREAKERS/ISOLATION TIE BREAKERS THIS COULD CAUSE PROBLEMS IN MAINTAINING THE RELAIBLITY OF THE SYSTEM, SHOULD THESE BREAKERS BE NEEDED IF PART OF THE SYSTEM LOSES ITS FEED.

RECOMMENDED REPAIR: TROUBLESHOOT THE WIRING ISSUE WHICH ALLOWS THE LIGHTS TO BE LIT WHEN THE BREAKER IS REMOVED FROM ITS CUBICLE AND CORRECT IT.

REPAIRS COMPLETED _____ YES X NO DATE: 5/8/2020

COMMENTS:

DEFICIENCIES: TRIP/CLOSE BREAKER CONTROL HANDLES AT DIGITAL MASTER CONTROL PANEL DISPLAYS A GREEN LIGHT INDICATING THE BREAKER IS OPEN. THIS LIGHT IS STILL LIT AFTER REMOVING BREAKER FROM ITS CUBICLE. IN THIS INSTANCE, ALL LIGHTS SHOULD GO OUT.

☐ ACCEPTABLE ☑ NON - ACCEPTABLE

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TOOLS USED:

Tested By: K. CUJAR Tested By: D. FLEMING

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DEFICIENCIES LOCATED

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 3
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE
DATE 5/12/2020 TEMPERATURE 70 °F HUMIDITY 30 % EQPT. LOCATION CENTRAL ELECTRICAL BLDG
SUBSTATION !13.2 kV POSITION BUS 1 DIFF. RELAY

DEFICIENCIES LOCATED: FOUND 87A INPUT TO BE APPROX. 25% OUT OF SPEC.

EQUIPMENT / SERVICES IMPACTED: PICKUP VALUE FOR A PHASE IS 25% HIGHTER THAN SET POINT.

RECOMMENDED REPAIR: CUSTOMER HAD SPARE RELAY IN STORAGE. TESTED AND INSTALLED SPARE RELAY IN PLACE OF DEFECTIVE.

CUSTOMER ALSO REQUESTED UIS FACILITATE THE REPAIR OF THE RELAY THROUGH SEL.

REPAIRS COMPLETED X YES ____ NO DATE: 5/12/2020

COMMENTS:

DEFICIENCIES: FOUND 87A INPUT TO BE APPROX. 25% OUT OF SPEC. REPAIRS COMPLETED ON 5/12/2020.

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: D. FLEMING Tested By: JR, KC

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DEFICIENCIES LOCATED

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 4
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE
DATE 5/13/2020 TEMPERATURE 70 °F HUMIDITY 30 % EQPT. LOCATION CENTRAL ELECTRICAL BLDG
SUBSTATION !13.2 kV POSITION BUS 2

DEFICIENCIES LOCATED: A PHASE BUS MAY HAVE A LOOSE CONNECTION BETWEEN SECTION 11 AND SECTION 15. DLRO TEST VALUES INDICATE THE A PHASE BUS HAS A MUCH HIGHER RESISTANCE THAN THE OTHER TWO PHASES.

EQUIPMENT / SERVICES IMPACTED: IF THE BUS HAS A LOOSE CONNECTION, HIGHER CURRENT LEVELS WILL CREATE EXCESSIVE HEAT AND DAMAGE THE BUS.

RECOMMENDED REPAIR: FURTHER INVESTIGATION IS REQUIRED IN THE NEAR FUTURE.

REPAIRS COMPLETED ____ YES X NO DATE: 5/13/2020

COMMENTS:

DEFICIENCIES: A PHASE BUS MAY HAVE A LOOSE CONNECTION BETWEEN SECTION 11 AND SECTION 15. DLRO TEST VALUES INDICATE THE A PHASE BUS HAS A MUCH HIGHER RESISTANCE THAN THE OTHER TWO PHASES.

☐ ACCEPTABLE ☑ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: D. FLEMING Tested By: JR, KC

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DEFICIENCIES LOCATED

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 5

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE

DATE 2/18/2020 TEMPERATURE 50 °F HUMIDITY 25 % EQPT. LOCATION RETENTION BLDG

SUBSTATION 12 POSITION MAIN A LINE METER

DEFICIENCIES LOCATED: PANEL METER, SQUARE D POWERLOGIC PM 800 NOT WORKING. ERROR "OS MISSING" SHOWN ON SCREEN.

EQUIPMENT / SERVICES IMPACTED: LINE VOLTAGE, CURRENT, POWER ARE UNKNOWN.

RECOMMENDED REPAIR: USER MANUAL SUGGESTS UPDATE FIRMWARE. IF THAT DOESN'T WORK, REPLACE METER.

REPAIRS COMPLETED _____ YES X NO DATE: 2/18/2020

COMMENTS:

DEFICIENCIES: PANEL METER, SQUARE D POWERLOGIC PM 800 NOT WORKING. ERROR "OS MISSING" SHOWN ON SCREEN.

☐ ACCEPTABLE ☑ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: D. FLEMING Tested By: _____

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DEFICIENCIES LOCATED

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 6

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE

DATE 2/21/2020 TEMPERATURE 70 °F HUMIDITY 60 % EQPT. LOCATION TERTIARY BUILDING

SUBSTATION !4 POSITION LIGHTING PANEL N

DEFICIENCIES LOCATED: THE BREAKER INSIDE THE BUCKET WILL NOT SHUT OFF.

EQUIPMENT / SERVICES IMPACTED: BREAKER WILL NOT OPEN IF CALLED UPON TO DO SO DURING A FAULT. PANEL BEING FED BY THIS POSITION DOES HAVE A MAIN BREAKER.

RECOMMENDED REPAIR: REPLACE BREAKER.

REPAIRS COMPLETED _____ YES X NO DATE: 2/21/2020

COMMENTS:

DEFICIENCIES: THE BREAKER INSIDE THE BUCKET WILL NOT SHUT OFF. BREAKER WILL NOT OPEN IF CALLED UPON TO DO SO DURING A FAULT. PANEL BEING FED BY THIS POSITION DOES HAVE A MAIN BREAKER. REPLACE BREAKER.

☐ ACCEPTABLE ☑ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: N. HERRST Tested By: D. FLEMING

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DEFICIENCIES LOCATED

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CUSTOMER Ann Arbor, City of PAGE 7

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE

DATE 2/20/2020 TEMPERATURE 60 °F HUMIDITY 30 % EQPT. LOCATION TERTIARY BUILDING

SUBSTATION !4 POSITION MAIN BREAKER MB-1

DEFICIENCIES LOCATED: BREAKER DOES NOT TRIP. DEFECTIVE ACTUATOR. WORN BUFFER BUSHINGS.

EQUIPMENT / SERVICES IMPACTED: BREAKER DOES NOT PROVIDE PROTECTION AND CONTACT ALIGNMENT. TIGHTNESS IS ALSO COMPROMISED.

RECOMMENDED REPAIR: REPLACE TRIP ACTUATOR AND BUFFER BUSHINGS.

REPAIRS COMPLETED _____ YES _____ NO DATE: _____

COMMENTS:

DEFICIENCIES: BREAKER DOES NOT TRIP. DEFECTIVE ACTUATOR. WORN BUFFER BUSHINGS. REPLACE TRIP ACTUATOR AND BUFFER BUSHINGS.

☐ ACCEPTABLE ☑ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: E. TAPPAN Tested By: J. KIRCHNER

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NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 8

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE

DATE 2/21/2020 TEMPERATURE 70 °F HUMIDITY 60 % EQPT. LOCATION TERTIARY FILTER BUILDING

SUBSTATION !4 POSITION MAIN BREAKER MB-2

DEFICIENCIES LOCATED: BREAKER WILL NOT TRIP. ACTUATOR IS DEFECTIVE.

EQUIPMENT / SERVICES IMPACTED: SUB 4 HAS TO BE SINGLE-ENDED UNTIL A MAIN IS REPAIRED.

RECOMMENDED REPAIR: REPLACE ACTUATOR, OR RETROFIT WITH AC-PRO. REPLACE BUFFER BUSHINGS.

REPAIRS COMPLETED _____ YES X NO DATE: 2/21/2020

COMMENTS: TIE BREAKER MOVED TO MAIN MB-2 POSITION. CURRENT STATE OF SUB IS DOUBLE-ENDED WITHOUT THE TIE BREAKER.

DEFICIENCIES: BREAKER WILL NOT TRIP. ACTUATOR IS DEFECTIVE. SUB 4 HAS TO BE SINGLE-ENDED UNTIL A MAIN IS REPAIRED. REPLACE ACTUATOR, OR RETROFIT WITH AC-PRO. REPLACE BUFFER BUSHINGS.

☐ ACCEPTABLE ☑ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: E. TAPPAN Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

DEFICIENCIES LOCATED

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 9

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE

DATE 2/21/2020 TEMPERATURE 70 °F HUMIDITY 60 % EQPT. LOCATION TERTIARY BUILDING

SUBSTATION !4 POSITION MCC-N

DEFICIENCIES LOCATED: BROKEN DISCONNECT HANDLE.

EQUIPMENT / SERVICES IMPACTED: THE EQUIPMENT COULD BE ON, BUT LOOKING AT THE DISCONNECT HANDLE, IT COULD APPEAR TO BE OFF.

RECOMMENDED REPAIR: REPLACE DISCONNECT HANDLE.

REPAIRS COMPLETED _____ YES X NO DATE: 2/21/2020

COMMENTS:

DEFICIENCIES: BROKEN DISCONNECT HANDLE. THE EQUIPMENT COULD BE ON, BUT LOOKING AT THE DISCONNECT HANDLE, IT COULD APPEAR TO BE OFF. REPLACE DISCONNECT HANDLE.

☐ ACCEPTABLE ☑ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

DEFICIENCIES LOCATED

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 10
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE
DATE 3/5/2020 TEMPERATURE 70 °F HUMIDITY 60 % EQPT. LOCATION TERTIARY BUILDING
SUBSTATION !4 POSITION MCC-N & MCC-M

DEFICIENCIES LOCATED: MCC-N & MCC-M ATSs HAVE EMERGENCY FEEDS TIED TO EACH OTHER.

EQUIPMENT / SERVICES IMPACTED: THE EMERGENCY FEEDS CAN NEVER BE ENERGIZED WITH THIS CONNECTION ARRANGEMENT.

RECOMMENDED REPAIR: IF ATSs ARE INTENDED TO OPERATE ANOTHER EMERGENCY SOURCE WILL NEED TO BE CONNECTED.

REPAIRS COMPLETED _____ YES X NO DATE: 3/5/2020

COMMENTS:

DEFICIENCIES: MCC-N & MCC-M ATSs HAVE EMERGENCY FEEDS TIED TO EACH OTHER. IF ATSs ARE INTENDED TO OPERATE, ANOTHER EMERGENCY SOURCE WILL NEED TO BE CONNECTED.

☐ ACCEPTABLE ☑ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: D. FLEMING Tested By: _____

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

DEFICIENCIES LOCATED

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 11

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE

DATE 2/20/2020 TEMPERATURE 60 °F HUMIDITY 30 % EQPT. LOCATION TERTIARY BUILDING

SUBSTATION !4 POSITION MCC-Q (SEC. 5) LP-Q

DEFICIENCIES LOCATED: PLASTIC ON/OFF HANDLE IS BROKEN.

EQUIPMENT / SERVICES IMPACTED: POSITION CANNOT BE OPERATED WITH DOOR CLOSED.

RECOMMENDED REPAIR: HANDLE REMOVED. PARTS ARE BEING OBTAINED BY UIS. POSITION MAY BE OPERATED WITHOUT HANDLE, HOWEVER,

USE CAUTION! LIVE PARTS ARE EXPOSED DURING OPERATION WITH THE DOOR OPEN.

REPAIRS COMPLETED _____ YES X NO DATE: 2/20/2020

COMMENTS:

DEFICIENCIES: PLASTIC ON/OFF HANDLE IS BROKEN. THE HANDLE WAS REMOVED. PARTS ARE BEING OBTAINED BY UIS. POSITION IS OPERABLE WITHOUT HANDLE, HOWEVER, USE CAUTION! LIVE PARTS ARE EXPOSED DURING OPERATION WITH DOOR OPEN.

☐ ACCEPTABLE ☑ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: D. FLEMING Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

DEFICIENCIES LOCATED

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 12

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE

DATE 3/5/2020 TEMPERATURE 70 °F HUMIDITY 60 % EQPT. LOCATION TERTIARY BUILDING

SUBSTATION !4 POSITION SUB 4

DEFICIENCIES LOCATED: CONTROLS ARE NOT WORKING WITH CONTROL POWER FED FROM A-SIDE.

EQUIPMENT / SERVICES IMPACTED: BREAKERS CANNOT BE OPERATED OR CHARGED WITHOUT PROPER CONTROL POWER. TRIPPING IS NOT AFFECTED, HOWEVER, RECLOSING AFTER AN OUTAGE OR REPAIR IS NOT POSSIBLE WITH CONTROL POWER ON A-SIDE.

RECOMMENDED REPAIR: FURTHER INVESTIGATION IS REQUIRED. A TEMPORARY SOLUTION IS TO SWITCH CONTROL POWER TO B-SIDE AND LEAVE IT IN MANUAL.

REPAIRS COMPLETED _____ YES X NO DATE: 3/5/2020

COMMENTS:

DEFICIENCIES: CONTROLS ARE NOT WORKING WITH CONTROL POWER FED FROM A-SIDE. FURTHER INVESTIGATION IS REQUIRED. A TEMPORARY SOLUTION IS TO SWITCH CONTROL POWER TO B-SIDE AND LEAVE IN MANUAL.

☐ ACCEPTABLE ☑ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: D. FLEMING Tested By: _____

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

DEFICIENCIES LOCATED

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 13
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE
DATE 2/21/2020 TEMPERATURE 70 °F HUMIDITY 60 % EQPT. LOCATION TERTIARY BUILDING
SUBSTATION !4 POSITION SUB 4 PANEL METERS

DEFICIENCIES LOCATED: DIGITAL PANEL METERS ON BOTH SIDES OF SWITCHBOARD ARE MALFUNCTIONING.

EQUIPMENT / SERVICES IMPACTED: POWER, KVA, VAR, PF READINGS ARE NOT READABLE. CURRENT AND VOLTAGE ANALOG METERS APPEAR TO BE WORKING CORRECTLY, ALTHOUGH NOT AS ACCURATE.

RECOMMENDED REPAIR: REPLACE BOTH PANEL METERS.

REPAIRS COMPLETED _____ YES X NO DATE: 2/21/2020

COMMENTS:

DEFICIENCIES: DIGITAL PANEL METERS ON BOTH SIDES OF SWITCHBOARD ARE MALFUNCTIONING. REPLACE BOTH PANEL METERS.

☐ ACCEPTABLE ☑ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: D. FLEMING Tested By: _____

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

DEFICIENCIES LOCATED

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 14

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE

DATE 3/2/2020 TEMPERATURE 70 °F HUMIDITY 60 % EQPT. LOCATION SOLIDS BUILDING

SUBSTATION !5 POSITION F2H 800A SPARE

DEFICIENCIES LOCATED: TRIP UNIT FAILS TO PASS MORE THAN 0.5 AMPS WITH SI TEST.

EQUIPMENT / SERVICES IMPACTED: BREAKER NOT AVAILABLE TO BE USED AS A SPARE IF NECESSARY.

RECOMMENDED REPAIR: REPLACE TRIP UNIT & RETEST.

REPAIRS COMPLETED _____ YES X NO DATE: 3/2/2020

COMMENTS:

DEFICIENCIES: TRIP UNIT FAILS TO PASS MORE THAN 0.5 AMPS WITH SI TEST. REPLACE TRIP UNIT & RETEST.

☐ ACCEPTABLE ☑ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #156386, DLRO #193764, SI #UIS224

Tested By: J. RYSENGA Tested By: E. TAPPAN

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

DEFICIENCIES LOCATED

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 15
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE
DATE 3/12/2020 TEMPERATURE 70 °F HUMIDITY 60 % EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION !8 POSITION MAIN A RELAY

DEFICIENCIES LOCATED: SEPAM S24 EXISTING GROUND FAULT SETTINGS DIFFER FROM MAIN B AND DIFFER FROM INITIAL PROGRAMMING ON 5/27/2016.

GF TCC HAS BEEN CHANGED FROM STANDARD INVERSE TIME TO DEFINITE TIME.

EQUIPMENT / SERVICES IMPACTED: ORIGINAL COORDINATION SCHEME MAY BE COMPROMISED AND BREAKER MAY TRIP PREMATURELY IF ANOTHER

DOWNSTREAM BREAKER ALSO SEES THE FAULT.

RECOMMENDED REPAIR: CUSTOMER HAS AGREED TO HAVE UIS CHANGE THE TCC BACK TO STANDARD INVERSE TIME DURING THE NEXT SCHEDULED

SHUTDOWN OF THIS POSITION IN A COUPLE WEEKS.

REPAIRS COMPLETED _____ YES _____ NO DATE: _____

COMMENTS:

DEFICIENCIES: RELAY SETTINGS DIFFER FROM MAIN B & ORIGINAL SPECS.

☐ ACCEPTABLE ☑ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: D. FLEMING Tested By: _____

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

DEFICIENCIES LOCATED

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 16

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE

DATE 3/12/2020 TEMPERATURE 70 °F HUMIDITY 60 % EQPT. LOCATION EAST BLOWER BUILDING

SUBSTATION !8 POSITION PAB-E3

DEFICIENCIES LOCATED: INTERLOCK AUX CONTACT DOES NOT ALLOW CONTROL POWER TO PASS IF LOADBREAK IS OPENED AND RECLOSED.

EQUIPMENT / SERVICES IMPACTED: IF LOADBREAK IS OPENED IT MAY NOT HAVE CONTROL POWER WHEN RECLOSED. MANUAL MANIPULATION OF AUX CONTACT IS NECESSARY TO REGAIN CONTROL POWER.

RECOMMENDED REPAIR: FURTHER INVESTIGATION IS REQUIRED TO VERIFY IF THE ISSUE IS A BAD AUX CONTACTOR OR BAD LINKAGE.

REPAIRS COMPLETED _____ YES X NO DATE: 3/12/2020

COMMENTS:

DEFICIENCIES: INTERLOCK AUX CONTACT MAY PREVENT CONTROL POWER WORKING AFTER LOADBREAK SWITCHING.

☐ ACCEPTABLE ☑ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: D. FLEMING Tested By: _____

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 17
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/24/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION MCC-RLS-A
SUBSTATION 1 — POSITION MAIN

MANUFACTURER	SQUARE D	SN / SO NO.	---	FRAME SIZE(F)	800
BREAKER TYPE	POWERPACT PL800	SENSOR TAPS	600	MOUNTING	(●) B.I. ( ) D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	( ) ON ( ) OFF
TRIP UNIT TYPE	MICROLOGIC 6.0 A	CATALOG NO.	PLP3408U44ALVJK	ZONE INTLK ☐	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Dirty	C
CONTACT FINGERS	☑	Acceptable	N/A
LOADING AND ARCING CONTACTS	☑	Acceptable	N/A
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 6	Size	500 KCMIL	CU (●) AL ( )

SETTINGS AS FOUND

RATING PLUG(R) 600 — SENSOR TAP — GRD. FLT. ( ) 3W ( ) 4W

LONG TIME PU	1	x	600	A =	600	A	DELAY 12	
SHORT TIME PU	4	=	2400	A			DELAY 0.0	I²T ( ) IN (●) OUT ( ) N/A
INST. PU	15	=	9000	A	(●) ON ( ) OFF			
GRD. FLT. PU	A	=	120	A	(●) ON ( ) OFF		DELAY 0.0	I²T ( ) IN (●) OUT ( ) N/A

SETTINGS AS LEFT

RATING PLUG(R) 600 — SENSOR TAP — GRD. FLT. ( ) 3W ( ) 4W

LONG TIME PU	1	x	600	A =	600	A	DELAY 12	
SHORT TIME PU	4	=	2400	A			DELAY 0.0	I²T ( ) IN (●) OUT ( ) N/A
INST. PU	15	=	9000	A	(●) ON ( ) OFF			
GRD. FLT. PU	A	=	120	A	(●) ON ( ) OFF		DELAY 0.0	I²T ( ) IN (●) OUT ( ) N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	18000	200%	---	---	0.003	0.003	0.003	0.003	0.003	0.003
	IPU									
SHORT TIME	4800	200%	---	---	0.045	0.045	0.045	0.045	0.045	0.045
	STPU									
LONG TIME	3600	600%	---	---	10.875	10.875	10.875	10.875	10.875	10.875
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	240	200%	---	---	0.042	0.042	0.042	0.042	0.042	0.042
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.038	0.036	0.028

COMMENTS: TESTED BREAKER IN MANUAL MODE.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572, SI #1512

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 18
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/24/2020 — TEMPERATURE 67 °F — HUMIDITY 35 % — EQPT. LOCATION SUB 1
SUBSTATION 1 — POSITION MAIN (A)

MANUFACTURER	SQUARE D	SN / SO NO.	085249508102	FRAME SIZE(F)	1600
BREAKER TYPE	MASTER PACT NW 16 H3	SENSOR TAPS	1600	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICRO LOGIC 6.0 A	CATALOG NO.	WA 6ECR44A9CFFFWSEA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	1200	LONG TIME PU	1.0	x	1200	A =	1200	A	DELAY	8		
SENSOR TAP	1,600	SHORT TIME PU	4	=	4800	A			DELAY	0.4	I²T	○ IN ◉ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	---	=	---	A	○ ON ◉ OFF					
		GRD. FLT. PU	B	=	360	A	◉ ON ○ OFF		DELAY	0.2	I²T	○ IN ◉ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	1200	LONG TIME PU	1.0	x	1200	A =	1200	A	DELAY	8		
SENSOR TAP	1,600	SHORT TIME PU	4	=	4800	A			DELAY	0.4	I²T	○ IN ◉ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	---	=	---	A	○ ON ◉ OFF					
		GRD. FLT. PU	B	=	360	A	◉ ON ○ OFF		DELAY	0.2	I²T	○ IN ◉ OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	6000	125%	---	---	0.420	0.420	---	---	---	---
	STPU									
LONG TIME	3600	300%	---	---	30.754	30.754	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	720	200%	---	---	0.159	0.159	---	---	---	---
	GFPU				---	---	---	---	---	---

EQUIPMENT TEMPERATURE 19 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.962

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,924.00	2,000	1,924.00	2,000	1,924.00
POLE TO FRAME	2,000	1,924.00	2,000	1,924.00	2,000	1,924.00
LINE TO LOAD	2,000	1,924.00	2,000	1,924.00	2,000	1,924.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C	---	---

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.015	0.015	0.014

COMMENTS: ALL FUNCTIONS PER TEST TOOL SAY PASSED
DATE CODE: 14061.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206124, DLRO #156856, SI #1512

Tested By: E. TAPPAN Tested By: E. KOEPFGEN

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 19
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/25/2020 — TEMPERATURE 67 °F — HUMIDITY 35 % — EQPT. LOCATION SUB 1
SUBSTATION 1 — POSITION MAIN (B)

MANUFACTURER	SQUARE D	SN / SO NO.	085249508101	FRAME SIZE(F)	1600
BREAKER TYPE	MASTER PACT NW 16 H3	SENSOR TAPS	1600	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICRO LOGIC 6.0 A	CATALOG NO.	WA 6ECR44A9CFFFWSEA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	1200	LONG TIME PU	1.0	x	1200	A =	1200	A	DELAY	8		
SENSOR TAP	1,600	SHORT TIME PU	4	=	4800	A			DELAY	0.4	I²T	○ IN ◉ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	---	=	---	A	○ ON ◉ OFF					
		GRD. FLT. PU	B	=	360	A	◉ ON ○ OFF		DELAY	0.2	I²T	○ IN ◉ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	1200	LONG TIME PU	1.0	x	1200	A =	1200	A	DELAY	8		
SENSOR TAP	1,600	SHORT TIME PU	4	=	4800	A			DELAY	0.4	I²T	○ IN ◉ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	---	=	---	A	○ ON ◉ OFF					
		GRD. FLT. PU	B	=	360	A	◉ ON ○ OFF		DELAY	0.2	I²T	○ IN ◉ OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	6000	125%	---	---	0.419	0.419	---	---	---	---
	STPU									
LONG TIME	3600	300%	---	---	31.094	31.094	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	720	200%	---	---	0.159	0.159	---	---	---	---
	GFPU				---	---	---	---	---	---

EQUIPMENT TEMPERATURE 19 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.962

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,924.00	2,000	1,924.00	2,000	1,924.00
POLE TO FRAME	2,000	1,924.00	2,000	1,924.00	2,000	1,924.00
LINE TO LOAD	2,000	1,924.00	2,000	1,924.00	2,000	1,924.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C	---	---

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.014	0.01	0.012

COMMENTS: ALL FUNCTIONS PER TEST TOOL SAY IT PASSED
DATE CODE: 14061.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979, DLRO #1570, SI #1512

Tested By: E. TAPPAN Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOLDED CASE CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 20
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/25/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION MCC RLS-A
SUBSTATION 1 — POSITION MCC RLS A & B TIE

MANUFACTURER	SQ D	SN / SO NO.	---	FRAME SIZE(F)	600
BREAKER TYPE	POWER PACT MJ 600	SENSOR TAPS	600	MOUNTING	(●) B.I. ( ) D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	( ) ON ( ) OFF
TRIP UNIT TYPE	---	CATALOG NO.	MJP36600LVJK	ZONE INTLK [ ]	TARGETS [ ]

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	NA
CONTACT FINGERS	☑	Acceptable	NA
LOADING AND ARCING CONTACTS	☑	Acceptable	NA
OVERCURRENT DEV. BATTERY	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	NA
AUXILIARY DEVICES	☐	N/A	NA
GROUND CONNECTION	☑	Acceptable	NA
LOAD CONDUCTOR NO. 0	Size		Cu ( ) Al ( )

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	---	---	---	---	---	---	---	---	---	---
	STPU									
LONG TIME	---	---	---	---	---	---	---	---	---	---
	LTPU									
GROUND FAULT	---	---	---	---	---	---	---	---	---	---
	GFPU									

MEGGER TEST IN MEGAOHMS	
A - B	2000+
B - C	2000+
C - A	2000+
A - G	2000+
B - G	2000+
C - G	2000+
OPEN POLES	
A -	2000+
B -	2000+
C -	2000+

CONTACT RESISTANCE READING

[ ] MICRO-OHMS [ ] MILLI-OHMS

PHASE A:	---
PHASE B:	---
PHASE C:	---

COMMENTS: UNABLE TO DUCTOR OR CLEAN DUE TO LINE OR LOAD BEING ENERGIZED FROM ALTERNATE SOURCES.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 21
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/24/2020 — TEMPERATURE 67 °F — HUMIDITY 35 % — EQPT. LOCATION SUB 1
SUBSTATION 1 — POSITION MCC-C

MANUFACTURER	SQUARE D	SN / SO NO.	085249512302	FRAME SIZE(F)	800
BREAKER TYPE	MASTER PACT NW 08 H3	SENSOR TAPS	250	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICRO LOGIC 6.0 A	CATALOG NO.	WA 6PPR44A9CXFXWXAA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C/L
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R) 250 — SENSOR TAP 800 — GRD. FLT. ◉ 3W ○ 4W

LONG TIME PU	0.9	x	250	A =	225	A	DELAY	24	
SHORT TIME PU	10	=	2250	A			DELAY	0.2	I²T ○ IN ◉ OUT ○ N/A
INST. PU	---	=	---	A	○ ON	◉ OFF			
GRD. FLT. PU	C	=	100	A	◉ ON	○ OFF	DELAY	0.0	I²T ○ IN ◉ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R) 250 — SENSOR TAP 800 — GRD. FLT. ◉ 3W ○ 4W

LONG TIME PU	0.9	x	250	A =	225	A	DELAY	24	
SHORT TIME PU	10	=	2250	A			DELAY	0.2	I²T ○ IN ◉ OUT ○ N/A
INST. PU	---	=	---	A	○ ON	◉ OFF			
GRD. FLT. PU	C	=	100	A	◉ ON	○ OFF	DELAY	0.0	I²T ○ IN ◉ OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	2812	125%	---	---	0.170	0.170	---	---	---	---
	STPU									
LONG TIME	1575	700%	---	---	15.505	15.505	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	200	200%	---	---	0.037	0.037	---	---	---	---
	GFPU				---	---	---	---	---	---

EQUIPMENT TEMPERATURE 19 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.962

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,924.00	2,000	1,924.00	2,000	1,924.00
POLE TO FRAME	2,000	1,924.00	2,000	1,924.00	2,000	1,924.00
LINE TO LOAD	2,000	1,924.00	2,000	1,924.00	2,000	1,924.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C	---	---

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.01	0.011	0.012

COMMENTS: ALL FUNCTIONS PASS PER TEST TOOL
DATE CODE: 14063.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206124, DLRO #156856, SI #1512

Tested By: E. TAPPAN — Tested By: E. KOEPFGEN

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 22
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/24/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SCREEN & GRIT BLDG ELEC. RM
SUBSTATION 1 — POSITION MCC-C

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — SERIAL NO. --- — TYPE 7700 LINE CONTRAL
CATALOG NO. 435X719M04 — DRAWING NO. 213B9202 — VOLTAGE CLASS 460
MAIN BUS RATING 600 A — MAIN BUS NEUTRAL RATING --- A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING --- — NUMBER OF SECTIONS 4 — LISTING [ ] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER --- MLO --- TYPE --- AMPACITY --- MAIN DISCONNECT X FUSE TYPE FPS SIZE 100
TOTAL POSITIONS EQUIPPED 20 — NO. OF SPARE SPACES 2 — TOTAL POSITIONS USED 18

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTIONS	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
SECTION 1 THRU SECTION 4	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	2,120	2,120	2,120		2,120	2,120	2,120			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
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Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 23
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/24/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SCREEN & GRIT BLD ELEC RM
SUBSTATION 1 — POSITION MCC-C (01)

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — SIZE 600A — TYPE 7700 LINE CONTROL
CATALOG NO. 435X719M04 — SERIES --- — MAX. VOLTS 480

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
1-1 BAR SCREEN 3	FRS R15	15A	62,645	5,618	12,079	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
1-2 SUMP PUMP	TRS 5R	5A	4,252	18,278	4,119	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
1-3 DOOR OPERATOR S GATE	FRS 3 2/10	3 2/10	11,372	2,337	13,761	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
1-4 ROTOR K F-8-1, F-8-2	TRS 20R	20A	11,766	2,049	3,879	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
1-5 SPARE	FRS R30	30A	15,410	2,077	2,253	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
1-6 DOOR OPERATOR N GATE W DOOR	TRS 2R	2A	6,039	1,730	5,725	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
1-7 LIGHTING PNL-C	VAR	80A	1,459	1,428	2,365	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
1-8 SPARE (WELDER PLUG)	BRKR	60A	9,986	4,260	22,406	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
2-1 RSLSE BUILDING ATS SOURCE 2	BRKR	150A	727.9	772.1	762.7	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: LIGHTING PNL-C OCPD IS 3 DIFFERENT FUSES ALL 80 DUAL ELEMENT.
BAR SCREEN 3 B & C PHASES BARRICADE MISSING.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 24

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/24/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SCREEN & GRIT BUILDING

SUBSTATION 1 — POSITION MCC-C (02)

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — SIZE 600A — TYPE 7700 LINE CONTROL

CATALOG NO. 435X719M04 — SERIES --- — MAX. VOLTS 480

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☐	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06

INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
2-2 SUMP N GARAGE BASEMENT	NONE	NONE	37,412	41,380	32,308	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
2-3 SUMP SUB M PUMP 1	FRS-R 12	12A	6,871	3,819	55,180	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
2-4 SC-1	FRS-R 30	30A	2,039	2,168	5,888	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
2-5 ROTOR K F-8-5	FRS 20R	20A	2,749	110,490	52,070	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
2-6 GRIT BLOWER NO. 3	FRS 15	15A	7,265	49,344	54,310	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
3-1 BAR SCREEN NO. 1 MS-1	TRI 30R	30A	4,276	6,036	5,120	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
3-2 SCREW CONVEYOR SS C-1	FRS R30	30A	4,618	5,104	5,661	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
3-3 GRIT SLURRY PUMP GP-3	FRS-R 30	30A	4,338	2,762	13,592	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
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(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 25
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/24/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SCREEN & GRIT BUILDING
SUBSTATION 1 — POSITION MCC-C (03)

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — SIZE 600A — TYPE 7700 LINE CONTROL
CATALOG NO. 435X719M04 — SERIES --- — MAX. VOLTS 480

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
4-2 SLUICE GATE NO. 3	FRS 7	7A	6,751	1,052	2,934	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
4-3 SLUICE GATE NO. 4	FRS 7	7A	5,291	1,712	94,201	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
4-5 MAIN	LPS 100	100A	119.2	100.1	107.4	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
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LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 26
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/25/2020 — TEMPERATURE 67 °F — HUMIDITY 35 % — EQPT. LOCATION SUB 1
SUBSTATION 1 — POSITION MCC-D

MANUFACTURER	SQUARE D	SN / SO NO.	085249512301	FRAME SIZE(F)	800
BREAKER TYPE	MASTER PACT NW 08 H3	SENSOR TAPS	250	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICRO LOGIC 6.0 A	CATALOG NO.	WA 6PPR44A9CXFXWXAA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	250	LONG TIME PU	0.9	x	250	A =	225	A	DELAY	24		
SENSOR TAP	800	SHORT TIME PU	10	=	2250	A			DELAY	0.2	I²T	○ IN ◉ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	---	=	---	A	○ ON ◉ OFF					
		GRD. FLT. PU	C	=	100	A	◉ ON ○ OFF		DELAY	0.0	I²T	○ IN ◉ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	250	LONG TIME PU	0.9	x	250	A =	225	A	DELAY	24		
SENSOR TAP	800	SHORT TIME PU	10	=	2250	A			DELAY	0.2	I²T	○ IN ◉ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	---	=	---	A	○ ON ◉ OFF					
		GRD. FLT. PU	C	=	75	A	◉ ON ○ OFF		DELAY	0.0	I²T	○ IN ◉ OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	2812	125%	---	---	0.170	0.170	---	---	---	---
	STPU									
LONG TIME	1575	700%	---	---	15.212	15.212	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	200	200%	---	---	0.036	0.036	---	---	---	---
	GFPU				---	---	---	---	---	---

EQUIPMENT TEMPERATURE 19 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.962

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,924.00	2,000	1,924.00	2,000	1,924.00
POLE TO FRAME	2,000	1,924.00	2,000	1,924.00	2,000	1,924.00
LINE TO LOAD	2,000	1,924.00	2,000	1,924.00	2,000	1,924.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C	---	---

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.008	0.008	0.009

COMMENTS: ALL FUNCTIONS PER TEST TOOL PASSED

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979, DLRO #1570, SI #1512

Tested By: E. TAPPAN Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 27

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/25/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SCREEN & GRIT BLD ELEC RM

SUBSTATION 1 — POSITION MCC-D

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — SERIAL NO. --- — TYPE 7700 LINE CONTROL

CATALOG NO. 435X719M05 — DRAWING NO. 213B9202 — VOLTAGE CLASS 460

MAIN BUS RATING SUPPLY:600 SEC:300 A — MAIN BUS NEUTRAL RATING --- A — CONDUCTOR (•) Cu ( ) Al

CURRENT WITHSTAND RATING --- — NUMBER OF SECTIONS 6 — LISTING [ ] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER --- MLO --- TYPE --- AMPACITY --- MAIN DISCONNECT X FUSE TYPE LPS SIZE 100

TOTAL POSITIONS EQUIPPED 33 — NO. OF SPARE SPACES 0 — TOTAL POSITIONS USED 30

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTIONS	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
SECTION 1 THRU SECTION 6	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	2,120	2,120	2,120		2,120	2,120	2,120			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE [ ] NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 28
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/25/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SCREEN & GRIT BLD ELEC RM
SUBSTATION 1 — POSITION MCC-D (01)

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — SIZE 600A — TYPE 7700 LINE CONTROL
CATALOG NO. 435X719M05 — SERIES --- — MAX. VOLTS 480

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
1-1 ROTOR K F-6-1	FRS-R 30	30A	23,370	8,017	21,304	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
1-2 ROTOR K F-6-2	FRS-R 30	30A	1,330	2,344	20,136	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
1-3 SLUICE GATE NO. 5	FRS 7	7A	2,592	4,380	18,965	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
1-4 EAST PLANT FLOW CONTROL VALVE	FRS-R 20	20A	5,566	2,326	32,150	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
1-5 LIGHTING PANEL P	FRS-R 80	80A	7,119	5,326	1,358	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
1-6 MAIN 1BFB-3 *	LPS 100	100A	217.3	141.5	78.4	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
2-1 BAR SCREEN NO. 2 MS-2	FRS-R 30	30A	19,811	4,288	6,937	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
2-2 JIB CRANES JC-113	FRS-R 20	20A	8,764	10,780	52,184	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
2-3 ROTOR K F-6-4, F-7-1, F-8-6	BRKR	20A	3,357	2,700	3,528	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: *DURING IR C-PHASE FUSE CLIP AT THE BOTTOM WAS HOT. TEMP FIX APPLIED WHILE WAITING FOR THE PERMANENT FIX PARTS.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 29
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/25/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SCREEN & GRIT BLD ELEC RM
SUBSTATION 1 — POSITION MCC-D (02)

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — SIZE 600A — TYPE 7700 LINE CONTROL
CATALOG NO. 435X719M05 — SERIES --- — MAX. VOLTS 480

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
2-4 GRIT BLOWER NO. 2	LOTO	LOTO				2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
2-5 CHANNEL AIR BLOWER	NONE	NONE	36,496	8,303	2,549	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
3-1 SEPTIC PUMP	NONE	NONE	1,176	1,238	1,418	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
3-2 HOIST	FRS 15	15A	3,732	20,345	11,465	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
3-3 SUMP PUMP 2	FRS-R 20	20A	57,200	2,725	1,978	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
3-4 GRIT / SLURRY PUMP GP-4	FRS-R 30	30A	11,763	3,862	4,774	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
3-5 GRIT DEWATERING GDU-1	FRS-R 30	30A	6,602	1,793	5,820	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
3-6 #3 SCREW CONVEYOR	FRS-R 20	20A	4,429	3,354	30,494	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
4-1 NO NAME**	NONE	NONE	25,718			2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: *GRIT BLOWER NO. 2: UNABLE TO TEST DUE TO LOTO / CHANNEL AIR BLOWER.
GRIT / SLURRY PUMP: VARIOUS FUSE IN USE ALL 30A / B TO C PHASE BARRIER BROKEN.

DEFICIENCIES: **DLRO WOULD NOT SETTLE ON A NUMBER. OPERATED SWITCH MULTIPLE TIMES & STILL WOULD NOT SETTLE. BAD B-PHASE CONTACT. BUCKET NOT IN USE.

☐ ACCEPTABLE ☑ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 30
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/25/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SCREEN & GRIT BLD ELEC RM
SUBSTATION 1 — POSITION MCC-D (03)

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — SIZE 600A — TYPE 7700 LINE CONTROL
CATALOG NO. 435X719M05 — SERIES --- — MAX. VOLTS 480

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
4-2 SHAFTLESS SCREW CONVEYOR 2	FRS-R 30	30A	13,388	3,575	6,767	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
4-3 SUMP NO. 2	FRS-R 12	12A	76,465	6,192	12,598	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
4-4 SCREENING COMPACTOR 3	FRS-R 30	30A	32,508	13,977	8,242	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
5-1 DOOR OPERATOR N GATE E DOOR	FRS 2 8/10	2 8/10 A	6,887	2,063	20,016	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
5-2 HEAT RECOVERY UNIT HR-1	FRS-R 30	30A	5,947	2,179	3,878	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
5-3 GRIT DEWATERING GDU-2	FRS-R 30	30A	16,788	18,565	2,098	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
5-4 ROTOR K F-5-2	FRS-R 30	30A	2,005	2,830	7,689	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
5-5 ROTOR K F-5-1	FRS-R 30	30A	2,872	3,739	3,590	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
5-6 WELDER OUTLET	TRS 30R	30A	17,568	3,902	2,094	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 31
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE
DATE 2/25/2020 TEMPERATURE 70 °F HUMIDITY 60 % EQPT. LOCATION SCREEN & GRIT BLD ELEC RM
SUBSTATION 1 POSITION MCC-D (04)

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC SIZE 600A TYPE 7700 LINE CONTROL
CATALOG NO. 435X719M05 SERIES --- MAX. VOLTS 480

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C
TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1
K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
5-7 GRIT SLURRY PUMP GP-1	FRS-R 30	30A	5,429	7,180	7,727	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
6-1 RSLSE BLD ATS SOURCE 1	BRKR	150A	861.5	815.5	936	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
6-2 ROTOR K F-3-1	TRS 20R	20A	14,415	1,181	5,834	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
6-3 SCREENING COMPACTOR SC-2	FRS-R 30	30A	2,953	4,495	40,748	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
6-4 ROTOR K F-6-3	TRS 20R	20A	1,416	1,438	1,575	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
6-5 GRIT SLURRY PUMP GR-2	FRS-R 30	30A	5,445	2,186	4,834	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES: ROTOR F-6-3 DOOR INTERLOCK WILL NOT ALLOW DISCONNECT TO OPERATE WITH DOOR CLOSED.

☐ ACCEPTABLE ☑ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 32
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/24/2020 — TEMPERATURE 67 °F — HUMIDITY 35 % — EQPT. LOCATION SUB 1
SUBSTATION 1 — POSITION MCC-RLS-A

MANUFACTURER	SQUARE D	SN / SO NO.	085249507701	FRAME SIZE(F)	800
BREAKER TYPE	MASTER PACT NW 08 H3	SENSOR TAPS	600	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICRO LOGIC 6.0 A	CATALOG NO.	WA 6ATR44B9CXFXWXAA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	N/A	

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	600	LONG TIME PU	1.0	x	600	A =	600	A	DELAY	12		
SENSOR TAP	800	SHORT TIME PU	4	=	2400	A			DELAY	0.2	I²T	○ IN ◉ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	---	=	---	A	○ ON ◉ OFF					
		GRD. FLT. PU	B	=	180	A	◉ ON ○ OFF		DELAY	0.0	I²T	○ IN ◉ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	600	LONG TIME PU	1.0	x	600	A =	600	A	DELAY	12		
SENSOR TAP	800	SHORT TIME PU	4	=	2400	A			DELAY	0.2	I²T	○ IN ◉ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	---	=	---	A	○ ON ◉ OFF					
		GRD. FLT. PU	B	=	180	A	◉ ON ○ OFF		DELAY	0.0	I²T	○ IN ◉ OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	3000	125%	---	---	0.170	0.170	---	---	---	---
	STPU									
LONG TIME	1800	300%	---	---	44.838	44.838	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	360	200%	---	---	0.036	0.036	---	---	---	---
	GFPU				---	---	---	---	---	---

EQUIPMENT TEMPERATURE 19 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.962

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,924.00	2,000	1,924.00	2,000	1,924.00
POLE TO FRAME	2,000	1,924.00	2,000	1,924.00	2,000	1,924.00
LINE TO LOAD	2,000	1,924.00	2,000	1,924.00	2,000	1,924.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C	---	---

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.013	0.012	0.013

COMMENTS: ALL FUNCTIONS PER TEST TOOL PASSED
DATE CODE: 14061.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206124, DLRO #156856, SI #1512

Tested By: E. TAPPAN Tested By: E. KOEPFGEN

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 33
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/24/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION RAW SEWAGE LIFT STATION
SUBSTATION 1 — POSITION MCC-RLS-A

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 3095127-1-137 — TYPE MODEL 6
CATALOG NO. --- — DRAWING NO. --- — VOLTAGE CLASS 600
MAIN BUS RATING 600 A — MAIN BUS NEUTRAL RATING 600 A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING 100 KA — NUMBER OF SECTIONS 5 — LISTING ☑ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER 1 — MLO --- — TYPE PL 800 — AMPACITY 800 — MAIN DISCONNECT --- — FUSE TYPE --- — SIZE ---
TOTAL POSITIONS EQUIPPED 16 — NO. OF SPARE SPACES 1 — TOTAL POSITIONS USED 15

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTIONS	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
ALL (5)	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	2,120	2,120	2,120		2,120	2,120	2,120			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 34
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/24/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION RSL STATION
SUBSTATION 1 — POSITION MCC-RLS-A (01)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE 600 — TYPE MODEL 6 MCL
CATALOG NO. --- — SERIES --- — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
SPARE 30A	BRKR	30A	14,414	9,678	26,110	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SURGE PROTECTION DEVICE	N/A	N/A	523.9	693.1	5,323	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
10HP SPARE	BRKR	30A	40,942	39,592	48,918	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
WATER CIRCULATING PUMP 1 RSL-P-1	BRKR	30A	21,052	20,404	20,968	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
WATER CIRCULATING PUMP 2 RSL-P-2	BRKR	30A	4,131	3,801	4,561	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE 30A	BRKR	30A	33,603	19,039	17,817	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
XFMR 30KVA LP-RLS	BRKR	60A	8,101	3,317	4,538	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
S-1-2	BRKR	20A	8,135	9,190	7,347	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 35

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE

DATE 2/24/2020 TEMPERATURE 70 °F HUMIDITY 60 % EQPT. LOCATION RSL STATION

SUBSTATION 1 POSITION MCC-RLS-A (02)

NAMEPLATE DATA

MANUFACTURER SQUARE D SIZE 600 TYPE MODEL 6 MCL

CATALOG NO. --- SERIES --- MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C

TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1

K2 = (K1) (TCF) = 1.06

INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
RLS-ACU-1	BRKR	15A	21,138	16,697	21,388	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
RLS-ACCU-1	BRKR	15A	11,747	9,736	8,805	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SCREW PUMP NO. 1	BRKR	250A	549.8	456.8	461.7	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SCREW PUMP NO. 3	BRKR	250A	696.4	716.6	567.8	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SCREW PUMP NO. 5	BRKR	250A				2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: SCREW PUMP NO. 5: LOTO APPLIED, UNABLE TO OPERATE.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 36
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/25/2020 — TEMPERATURE 67 °F — HUMIDITY 35 % — EQPT. LOCATION SUB 1
SUBSTATION 1 — POSITION MCC-RLS-B

MANUFACTURER	SQUARE D	SN / SO NO.	085249507801	FRAME SIZE(F)	800
BREAKER TYPE	MASTER PACT NW 08 H3	SENSOR TAPS	400	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICRO LOGIC 6.0 A	CATALOG NO.	WA 6ASR44A9CXFXWXAA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	400	LONG TIME PU	0.9	x	400	A =	360	A	DELAY	20		
SENSOR TAP	800	SHORT TIME PU	5	=	1800	A			DELAY	0.2	I²T	○ IN ◉ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	---	=	---	A	○ ON ◉ OFF					
		GRD. FLT. PU	C	=	160	A	◉ ON ○ OFF		DELAY	0.0	I²T	○ IN ◉ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	400	LONG TIME PU	0.9	x	400	A =	360	A	DELAY	20		
SENSOR TAP	800	SHORT TIME PU	5	=	1800	A			DELAY	0.2	I²T	○ IN ◉ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	---	=	---	A	○ ON ◉ OFF					
		GRD. FLT. PU	C	=	160	A	◉ ON ○ OFF		DELAY	0.0	I²T	○ IN ◉ OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	2250	125%	---	---	0.170	0.170	---	---	---	---
	STPU									
LONG TIME	1320	366%	---	---	46.697	46.697	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	320	200%	---	---	0.038	0.038	---	---	---	---
	GFPU				---	---	---	---	---	---

EQUIPMENT TEMPERATURE 19 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.962

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,924.00	2,000	1,924.00	2,000	1,924.00
POLE TO FRAME	2,000	1,924.00	2,000	1,924.00	2,000	1,924.00
LINE TO LOAD	2,000	1,924.00	2,000	1,924.00	2,000	1,924.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C	---	---

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.011	0.01	0.013

COMMENTS: ALL FUNCTIONS PER TEST TOOL PASSED
DATE CODE: 14061.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979, DLRO #1570, SI #1512

Tested By: E. TAPPAN Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 37
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/25/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION RAW SEWAGE LIFT STATION
SUBSTATION 1 — POSITION MCC-RLS-B

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-138 — TYPE MODEL 6
CATALOG NO. --- — DRAWING NO. --- — VOLTAGE CLASS 600
MAIN BUS RATING 600 A — MAIN BUS NEUTRAL RATING 600 A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING 100 KA — NUMBER OF SECTIONS 4 — LISTING [x] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER 1 — MLO — TYPE * — AMPACITY 600 — MAIN DISCONNECT --- — FUSE TYPE --- — SIZE ---
TOTAL POSITIONS EQUIPPED 15 — NO. OF SPARE SPACES 3 — TOTAL POSITIONS USED 12

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	NEW
INSULATING MEMBERS	☑	Acceptable	NEW
CUBICLES	☑	Acceptable	NEW
GROUND CONNECTIONS	☑	Acceptable	NEW
AUXILIARY DEVICES	☑	Acceptable	NEW

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 10 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.5

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
ALL (4)	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	1,000	1,000	1,000		1,000	1,000	1,000			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS: * POWER PACT LJ600

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 38

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/25/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION RLS BUILDING

SUBSTATION 1 — POSITION MCC-RLS-B (01)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE 600A — TYPE MODEL 6

CATALOG NO. --- — SERIES --- — MAX. VOLTS 600V

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06

INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
10HP SPARE	BRKR	30A	41,676	34,242	44,623	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SURGE PROTECTION	BRKR	N/A	1,826	1,283	2,265	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
MAIN	BRKR	600A	577.9	971	1,932	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SCREW PUMP NO. 2	BRKR	250A	11,895	1,487	2,319	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE	BRKR	30A	14,192	19,092	14,214	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
POSITIVE PRESSURIZATION UNIT	BRKR	25A	9,471	12,505	8,271	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
WELDER OUTLET	BRKR	30A	25,260	11,723	4,565	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SCREW PUMP NO. 4	BRKR	250A	1,208	1,724	2,312	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
TO ATS RLS	BRKR	60A	12,265	10,238	13,083	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 39
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/25/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION RSLS BUILDING
SUBSTATION 1 — POSITION MCC-RLS-B (02)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE 600A — TYPE MODEL 6
CATALOG NO. --- — SERIES --- — MAX. VOLTS 600V

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
48 IN GATE S-1-1	BRKR	30A	44,908	35,038	38,326	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE	BRKR	30A	20,204	24,508	23,398	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
EXHAUST FAN 2	BRKR	30A	25,834	26,772	7,176	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
EXHAUST FAN 1	BRKR	30A	5,527	3,018	4,083	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SUPPLY FAN RLS1SF-1	BRKR	30A	12,222	16,443	8,778	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOLDED CASE CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 40
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/25/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION MCC-RLS-B
SUBSTATION 1 — POSITION MCC-RLS-B MAIN

MANUFACTURER	SQ D	SN / SO NO.	---	FRAME SIZE(F)	600
BREAKER TYPE	POWER PACT LJ600	SENSOR TAPS	600	MOUNTING	(●) B.I. ( ) D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	( ) ON ( ) OFF
TRIP UNIT TYPE	MICROLOGIC 6.3E	CATALOG NO.	LJP3660US4XENLH1	ZONE INTLK ☐	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Dirty	C
CONTACT FINGERS	☑	Acceptable	NA
LOADING AND ARCING CONTACTS	☑	Acceptable	NA
OVERCURRENT DEV. BATTERY	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	NA
AUXILIARY DEVICES	☐	N/A	NA
GROUND CONNECTION	☑	Acceptable	NA
LOAD CONDUCTOR NO. 0	Size		Cu ( ) Al ( )

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	8250	13.75	---	---	0.058	0.058	0.058	0.058	0.058	0.058
	IPU									
SHORT TIME	3786	9.46	---	---	0.113	0.113	0.113	0.113	0.113	0.113
	STPU									
LONG TIME	1476	3.89	---	---	38.84	38.84	38.84	38.84	38.84	38.84
	LTPU									
GROUND FAULT	240	0.4	---	---	0.038	0.038	0.038	0.038	0.038	0.038
	GFPU									

MEGGER TEST IN MEGAOHMS	
A - B	2000+
B - C	2000+
C - A	2000+
A - G	2000+
B - G	2000+
C - G	2000+
OPEN POLES	
A -	2000+
B -	2000+
C -	2000+

CONTACT RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

PHASE A:	0.577
PHASE B:	0.971
PHASE C:	1.932

COMMENTS: IR SET AT 400A. INST SET AT 11.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572, SI #1482

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 41
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/25/2020 — TEMPERATURE 67 °F — HUMIDITY 35 % — EQPT. LOCATION SUB 1
SUBSTATION 1 — POSITION SECTION 4 (SPARE)

MANUFACTURER	SQUARE D	SN / SO NO.	085249508201	FRAME SIZE(F)	800
BREAKER TYPE	MASTER PACT NW 08 H3	SENSOR TAPS	800	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICRO LOGIC 6.0 A	CATALOG NO.	WA 6AAR44A9CXFXWXAA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND												
RATING PLUG(R)	800	LONG TIME PU	1.0	x	800	A =	800	A	DELAY	0.5		
SENSOR TAP	800	SHORT TIME PU	1.5	=	1200	A			DELAY	0.1	I²T	◉ IN ○ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	2.0	=	1600	A	◉ ON ○ OFF					
		GRD. FLT. PU	A	=	160	A	◉ ON ○ OFF		DELAY	0.1	I²T	◉ IN ○ OUT ○ N/A

SETTINGS AS LEFT												
RATING PLUG(R)	800	LONG TIME PU	1.0	x	800	A =	800	A	DELAY	0.5		
SENSOR TAP	800	SHORT TIME PU	1.5	=	1200	A			DELAY	0.1	I²T	◉ IN ○ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	2.0	=	1600	A	◉ ON ○ OFF					
		GRD. FLT. PU	A	=	160	A	◉ ON ○ OFF		DELAY	0.1	I²T	◉ IN ○ OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	2000	---	---	---	0.037	0.037	---	---	---	---
	IPU									
SHORT TIME	1400	---	---	---	5.538	5.538	---	---	---	---
	STPU									
LONG TIME	1067	---	---	---	15.772	15.772	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	320	---	---	---	0.613	0.613	---	---	---	---
	GFPU				---	---	---	---	---	---

EQUIPMENT TEMPERATURE 19 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.962

INSULATION RESISTANCE	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,924.00	2,000	1,924.00	2,000	1,924.00
POLE TO FRAME	2,000	1,924.00	2,000	1,924.00	2,000	1,924.00
LINE TO LOAD	2,000	1,924.00	2,000	1,924.00	2,000	1,924.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C	---	---

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.017	0.024	0.024

COMMENTS: ALL FUNCTIONS PER TEST TOOL PASSED.
DATE CODE: 14061.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206479, DLRO #1570, SI #1512

Tested By: E. TAPPAN Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 42
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/24/2020 — TEMPERATURE 67 °F — HUMIDITY 35 % — EQPT. LOCATION SUB 1
SUBSTATION 1 — POSITION SPARE (SECTION 1)

MANUFACTURER	SQUARE D	SN / SO NO.	085249507902	FRAME SIZE(F)	800
BREAKER TYPE	MASTER PACT NW 08 H3	SENSOR TAPS	250	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	1D	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICRO LOGIC 6.0 A	CATALOG NO.	WA6PPR44A9CXFXWXAA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	250	LONG TIME PU	1.0	x	250	A =	250	A	DELAY	24		
SENSOR TAP	800	SHORT TIME PU	10	=	2500	A			DELAY	0.1	I²T ○ IN	◉ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	15	=	3750	A	◉ ON ○ OFF					
		GRD. FLT. PU	A	=	75	A	◉ ON ○ OFF		DELAY	0.0	I²T ○ IN	◉ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	250	LONG TIME PU	1.0	x	250	A =	250	A	DELAY	24		
SENSOR TAP	800	SHORT TIME PU	10	=	2500	A			DELAY	0.1	I²T ○ IN	◉ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	15	=	3750	A	◉ ON ○ OFF					
		GRD. FLT. PU	A	=	75	A	◉ ON ○ OFF		DELAY	0.0	I²T ○ IN	◉ OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	4688	125%	---	---	0.035	0.035	---	---	---	---
	IPU									
SHORT TIME	3125	125%	---	---	0.111	0.111	---	---	---	---
	STPU									
LONG TIME	1750	700%	---	---	14.963	14.963	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	150	200%	---	---	0.036	0.036	---	---	---	---
	GFPU				---	---	---	---	---	---

EQUIPMENT TEMPERATURE 19 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.962

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,924.00	2,000	1,924.00	2,000	1,924.00
POLE TO FRAME	2,000	1,924.00	2,000	1,924.00	2,000	1,924.00
LINE TO LOAD	2,000	1,924.00	2,000	1,924.00	2,000	1,924.00

CONTROL WIRING				COUNTER READING BEG/END	
READING		20°C		---	---

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.023	0.021	0.022

COMMENTS: ALL FUNCTIONS PER TEST TOOL SAY PASSED
DATE CODE: 14063.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206124, DLRO #156856, SI #1512

Tested By: E. TAPPAN Tested By: E. KOEPFGEN

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE SWITCHBOARD INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 43

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/24/2020 — TEMPERATURE 50 °F — HUMIDITY 60 % — EQPT. LOCATION SUB 1

SUBSTATION 1 — POSITION SUB 1

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. E -409906 — TYPE POWER ZONE 4

CATALOG NO. --- — DRAWING NO. 30951271-004 — VOLTAGE CLASS 480/277

PHASE AMPACITY 2000 A — WITHSTAND RATING 100 kA — CONDUCTOR ☑ Cu ☐ Al

INSTALLED DEVICES

DRAWOUT LVACB 9 — BOLT-IN LVACB --- — DRAWOUT MCCB --- — BOLT-IN MCCB ---

BOLTED PRESSURE SWITCHES --- — FUSED DISCONNECTS --- — PROTECTIVE RELAYS --- — PANEL METERS 2

kWh METERS --- — VT's 6 — CT's 6 — CPT's 2

Other 2 - SURGE LOGICS

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 10 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.5

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
1-2	RDG.	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
	20°C	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
3-4	RDG.	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
	20°C	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
---	RDG.										
	20°C										
---	RDG.										
	20°C										
---	RDG.										
	20°C										
---	RDG.										
	20°C										
---	RDG.										
	20°C										
---	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206127

Tested By: E. TAPPAN Tested By: E. KOEPFGEN

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

SWITCHBOARD BUS CONNECTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 44
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/25/2020 — TEMPERATURE 67 °F — HUMIDITY 35 % — EQPT. LOCATION SUB 1
SUBSTATION 1 — POSITION SUB 1

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. E-409906 — TYPE POWER ZONE 4
CATALOG NO. --- — DRAWING NO. 30951271-004 — VOLTAGE CLASS 480/277
PHASE AMPACITY 2000 A — WITHSTAND RATING 100 kA — CONDUCTOR (•) CU ( ) AL

BUS SECTION TESTED		RESISTANCE IN ☑ MICRO-OHMS ☐ MILLI-OHMS					BUS SECTION TESTED		RESISTANCE IN ☐ MICRO-OHMS ☐ MILLI-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
1	2	42	43	41	31	22							
3	4	50	45	34	33	25							

COMMENTS: NEUTRAL DOES NOT PASS THROUGH SECTIONS 2 & 3.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: DLRO #1570

Tested By: E. TAPPAN Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOADBREAK DISCONNECT TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 45
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 2/24/2020 | TEMPERATURE 67 °F | HUMIDITY 35 % | EQPT. LOCATION SUB 1
SUBSTATION 1 | POSITION SUB 1 (A)

FUSE DATA

MANUFACTURER N/A | TYPE --- | HOLDER --- | MAX. AMPS ---
REFILL ELEMENT TYPE --- | SIZE --- | CAT. NO. --- | TCC NO. --- | VOLTAGE --- kV

NAMEPLATE DATA

MANUFACTURER SQUARE D | SERIAL NO. ---
VOLTAGE 15 kV | TYPE HVL | AMPERES 600 | INTERRUPTING RATING 40 kA
TYPE OPERATING MECHANISM MANUAL | AGE 1/14 | B.I.L. RATING 95 kV
MOMENTARY FAULT CLOSING AMPS 40 kA | OTHER NAMEPLATE DATA ---

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	NA
INSULATING MEMBERS	☑	Acceptable	NA
MECHANICAL CONNECTION	☑	Acceptable	NA
STRUCTURAL MEMBERS	☑	Acceptable	NA
CUBICLE	☑	Acceptable	NA
AUXILIARY DEVICES	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
MAIN CONTACTS	☑	Acceptable	NA
HEATERS	☐	N/A	NA
BEARINGS	☑	Acceptable	NA
CONTACT SEQUENCE	☑	Acceptable	NA
GROUND CONNECTION	☑	Acceptable	NA

INSULATION TEST VOLTAGE 5 kVdc | TEST VOLTAGE MULTIPLIER, K1 = 1 | K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 19 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.95

INSULATION TESTS

	RANGE MULTIPLIER	K2	POLE 1 (P1-P2) MΩ READING	POLE 1 (P1-P2) MΩ 20°C	POLE 2 (P2-P3) MΩ READING	POLE 2 (P2-P3) MΩ 20°C	POLE 3 (P1-P3) MΩ READING	POLE 3 (P1-P3) MΩ 20°C
POLE TO POLE	1.000	0.950	100,000.0	95,000.00	100,000.0	95,000.00	100,000.0	95,000.00
POLE TO FRAME	1.000	0.950	100,000.0	95,000.00	100,000.0	95,000.00	100,000.0	95,000.00
LINE TO FRAME	1.000	0.950	100,000.0	95,000.00	100,000.0	95,000.00	100,000.0	95,000.00
LOAD TO FRAME	1.000	0.950	100,000.0	95,000.00	100,000.0	95,000.00	100,000.0	95,000.00
LINE TO LOAD	1.000	0.950	100,000.0	95,000.00	100,000.0	95,000.00	100,000.0	95,000.00

Contacts

		POLE 1	POLE 2	POLE 3
CONTACT RESISTANCE SWITCH & FUSE ☐ MICRO-OHMS ☑ MILLI-OHMS		---	---	---
SWITCH CONTACT		0.039	0.041	0.040
FUSE		---	---	---
HI POT (MICRO AMPS)	37 KVDC	2.5	1.9	3.2

COMMENTS: NON FUSED SWITCH
HIPOT VALUE 37 kVDC

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206124, DLRO #156856, HIPOT #191469

Tested By: D. FLEMING Tested By: E. KOEPFGEN

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOADBREAK DISCONNECT TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 46
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 2/25/2020 | TEMPERATURE 65 °F | HUMIDITY 50 % | EQPT. LOCATION SUB 1
SUBSTATION 1 | POSITION SUB 1 (B)

FUSE DATA

MANUFACTURER N/A | TYPE --- | HOLDER --- | MAX. AMPS ---
REFILL ELEMENT TYPE --- | SIZE --- | CAT. NO. --- | TCC NO. --- | VOLTAGE --- kV

NAMEPLATE DATA

MANUFACTURER SQUARE D | SERIAL NO. ---
VOLTAGE 15 kV | TYPE HVL | AMPERES 600 | INTERRUPTING RATING 40 kA
TYPE OPERATING MECHANISM MANUAL | AGE 1/14 | B.I.L. RATING 95 kV
MOMENTARY FAULT CLOSING AMPS 40 kA | OTHER NAMEPLATE DATA ---

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTION	☑	Acceptable	C
STRUCTURAL MEMBERS	☑	Acceptable	C
CUBICLE	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
MAIN CONTACTS	☑	Acceptable	C/L
HEATERS	☐	N/A	NA
BEARINGS	☑	Acceptable	C
CONTACT SEQUENCE	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C

INSULATION TEST VOLTAGE 5 kVdc | TEST VOLTAGE MULTIPLIER, K1 = 1 | K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 18 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.9

INSULATION TESTS

	RANGE MULTIPLIER	K2	POLE 1 (P1-P2) MΩ READING	POLE 1 (P1-P2) MΩ 20°C	POLE 2 (P2-P3) MΩ READING	POLE 2 (P2-P3) MΩ 20°C	POLE 3 (P1-P3) MΩ READING	POLE 3 (P1-P3) MΩ 20°C
POLE TO POLE	1.000	0.900	100,000.0	90,000.00	100,000.0	90,000.00	100,000.0	90,000.00
POLE TO FRAME	1.000	0.900	100,000.0	90,000.00	100,000.0	90,000.00	100,000.0	90,000.00
LINE TO FRAME	1.000	0.900	100,000.0	90,000.00	100,000.0	90,000.00	100,000.0	90,000.00
LOAD TO FRAME	1.000	0.900	100,000.0	90,000.00	100,000.0	90,000.00	100,000.0	90,000.00
LINE TO LOAD	1.000	0.900	100,000.0	90,000.00	100,000.0	90,000.00	100,000.0	90,000.00

Contacts		POLE 1	POLE 2	POLE 3
CONTACT RESISTANCE SWITCH & FUSE ☐ MICRO-OHMS ☑ MILLI-OHMS		---	---	---
SWITCH CONTACT		0.032	0.028	0.031
FUSE		---	---	---
HI POT (MICRO AMPS)	37 kVDC	250	175	300

COMMENTS: NON FUSED SWITCH
HIPOT VALUE 37 kVDC

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979, HIPOT #191469

Tested By: E. KOEPFGEN Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LIGHTNING ARRESTER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 47
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/24/2020 — TEMPERATURE 67 °F — HUMIDITY 35 % — EQPT. LOCATION SUB 1
SUBSTATION 1 — POSITION SUB 1 A + B

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — TYPE --- — MODEL 4Q13
CATALOG NO. --- — SERIAL NO. 9L20FXX015XHS — RELIEF ---
RATED RMS VOLTAGE 15 kV — RATED MCOV 12.7 kV — RMS CURRENT RATING 0 kA — RATED CREST 0 kA
SYSTEM VOLTAGE 13.2 kV — ARRESTER TYPE STATION ○ INTERMEDIATE ○ DISTRIBUTION ◉ — MATERIAL TYPE PORCELAIN ○ POLYMER ◉

INSULATION TEST VOLTAGE 5.00 kV DC — TEST VOLTAGE MULTIPLIER 1
RANGE MULTIPLIER 1.0 — EQUIPMENT TEMPERATURE 20 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1

INSULATION TEST

POSITION	TOTAL CORRECTION MULTIPLIER	A PHASE TO GROUND		B PHASE TO GROUND		C PHASE TO GROUND	
		ACTUAL MEGOHMS	CORRECTED MEGOHMS	ACTUAL MEGOHMS	CORRECTED MEGOHMS	ACTUAL MEGOHMS	CORRECTED MEGOHMS
SUB 1 A	1	100,000	100,000.0	100,000	100,000.0	100,000	100,000.0
SUB 1 B	1	100,000	100,000.0	100,000	100,000.0	100,000	100,000.0

WATT LOSS TEST

TEST kV SWITCH SETTING
OUTPUT TEST VOLTAGE
READING CORRECTION FACTOR

○ GROUNDED SPECIMEN TEST
○ UNGROUNDED SPECIMEN TEST

MILLI-WATT LOSS

POSITION	A PHASE	B PHASE	C PHASE

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206124

Tested By: D. FLEMING Tested By: E. KOEPFGEN

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER DIELECTRIC ABSORPTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 48
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/24/2020 — TEMPERATURE 67 °F — HUMIDITY 35 % — EQPT. LOCATION SUB 1
SUBSTATION 1 — POSITION SUB 1 TRANSFORMER 1

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 309S1271-003-01-1
SPECIFICATION NO. --- — KVA 750 / / — TYPE VPI — CLASS AA
PHASE 3 — TEMPERATURE RISE 115 °C °C — IMPEDANCE 5.83 % — B.I.L. RATING 95 kV PRI. 10 kV SEC.
COOLANT DRY — CAPACITY --- GALLONS — TOTAL WEIGHT 7000 LB
WINDING POLARITY --- — WINDING MATERIAL CU — K FACTOR NA
PRIMARY VOLTAGE 13.2 — (●) DELTA ( ) WYE — RATED CURRENT 32,805 / / AMPERES
SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 902 / / AMPERES
TAP VOLTAGES 13,860 | 13,530 | 13,200 | 12,820 | 12,540
TAP CONNECTIONS E-F | D-F | E-G | D-G | C-G
TAP SETTING E-G 13,200 VOLTS — # FANS --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE ☑

TEST VOLTAGE:
PRIMARY TO SECONDARY 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 1 — K2=(TCF) (K1)
PRIMARY TO GROUND 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 1
SECONDARY TO GROUND 1 kVdc — TEST VOLTAGE MULTIPLIER, K1 1

CORE/COIL TEMPERATURE 19 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF — DRY 0.962 — LIQUID 0.950

MINUTES	PRIMARY TO SECONDARY GROUND GUARDED				PRIMARY TO GROUND SECONDARY GUARDED				SECONDARY TO GROUND PRIMARY GUARDED			
	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C
0.25	100,000.0	1	0.962	96,200.0	100,000.0	1	0.962	96,200.0	100,000.0	1	0.962	96,200.0
0.50	100,000.0	1	0.962	96,200.0	100,000.0	1	0.962	96,200.0	100,000.0	1	0.962	96,200.0
0.75	100,000.0	1	0.962	96,200.0	100,000.0	1	0.962	96,200.0	100,000.0	1	0.962	96,200.0
1.00	100,000.0	1	0.962	96,200.0	100,000.0	1	0.962	96,200.0	100,000.0	1	0.962	96,200.0
1.25	100,000.0	1	0.962	96,200.0	100,000.0	1	0.962	96,200.0	100,000.0	1	0.962	96,200.0
1.50	100,000.0	1	0.962	96,200.0	100,000.0	1	0.962	96,200.0	100,000.0	1	0.962	96,200.0
1.75	100,000.0	1	0.962	96,200.0	100,000.0	1	0.962	96,200.0	100,000.0	1	0.962	96,200.0
2.00	100,000.0	1	0.962	96,200.0	100,000.0	1	0.962	96,200.0	100,000.0	1	0.962	96,200.0
3.00	100,000.0	1	0.962	96,200.0	100,000.0	1	0.962	96,200.0	100,000.0	1	0.962	96,200.0
4.00												
5.00												
6.00												
7.00												
8.00												
9.00												
10.00												
POLARIZATION INDEX												

POLARIZATON INDEX = 10 MINUTE RDG. / 1 MINUTE RDG.

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206124

Tested By: D. FLEMING Tested By: E. KOEPFGEN

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER INSPECTION

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 49

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/24/2020 — TEMPERATURE 67 °F — HUMIDITY 35 % — EQPT. LOCATION SUB 1

SUBSTATION 1 — POSITION SUB 1 TRANSFORMER 1

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 309S1271-003-01-1

SPECIFICATION NO. --- — kVA 750 / / — TYPE VPI — CLASS AA

PHASE 3 — TEMPERATURE RISE 115 °C / °C — IMPEDANCE 5.83 % — B.I.L. RATING 95 kV PRI. / 10 kV SEC.

COOLANT DRY — CAPACITY --- GALLONS — TOTAL WEIGHT 7000 LB

WINDING POLARITY --- — WINDING MATERIAL CU — K FACTOR NA

PRIMARY VOLTAGE 13.2 — (●) DELTA ( ) WYE — RATED CURRENT 32,805 / / AMPERES

SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 902 / / AMPERES

TAP VOLTAGES	13,860	13,530	13,200	12,820	12,540			
TAP CONNECTIONS	E-F	D-F	E-G	D-G	C-G			

TAP SETTING E-G 13,200 VOLTS — # FANS --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE [x]

GAUGES:

COOLANT TEMPERATURE --- °C — MAXIMUM TEMPERATURE --- °C — RESET TEMPERATURE GAUGE [ ]

COOLANT LEVEL --- — PRESSURE VACUUM --- # — LCR COUNTER ---

OTHER GAUGES ---

VISUAL INSPECTION:

BUSHINGS ACCEPTABLE — SUPPORT INSULATORS ACCEPTABLE — CONNECTIONS ACCEPTABLE

PAINT ACCEPTABLE — RADIATORS --- — FANS ---

NO-LOAD TAP CHANGER --- — LEAKS ---

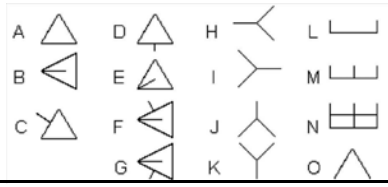
MAIN TANK DIELECTRIC SAMPLE SYRINGE # --- — BOTTLE # ---

LTC DIELECTRIC SAMPLE SYRINGE # --- — BOTTLE # ---

GROUND CONDUCTOR SIZE 4/0 AWG/kcm — NO. OF GROUND CONDUCTORS 1 — GROUND CONDUCTOR CONDITION ACC

ADDITIONAL EQUIPMENT ---

VECTOR DIAGRAM



PRI. VECTOR: E

SEC. VECTOR: H

POST TEST VOLTAGES

NO LOAD SECONDARY VOLTAGE			
X1 - X2	--- V	X0 - G	--- V
X1 - X3	--- V	X0 - X1	--- V
X2 - X3	--- V	X0 - X2	--- V
		X0 - X3	--- V

COMMENTS:

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: D. FLEMING Tested By: E. KOEPFGEN

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER TURNS RATIO TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 50

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/24/2020 — TEMPERATURE 67 °F — HUMIDITY 35 % — EQPT. LOCATION SUB 1

SUBSTATION 1 — POSITION SUB 1 TRANSFORMER 1

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 309S1271-003-01-1

SPECIFICATION NO. --- — KVA 750 / / — TYPE VPI — CLASS AA

PHASE 3 — TEMPERATURE RISE 115 °C °C — IMPEDANCE 5.83 % — B.I.L. RATING 95 kV PRI. 10 kV SEC.

COOLANT DRY — CAPACITY --- GALLONS — TOTAL WEIGHT 7000 LB

WINDING POLARITY --- — WINDING MATERIAL CU — K FACTOR NA

PRIMARY VOLTAGE 13.2 — (●) DELTA ( ) WYE — RATED CURRENT 32,805 / / AMPERES

SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 902 / / AMPERES

TAP VOLTAGES 13,860 | 13,530 | 13,200 | 12,820 | 12,540

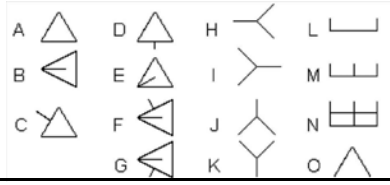
TAP CONNECTIONS E-F | D-F | E-G | D-G | C-G

TAP SETTING E-G 13,200 VOLTS — # FANS --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE ☑

TRANSFORMER TURNS RATIO TESTS

TAP NUMBER		WINDING VOLTAGES	CALCULATED RATIO	MEASURED RATIO		
				H_1H_3/X_1X_0	H_2H_1/X_2X_0	H_3H_2/X_3X_0
1	E-F	13,860 / 277	50.0361			
2	D-F	13,530 / 277	48.8448			
3	E-G	13,200 / 277	47.6534	47.6960	47.7040	47.6960
4	D-G	12,820 / 277	46.2816			
5	C-G	12,540 / 277	45.2708			
6		/				
7		/				
8		/				

VECTOR DIAGRAM



PRI. VECTOR: A

SEC. VECTOR: H

CORRECTION FACTOR FOR UNACCESSIBLE NEUTRAL

PHASE TESTED	BLACK	RED	BLACK	RED	JUMPER	READING MULTIPLIER	TEST SHEET DESIGNATION
DELTA-WYE							
A	H1	H3	X1	X2	H2H3	1.547	H1-H3 X1-X2
B	H2	H1	X2	X3	H1H3	1.547	H2-H3 X2-X3
C	H3	H2	X3	X1	H1H2	1.547	H3-H2 X3-X1
WYE-DELTA							
A	H1	H3	X1	X2	X2X3	1.5000	H1-H3 X1-X2
B	H2	H1	X2	X3	X1X3	1.5000	H2-H1 X2-X3
C	H3	H2	X3	X1	X1X2	1.5000	H3-H2 X3-X1

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: TTR #184970

Tested By: D. FLEMING Tested By: E. KOEPFGEN

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER DIELECTRIC ABSORPTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 51
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/25/2020 — TEMPERATURE 65 °F — HUMIDITY 50 % — EQPT. LOCATION SUB 1
SUBSTATION 1 — POSITION SUB 1 TRANSFORMER 2

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 309S1271-006-01-1
SPECIFICATION NO. --- — KVA 750 / / — TYPE VPI — CLASS AA
PHASE 3 — TEMPERATURE RISE 115 °C °C — IMPEDANCE 5.8 % — B.I.L. RATING 95 kV PRI. 10 kV SEC.
COOLANT DRY — CAPACITY --- GALLONS — TOTAL WEIGHT 7000 LBS
WINDING POLARITY --- — WINDING MATERIAL CU — K FACTOR ---
PRIMARY VOLTAGE 13,200 — (●) DELTA ( ) WYE — RATED CURRENT 33 / / AMPERES
SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 902 / / AMPERES
TAP VOLTAGES 13,860 | 13,530 | 13,200 | 12,820 | 12,540
TAP CONNECTIONS E-F | D-F | E-G | D-G | C-G
TAP SETTING E-G 13,200 VOLTS — # FANS — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE [☑]

TEST VOLTAGE:
PRIMARY TO SECONDARY 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 1 — K2=(TCF) (K1)
PRIMARY TO GROUND 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 1
SECONDARY TO GROUND 1 kVdc — TEST VOLTAGE MULTIPLIER, K1 1

CORE/COIL TEMPERATURE 18 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF — DRY 0.924 — LIQUID 0.900

MINUTES	PRIMARY TO SECONDARY GROUND GUARDED				PRIMARY TO GROUND SECONDARY GUARDED				SECONDARY TO GROUND PRIMARY GUARDED			
	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C
0.25	100,000.0	1	0.924	92,400.0	100,000.0	1	0.924	92,400.0	100,000.0	1	0.924	92,400.0
0.50	100,000.0	1	0.924	92,400.0	100,000.0	1	0.924	92,400.0	100,000.0	1	0.924	92,400.0
0.75	100,000.0	1	0.924	92,400.0	100,000.0	1	0.924	92,400.0	100,000.0	1	0.924	92,400.0
1.00	100,000.0	1	0.924	92,400.0	100,000.0	1	0.924	92,400.0	100,000.0	1	0.924	92,400.0
1.25	100,000.0	1	0.924	92,400.0	100,000.0	1	0.924	92,400.0	100,000.0	1	0.924	92,400.0
1.50	100,000.0	1	0.924	92,400.0	100,000.0	1	0.924	92,400.0	100,000.0	1	0.924	92,400.0
1.75	100,000.0	1	0.924	92,400.0	100,000.0	1	0.924	92,400.0	100,000.0	1	0.924	92,400.0
2.00	100,000.0	1	0.924	92,400.0	100,000.0	1	0.924	92,400.0	100,000.0	1	0.924	92,400.0
3.00	100,000.0	1	0.924	92,400.0	100,000.0	1	0.924	92,400.0	100,000.0	1	0.924	92,400.0
4.00					100,000.0	1	0.924	92,400.0				
5.00					100,000.0	1	0.924	92,400.0				
6.00					100,000.0	1	0.924	92,400.0				
7.00					100,000.0	1	0.924	92,400.0				
8.00					100,000.0	1	0.924	92,400.0				
9.00					100,000.0	1	0.924	92,400.0				
10.00					100,000.0	1	0.924	92,400.0				
POLARIZATION INDEX					1.00							

POLARIZATON INDEX = 10 MINUTE RDG. / 1 MINUTE RDG.

COMMENTS:

DEFICIENCIES:

[☑] ACCEPTABLE [☐] NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979

Tested By: E. KOEPFGEN Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER INSPECTION

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 52

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/25/2020 — TEMPERATURE 65 °F — HUMIDITY 50 % — EQPT. LOCATION SUB 1

SUBSTATION 1 — POSITION SUB 1 TRANSFORMER 2

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 309S1271-006-01-1

SPECIFICATION NO. --- — KVA 750 / / — TYPE VPI — CLASS AA

PHASE 3 — TEMPERATURE RISE 115 °C / °C — IMPEDANCE 5.8 % — B.I.L. RATING 95 kV PRI. / 10 kV SEC.

COOLANT DRY — CAPACITY --- GALLONS — TOTAL WEIGHT 7000 LBS

WINDING POLARITY --- — WINDING MATERIAL CU — K FACTOR ---

PRIMARY VOLTAGE 13,200 — (●) DELTA ( ) WYE — RATED CURRENT 33 / / AMPERES

SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 902 / / AMPERES

TAP VOLTAGES	13,860	13,530	13,200	12,820	12,540			
TAP CONNECTIONS	E-F	D-F	E-G	D-G	C-G			

TAP SETTING E-G 13,200 VOLTS — # FANS — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE ☑

GAUGES:

COOLANT TEMPERATURE --- °C — MAXIMUM TEMPERATURE --- °C — RESET TEMPERATURE GAUGE ☐

COOLANT LEVEL --- — PRESSURE VACUUM --- # — LCR COUNTER ---

OTHER GAUGES ---

VISUAL INSPECTION:

BUSHINGS ACCEPTABLE — SUPPORT INSULATORS ACCEPTABLE — CONNECTIONS ACCEPTABLE

PAINT ACCEPTABLE — RADIATORS --- — FANS ---

NO-LOAD TAP CHANGER --- — LEAKS ---

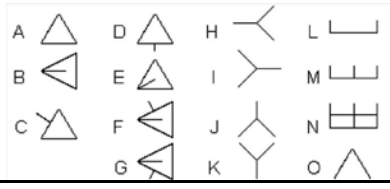
MAIN TANK DIELECTRIC SAMPLE SYRINGE # — BOTTLE #

LTC DIELECTRIC SAMPLE SYRINGE # — BOTTLE #

GROUND CONDUCTOR SIZE 4/0 AWG/kcm — NO. OF GROUND CONDUCTORS 1 — GROUND CONDUCTOR CONDITION ACC

ADDITIONAL EQUIPMENT

VECTOR DIAGRAM



PRI. VECTOR: E

SEC. VECTOR: H

POST TEST VOLTAGES

NO LOAD SECONDARY VOLTAGE					
X1 - X2	---	V	X0 - G	---	V
X1 - X3	---	V	X0 - X1	---	V
X2 - X3	---	V	X0 - X2	---	V
			X0 - X3	---	V

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: EK / DF / ET — Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER TURNS RATIO TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 53
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/25/2020 — TEMPERATURE 65 °F — HUMIDITY 50 % — EQPT. LOCATION SUB 1
SUBSTATION 1 — POSITION SUB 1 TRANSFORMER 2

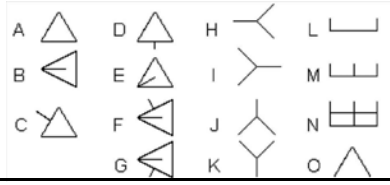
NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 309S1271-006-01-1
SPECIFICATION NO. --- — KVA 750 / / — TYPE VPI — CLASS AA
PHASE 3 — TEMPERATURE RISE 115 °C °C — IMPEDANCE 5.8 % — B.I.L. RATING 95 kV PRI. 10 kV SEC.
COOLANT DRY — CAPACITY --- GALLONS — TOTAL WEIGHT 7000 LBS
WINDING POLARITY --- — WINDING MATERIAL CU — K FACTOR ---
PRIMARY VOLTAGE 13,200 — (●) DELTA ( ) WYE — RATED CURRENT 33 / / AMPERES
SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 902 / / AMPERES
TAP VOLTAGES 13,860 | 13,530 | 13,200 | 12,820 | 12,540
TAP CONNECTIONS E-F | D-F | E-G | D-G | C-G
TAP SETTING E-G 13,200 VOLTS — # FANS — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE ☑

TRANSFORMER TURNS RATIO TESTS

TAP NUMBER		WINDING VOLTAGES	CALCULATED RATIO	MEASURED RATIO H_1H_3/X_1X_0	MEASURED RATIO H_2H_1/X_2X_0	MEASURED RATIO H_3H_2/X_3X_0
1	E-F	13,860 / 277	50.0361			
2	D-F	13,530 / 277	48.8448			
3	E-G	13,200 / 277	47.6534	47.7140	47.7160	47.7810
4	D-G	12,820 / 277	46.2816			
5	C-G	12,540 / 277	45.2708			
6		/				
7		/				
8		/				

VECTOR DIAGRAM



PRI. VECTOR: E
SEC. VECTOR: H

CORRECTION FACTOR FOR UNACCESSIBLE NEUTRAL

PHASE TESTED	BLACK	RED	BLACK	RED	JUMPER	READING MULTIPLIER	TEST SHEET DESIGNATION
DELTA-WYE							
A	H1	H3	X1	X2	H2H3	1.547	H1-H3 X1-X2
B	H2	H1	X2	X3	H1H3	1.547	H2-H3 X2-X3
C	H3	H2	X3	X1	H1H2	1.547	H3-H2 X3-X1
WYE-DELTA							
A	H1	H3	X1	X2	X2X3	1.5000	H1-H3 X1-X2
B	H2	H1	X2	X3	X1X3	1.5000	H2-H1 X2-X3
C	H3	H2	X3	X1	X1X2	1.5000	H3-H2 X3-X1

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: TTR #184970

Tested By: E. KOEPFGEN Tested By: E. TAPPAN

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 54

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/24/2020 — TEMPERATURE 67 °F — HUMIDITY 35 % — EQPT. LOCATION SUB 1

SUBSTATION 1 — POSITION TIE

MANUFACTURER	SQUARE D	SN / SO NO.	085249508103	FRAME SIZE(F)	1600
BREAKER TYPE	MASTER PACT NW 16 H3	SENSOR TAPS	1200	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICRO LOGIC 6.0 A	CATALOG NO.	WA 6ECR44A9CFFFWSEA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	1200	LONG TIME PU	0.8	x	1200	A =	960	A	DELAY	8		
SENSOR TAP	1,600	SHORT TIME PU	4	=	3840	A			DELAY	0.3	I²T	○ IN ● OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	---	=	---	A	○ ON ● OFF					
		GRD. FLT. PU	A	=	240	A	● ON ○ OFF		DELAY	0.1	I²T	○ IN ● OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	1200	LONG TIME PU	0.8	x	1200	A =	960	A	DELAY	8		
SENSOR TAP	1,600	SHORT TIME PU	4	=	3840	A			DELAY	0.3	I²T	○ IN ● OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	---	=	---	A	○ ON ● OFF					
		GRD. FLT. PU	A	=	240	A	● ON ○ OFF		DELAY	0.1	I²T	○ IN ● OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	4800	---	---	---	0.278	0.278	---	---	---	---
	STPU									
LONG TIME	2880	---	---	---	31.288	31.288	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	480	---	---	---	0.098	0.098	---	---	---	---
	GFPU				---	---	---	---	---	---

EQUIPMENT TEMPERATURE 19 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.962

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,924.00	2,000	1,924.00	2,000	1,924.00
POLE TO FRAME	2,000	1,924.00	2,000	1,924.00	2,000	1,924.00
LINE TO LOAD	2,000	1,924.00	2,000	1,924.00	2,000	1,924.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C	---	---

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.021	0.018	0.021

COMMENTS: ALL FUNCTIONS PER TEST TOOL SAY PASSED

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206124, DLRO #156856, SI #1512

Tested By: E. TAPPAN Tested By: E. KOEPFGEN

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 55
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/3/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB
SUBSTATION 13.2 kV — POSITION 52F 1SP

MANUFACTURER SQUARE D — SERIAL NUMBER 17 77448
TYPE VR — MODEL NO. 17-28142137-002 — DATE MANUFACTURED 10/13
MAXIMUM VOLTAGE 15 kV — AMPACITY 1200 — OPERATING VOLTAGE 13.2 kV
INTERRUPTING CAPACITY 25 kA @ --- kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
MECHANICAL CONNECTIONS	☑	Dirty	C
STRUCTURAL MEMBERS	☑	Dirty	C
CUBICLE	☑	Dirty	C
RACKING DEVICES	☑	Dirty	C
SHUTTER	☑	Dirty	C

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Acceptable	C/L
VACUUM BOTTLE	☑	Acceptable	C
CONTACT EROSION INDICATOR	☑	Acceptable	C
OPERATING MECHANISM	☑	Acceptable	C
CONTACT SEQUENCE	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
MILLIWATT LOSS TEST VOLTAGE kVac — HIGH POTENTIAL TEST VOLTAGE 38 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
POLE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LOAD TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO LOAD	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.2	0.24	2.0
HIGH POTENTIAL OPEN TEST	0.2	0.3	0.2

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE	RDG.	0.03	0.03	0.031
☐ MICRO-OHMS ☑ MILLI-OHMS	20°C	0.0299	0.0299	0.0309
CONTACT RESISTANCE	RDG.			
☐ MICRO-OHMS ☐ MILLI-OHMS	20°C			

	POLE 1	POLE 2	POLE 3
OPENING SPEED	---	---	---
CLOSING SPEED	---	---	---

COUNTER READING: BEG. 00543
END 00551

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539 DUCTOR #193761 HI POT #156393

Tested By: A. SHERWOOD Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 56
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 5/8/2020 — TEMPERATURE 65 °F — HUMIDITY 60 % — EQPT. LOCATION CEB
SUBSTATION 13.2 kV — POSITION 52F2SP

MANUFACTURER SQUARE D — SERIAL NUMBER 17 77462
TYPE VR — MODEL NO. 17-28142137-002 — DATE MANUFACTURED 10/13
MAXIMUM VOLTAGE 15 kV — AMPACITY 1200 — OPERATING VOLTAGE 13.2 kV
INTERRUPTING CAPACITY 25 kA @ --- kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	New	
INSULATING MEMBERS	☑	New	
MECHANICAL CONNECTIONS	☑	New	
STRUCTURAL MEMBERS	☑	New	
CUBICLE	☑	New	
RACKING DEVICES	☑	New	
SHUTTER	☑	New	

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	New	
VACUUM BOTTLE	☑	New	
CONTACT EROSION INDICATOR	☑	New	
OPERATING MECHANISM	☑	New	
CONTACT SEQUENCE	☑	New	
GROUND CONNECTION	☑	New	
AUXILIARY DEVICES	☑	New	

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 18 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.9
MILLIWATT LOSS TEST VOLTAGE kVac — HIGH POTENTIAL TEST VOLTAGE 38 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	0.900	100,000+	90,000.00	100,000+	90,000.00	100,000+	90,000.00
POLE TO FRAME	1.000	0.900	100,000+	90,000.00	100,000+	90,000.00	100,000+	90,000.00
LINE TO FRAME	1.000	0.900	100,000+	90,000.00	100,000+	90,000.00	100,000+	90,000.00
LOAD TO FRAME	1.000	0.900	100,000+	90,000.00	100,000+	90,000.00	100,000+	90,000.00
LINE TO LOAD	1.000	0.900	100,000+	90,000.00	100,000+	90,000.00	100,000+	90,000.00

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.24	0.18	0.2
HIGH POTENTIAL OPEN TEST	0.14	0.14	0.16

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE	RDG.	0.039	0.041	0.04
☐ MICRO-OHMS ☑ MILLI-OHMS	20°C	0.0393	0.0413	0.0403
CONTACT RESISTANCE	RDG.			
☐ MICRO-OHMS ☐ MILLI-OHMS	20°C			

	POLE 1	POLE 2	POLE 3
OPENING SPEED			
CLOSING SPEED			

COUNTER READING: BEG. 00438
END 00444

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #172767 DUCTOR #141261 HI POT #156393

Tested By: K. CUJAR Tested By: D. FLEMING 16100, REVISED 5/18/2011

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

BATTERY INSPECTION REPORT

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 57
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 2/27/2020 | TEMPERATURE 55 °F | HUMIDITY 60 % | EQPT. LOCATION CENTRAL ELECTRICAL BLDG
SUBSTATION 13.2 kV | POSITION BATTERY BANK

BATTERY DATA

MANUFACTURER MONOLITE | MODEL 4 SLA 150 | CELL VOLTAGE (V) 4
CATALOG NO. PWCYAL2ZAA | SPEC. GRAVITY RANGE (g/cm^3) - | CAPACITY RATING (Ah) 150
NUMBER OF CELLS 30 | # OF RACKS 3 | OVERALL BATTERY VOLTAGE (V) | COMMISSION DATE 2013
OTHER CPR: 677077

CHARGER DATA

MANUFACTURER SAFT | CURRENT 28 Amps | VOLTAGE 130.00 Volts
MODEL AT10-130-040-480-1101030000 | EQUALIZATION VOLTAGE 136 Volts
OTHER S/N: RA318366/867001

BATTERY INSPECTION

DESCRIPTION	INSPECTED	CONDITION
VENTILATION OF ROOM OR ENCLOSURE	☑	Acceptable
EYEWASH EQUIPMENT	☐	N/A
PHYSICAL AND MECHANICAL CONDITION	☑	Acceptable
ANCHORAGE, ALIGNMENT AND GROUNDING	☑	Acceptable
ELECTROLYTE LEVEL	☐	N/A
FLAME ARRESTERS	☐	N/A
SUPPORT RACKS, MOUNTING, CLEARANCES	☑	Acceptable
NEUTRALIZE ACID ON EXTERIOR SURFACES	☐	N/A
CLEAN CORRODED/OXIDIZED TERMINALS	☑	Acceptable
BATTERY CASE/ENCLOSURE	☐	N/A

CHARGER INSPECTION

DESCRIPTION	INSPECTED	CONDITION
PHYSICAL AND MECHANICAL CONDITION	☑	Acceptable
ANCHORAGE, ALIGNMENT AND GROUNDING	☑	Acceptable
CLEAN AND REMOVE DEBRIS	☑	Acceptable
FILTER AND TANK CAPACITORS	☑	Acceptable
COOLING FANS, VERIFY OPERATION	☐	N/A
CLEAN OR REPLACE FILTERS	☐	N/A
BOLTED ELECTRICAL CONNECTIONS	☑	Acceptable
FUNCTIONS AND ALARMS	☑	Acceptable
	☐	N/A
	☐	N/A

STRING MEASUREMENTS

Overall Voltage 136.3 VDC | Float Current 1.9 ADC | AC Ripple Current --- A | Total AC Current 0.82 A

GROUND TEST

Positive Terminal to Gnd. 66.6 VDC | NegativeTerminal to Gnd. 69.5 VDC

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: AEMC #177327; FLUKE #193314

Tested By: J. RYSENGA Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

BATTERY INSPECTION
MAINTENANCE FREE

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 58

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/27/2020 — TEMPERATURE 55 °F — HUMIDITY 60 % — EQPT. LOCATION CENTRAL ELECTRICAL BLDG

SUBSTATION 13.2 kV — POSITION BATTERY BANK

NAMEPLATE DATA

MANUFACTURER MONOLITE — CELL TYPE SLA — CELL VOLTAGE 4

CATALOG NO. PWCYAL2ZAA — SPECIFIC GRAVITY RANGE --- — AMP HOUR RATING 150

OVERALL BATTERY VOLTAGE 136.3 Vdc — NUMBER OF CELLS 30

BATTERY TEMP. 13 °C

OTHER

BATTERY CHARGE STATUS ☑ CHARGED ☐ DISCHARGED ☐ EQUALIZED — TEMPERATURE CORRECTED READINGS ☐ YES ☐ NO

CELL	INTERCELL RES	VOLTAGE	IMPEDANCE
1		4.563	1.078
2		4.563	0.884
3		4.496	0.942
4		4.571	0.942
5		4.540	1.018
6		4.596	1.035
7		4.537	1.030
8		4.518	0.984
9		4.529	0.995
10		4.495	1.011
11		4.597	0.998
12		4.565	1.038
13		4.506	0.956
14		4.606	0.975
15		4.583	0.958
16		4.530	0.984
17		4.562	0.975
18		4.492	1.030
19		4.551	1.060
20		4.600	1.042
21		4.516	1.037
22		4.544	0.966
23		4.526	1.000
24		4.557	1.199
25		4.557	1.095
26		4.603	0.980
27		4.607	1.089
28		4.532	0.976
29		4.595	0.957
30		4.522	0.980

CELL	INTERCELL RES	VOLTAGE	IMPEDANCE
31			
32			
33			
34			
35			
36			
37			
38			
39			
40			
41			
42			
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COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: BITE 3 #193331, FLUKE #193314

Tested By: J. RYSENGA Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

STATION BATTERY CONNECTION RESISTANCE

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 59
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/27/2020 — TEMPERATURE 55 °F — HUMIDITY 60 % — EQPT. LOCATION CENTRAL ELECTRICAL BLDG
SUBSTATION 13.2 kV — POSITION BATTERY BANK

NAMEPLATE DATA

MANUFACTURER MONOLITE — CELL TYPE SLA — CELL VOLTAGE 4
CATALOG NO. PWCYAL2ZAA — SPECIFIC GRAVITY RANGE -- — AMP HOUR RATING 150
OVERALL BATTERY VOLTAGE 136.3 VDC — NUMBER OF CELLS 30
BATTERY TEMP. 13 °C
OTHER

BATTERY CHARGE STATUS ☑ CHARGED ☐ DISCHARGED ☐ EQUALIZED — TEMPERATURE CORRECTED READINGS ☐ YES ☑ NO

METER PROBES BETWEEN		AS FOUND MICRO-OHMS	AS LEFT MICRO-OHMS
Post/Cell	1-2	126	126
Post/Cell	2-3	84	84
Post/Cell	3-4	109	109
Post/Cell	4-5	82	82
Post/Cell	5-6	80	80
Post/Cell	6-7	86	86
Post/Cell	7-8	116	116
Post/Cell	8-9	87	87
Post/Cell	9-10	108	108
Post/Cell	10-11 CABLE	353	353
Post/Cell	11-12	113	113
Post/Cell	12-13	83	83
Post/Cell	13-14	113	113
Post/Cell	14-15	77	77
Post/Cell	15-16	88	88
Post/Cell	16-17	77	77
Post/Cell	17-18	118	118
Post/Cell	18-19	84	84
Post/Cell	19-20	110	110
Post/Cell	20-21 CABLE	343	343
Post/Cell	21-22	112	112
Post/Cell	22-23	79	79
Post/Cell	23-24	114	114
Post/Cell	24-25	82	82
Post/Cell	25-26	84	84
Post/Cell	26-27	82	82
Post/Cell	27-28	113	113
Post/Cell	28-29	81	81
Post/Cell	29-30	124	124
Post/Cell			

METER PROBES BETWEEN		AS FOUND MICRO-OHMS	AS LEFT MICRO-OHMS
Post/Cell			
Post/Cell			
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COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER DLRO # 193764

Tested By: D. FLEMING Tested By: J. RYSENGA

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MEDIUM VOLTAGE SWITCHBOARD INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 60
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 5/12/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB
SUBSTATION 13.2 kV — POSITION BUS #1 & #2

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. --- — TYPE METAL CLAD
CATALOG NO. 17-28142137-002 — DRAWING NO. --- — VOLTAGE CLASS 15
PHASE AMPACITY 1200 A — WITHSTAND RATING 25 kA — CONDUCTOR ☐ Cu ☑ Al

INSTALLED DEVICES

VACUUM BREAKERS 22 — AIR BREAKERS --- — LOADBREAK DISCONNECTS --- — NUMBER OF BAYS 17
VOLTAGE RELAYS --- — OVERCURRENT RELAYS --- — OTHER PROTECTIVE RELAYS 28 — AUXILIARY RELAY ---
PANEL METERS --- — kWh METERS 22 — VT's 12 — CT's 162 — CPT's ---
Other ---

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF = 1.06

INSULATION RESISTANCE TEST RESULTS - MEGOHMS

BUS SECTION TESTED	RANGE MULT.	K2		PHASE A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C
BUS #1 SEC 3-8	1	1.06	RDG.	100,000	100,000	100,000		100,000	100,000	100,000
			20°C	106,000	106,000	106,000		106,000	106,000	106,000
BUS #2 SEC 9-15	1	1.06	RDG.	100,000	100,000	100,000		100,000	100,000	100,000
			20°C	106,000	106,000	106,000		106,000	106,000	106,000
		1.06	RDG.							
			20°C							
		1.06	RDG.							
			20°C							
		1.06	RDG.							
			20°C							

ACTUAL READING — SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGER #156386

Tested By: DF, JR — Tested By: KC

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MEDIUM VOLTAGE SWITCHBOARD
HIGH POTENTIAL TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 61
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 5/12/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB
SUBSTATION 13.2 kV — POSITION BUS #1 & #2

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. --- — TYPE METAL CLAD
CATALOG NO. 17-28142137-002 — DRAWING NO. --- — VOLTAGE CLASS 15 KV
PHASE AMPACITY 1200 A — WITHSTAND RATING 25 kA — CONDUCTOR ○ Cu ◉ Al

INSTALLED DEVICES

VACUUM BREAKERS 22 — AIR BREAKERS --- — LOADBREAK DISCONNECTS --- — NUMBER OF BAYS 17
VOLTAGE RELAYS --- — OVERCURRENT RELAYS --- — OTHER PROTECTIVE RELAYS --- — AUXILIARY RELAYS ---
PANEL METERS 28 — kWh METERS 1 — VT's 12 — CT's 162 — CPT's ---
Other ---

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

INSULATION TEST VOLTAGE 37 ☐ kVac ☐ kVdc — TEST VOLTAGE MULTIPLIER 1
EQUIPMENT TEMPERATURE 21 °C

K1 = RANGE MULTIPLIER

HIGHPOTENTIAL TESTS

BUS SECTION TESTED	K1		LEAKAGE - MICROAMPS A-GND	B-GND	C-GND	N-GND
BUS #1 SEC 3-8	1	RDG.	24	20	20	
		TOTAL LEAKAGE	24	20	20	
BUS #2 SEC 9-15	1	RDG.	22	31	12	
		TOTAL LEAKAGE	22	31	12	
		RDG.				
		TOTAL LEAKAGE				
		RDG.				
		TOTAL LEAKAGE				
		RDG.				
		TOTAL LEAKAGE				

BUS HIGH POTENTIAL TESTS CONDUCTED PHASE TO GROUND, WITH OTHER CONDUCTORS GROUNDED. LEAKAGE RECORDED AFTER TEST VOLTAGE APPLIED FOR ONE MINUTE.

TOTAL LEAKAGE = (K1) (ACTUAL READING)

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: HI POT #156393

Tested By: DF Tested By: JK, KC

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

SWITCHBOARD BUS CONNECTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 62
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 5/12/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB
SUBSTATION 13.2 kV — POSITION BUS #1 & #2

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. --- — TYPE METAL CLAD
CATALOG NO. 17-28142137-002 — DRAWING NO. --- — VOLTAGE CLASS 15KV
PHASE AMPACITY 1200 A — WITHSTAND RATING 25 kA — CONDUCTOR (•) CU ( ) AL

BUS SECTION TESTED		RESISTANCE IN ☑ MICRO-OHMS ☐ MILLI-OHMS					BUS SECTION TESTED		RESISTANCE IN ☐ MICRO-OHMS ☐ MILLI-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
3	8	194.7	179.9	163.4	---	250.7							
9	15	3428.0	182.0	174.0	---	287.5							
11	15	3405	144.0	131.0	---	219.0							
9	11	124	107	101	---	149							

COMMENTS:

DEFICIENCIES: A PHASE MAY HAVE A LOOSE CONNECTION BETWEEN SECTION 11 AND SECTION 15. FURTHER INVESTIGATION REQUIRED IN NEAR FUTURE.

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: DUCTOR #193764

Tested By: DF, JR Tested By: KC

Utilities Instrumentation Service, Inc.
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(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 63
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 5/8/2020 — TEMPERATURE 65 °F — HUMIDITY 60 % — EQPT. LOCATION CEB
SUBSTATION 13.2 kV — POSITION BUS 1 - BUS 2 ISOLATION BREAKER (52 1B)

MANUFACTURER SQUARE D — SERIAL NUMBER 17 77456
TYPE VR — MODEL NO. 17-28142137-002 — DATE MANUFACTURED 10/13
MAXIMUM VOLTAGE 15 kV — AMPACITY 1200 — OPERATING VOLTAGE 13.2 kV
INTERRUPTING CAPACITY 25 kA @ --- kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	New	
INSULATING MEMBERS	☑	New	
MECHANICAL CONNECTIONS	☑	New	
STRUCTURAL MEMBERS	☑	New	
CUBICLE	☑	New	
RACKING DEVICES	☑	New	
SHUTTER	☑	New	

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	New	
VACUUM BOTTLE	☑	New	
CONTACT EROSION INDICATOR	☑	New	
OPERATING MECHANISM	☑	New	
CONTACT SEQUENCE	☑	New	
GROUND CONNECTION	☑	New	
AUXILIARY DEVICES	☑	New	

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 18 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.9
MILLIWATT LOSS TEST VOLTAGE kVac — HIGH POTENTIAL TEST VOLTAGE 38 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	0.900	100,000+	90,000.00	100,000+	90,000.00	100,000+	90,000.00
POLE TO FRAME	1.000	0.900	100,000+	90,000.00	100,000+	90,000.00	100,000+	90,000.00
LINE TO FRAME	1.000	0.900	100,000+	90,000.00	100,000+	90,000.00	100,000+	90,000.00
LOAD TO FRAME	1.000	0.900	100,000+	90,000.00	100,000+	90,000.00	100,000+	90,000.00
LINE TO LOAD	1.000	0.900	100,000+	90,000.00	100,000+	90,000.00	100,000+	90,000.00

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.28	0.76	0.24
HIGH POTENTIAL OPEN TEST	0.22	0.30	0.22

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE	RDG.	0.04	0.04	0.039
☐ MICRO-OHMS ☑ MILLI-OHMS	20°C	0.0403	0.0403	0.0393
CONTACT RESISTANCE	RDG.			
☐ MICRO-OHMS ☐ MILLI-OHMS	20°C			

	POLE 1	POLE 2	POLE 3
OPENING SPEED			
CLOSING SPEED			

COUNTER READING: BEG. 00111
END 00122

COMMENTS: THE FIRST TIME THIS BREAKER WAS OPERATED (W/ ELECTRIC CONTROLS), UPON REACHING FULL CHARGE, THE BREAKER CLOSED. THE CLOSE SIGNAL HAD NOT YET BEEN SENT. THE BREAKER WAS THEN OPERATED SEVERAL MORE TIMES, BOTH ELECTRICALLY AND MANUALLY, FULL INSPECTED AND TESTED WITHOUT ANY FURTHER PROBLEMS. THE BREAKER APPEARS TO OPERATE AS INTENDED NOW.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #156386 DUCTOR #168918 HI POT #7132

Tested By: K. CUJAR Tested By: J. K G. E

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 64
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 5/8/2020 — TEMPERATURE 65 °F — HUMIDITY 60 % — EQPT. LOCATION CEB
SUBSTATION 13.2 kV — POSITION BUS 1 - BUS 2 TIE BREAKER (52 T)

MANUFACTURER SQUARE D — SERIAL NUMBER 17 77451
TYPE VR — MODEL NO. 17-28142137-002 — DATE MANUFACTURED 10/13
MAXIMUM VOLTAGE 15 kV — AMPACITY 1200 — OPERATING VOLTAGE 13.2 kV
INTERRUPTING CAPACITY 25 kA @ --- kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	New	
INSULATING MEMBERS	☑	New	
MECHANICAL CONNECTIONS	☑	New	
STRUCTURAL MEMBERS	☑	New	
CUBICLE	☑	New	
RACKING DEVICES	☑	New	
SHUTTER	☑	New	

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	New	
VACUUM BOTTLE	☑	New	
CONTACT EROSION INDICATOR	☑	New	
OPERATING MECHANISM	☑	New	
CONTACT SEQUENCE	☑	New	
GROUND CONNECTION	☑	New	
AUXILIARY DEVICES	☑	New	

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 18 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.9
MILLIWATT LOSS TEST VOLTAGE kVac — HIGH POTENTIAL TEST VOLTAGE 38 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	0.900	100,000+	90,000.00	100,000+	90,000.00	100,000+	90,000.00
POLE TO FRAME	1.000	0.900	100,000+	90,000.00	100,000+	90,000.00	100,000+	90,000.00
LINE TO FRAME	1.000	0.900	100,000+	90,000.00	100,000+	90,000.00	100,000+	90,000.00
LOAD TO FRAME	1.000	0.900	100,000+	90,000.00	100,000+	90,000.00	100,000+	90,000.00
LINE TO LOAD	1.000	0.900	100,000+	90,000.00	100,000+	90,000.00	100,000+	90,000.00

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.20	0.22	0.20
HIGH POTENTIAL OPEN TEST	0.18	0.20	0.18

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE	RDG.	0.039	0.037	0.04
☐ MICRO-OHMS ☑ MILLI-OHMS	20°C	0.0393	0.0373	0.0403
CONTACT RESISTANCE	RDG.			
☐ MICRO-OHMS ☐ MILLI-OHMS	20°C			

	POLE 1	POLE 2	POLE 3
OPENING SPEED			
CLOSING SPEED			

COUNTER READING: BEG. 00567
END 00574

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #172767 DUCTOR #141281 HI POT #156393

Tested By: K. CUJAR Tested By: D. FLEMING 16100, REVISED 5/18/2011

Utilities Instrumentation Service, Inc.
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VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 65
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/4/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB
SUBSTATION 13.2 kV — POSITION BUS 1 - BUS 3 TIE BREAKER (52 GT1)

MANUFACTURER SQUARE D — SERIAL NUMBER 17 77444
TYPE VR — MODEL NO. 17-28142137-002 — DATE MANUFACTURED 10/13
MAXIMUM VOLTAGE 15 kV — AMPACITY 1200 — OPERATING VOLTAGE 13.2 kV
INTERRUPTING CAPACITY 25 kA @ --- kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTIONS	☑	Acceptable	C/L
STRUCTURAL MEMBERS	☑	Acceptable	C
CUBICLE	☑	Acceptable	C
RACKING DEVICES	☑	Acceptable	C/L
SHUTTER	☑	Acceptable	C

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Acceptable	C/L
VACUUM BOTTLE	☑	Acceptable	C
CONTACT EROSION INDICATOR	☑	Acceptable	C
OPERATING MECHANISM	☑	Acceptable	C/L
CONTACT SEQUENCE	☑	Acceptable	NA
GROUND CONNECTION	☑	Acceptable	C/L
AUXILIARY DEVICES	☑	Acceptable	C

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
MILLIWATT LOSS TEST VOLTAGE kVac — HIGH POTENTIAL TEST VOLTAGE 38 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
POLE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LOAD TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO LOAD	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.12	1.4	0.12
HIGH POTENTIAL OPEN TEST	0.1	16	0.1

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE	RDG.	0.0333	0.0317	0.0325
☐ MICRO-OHMS ☑ MILLI-OHMS	20°C	0.0332	0.0316	0.0324
CONTACT RESISTANCE	RDG.			
☐ MICRO-OHMS ☐ MILLI-OHMS	20°C			

	POLE 1	POLE 2	POLE 3
OPENING SPEED	---	---	---
CLOSING SPEED	---	---	---

COUNTER READING: BEG. 00454
END 00458

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER UIS #15636 DUCTOR UIS #1572 HI POT #156393

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 66
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 5/12/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB
SUBSTATION 13.2 kV — POSITION BUS 1 MAIN BREAKER (52 M1)

MANUFACTURER SQUARE D — SERIAL NUMBER 17 77453
TYPE VR — MODEL NO. 17-28142137-002 — DATE MANUFACTURED 10 / 13
MAXIMUM VOLTAGE 15 kV — AMPACITY 1200 — OPERATING VOLTAGE 13.2 kV
INTERRUPTING CAPACITY 25 kA @ --- kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	C/L
INSULATING MEMBERS	☑	Acceptable	C/L
MECHANICAL CONNECTIONS	☑	Acceptable	C/L
STRUCTURAL MEMBERS	☑	Acceptable	C/L
CUBICLE	☑	Acceptable	C/L
RACKING DEVICES	☑	Acceptable	C/L
SHUTTER	☑	Acceptable	C/L

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Acceptable	C/L
VACUUM BOTTLE	☑	Acceptable	C/L
CONTACT EROSION INDICATOR	☑	Acceptable	C/L
OPERATING MECHANISM	☑	Acceptable	C/L
CONTACT SEQUENCE	☑	Acceptable	C/L
GROUND CONNECTION	☑	Acceptable	C/L
AUXILIARY DEVICES	☑	Acceptable	C/L

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
MILLIWATT LOSS TEST VOLTAGE kVac — HIGH POTENTIAL TEST VOLTAGE 38 ☐ kVAC ☐ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
POLE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LOAD TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO LOAD	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.46	2.60	0.84
HIGH POTENTIAL OPEN TEST	0.26	0.30	0.34

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE	RDG.	0.027	0.031	0.027
☐ MICRO-OHMS ☑ MILLI-OHMS	20°C	0.0269	0.0309	0.0269
CONTACT RESISTANCE	RDG.			
☐ MICRO-OHMS ☐ MILLI-OHMS	20°C			

	POLE 1	POLE 2	POLE 3
OPENING SPEED			
CLOSING SPEED			

COUNTER READING: BEG. 00505
END 00512

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #156386 DUCTOR #193764 HI POT #156393

Tested By: K. CUJAR Tested By: J. RYSENGA 16100, REVISED 5/18/2011

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 67
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/4/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB
SUBSTATION 13.2 kV — POSITION BUS 2 - BUS 3 TIE BREAKER (52 GT2)

MANUFACTURER SQUARE D — SERIAL NUMBER 17 77461
TYPE VR — MODEL NO. 17-28142137-002 — DATE MANUFACTURED 10/13
MAXIMUM VOLTAGE 15 kV — AMPACITY 1200 — OPERATING VOLTAGE 13.2 kV
INTERRUPTING CAPACITY 25 kA @ --- kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTIONS	☑	Acceptable	C/L
STRUCTURAL MEMBERS	☑	Acceptable	C
CUBICLE	☑	Acceptable	C
RACKING DEVICES	☑	Acceptable	C/L
SHUTTER	☑	Acceptable	C

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Acceptable	C/L
VACUUM BOTTLE	☑	Acceptable	C
CONTACT EROSION INDICATOR	☑	Acceptable	C
OPERATING MECHANISM	☑	Acceptable	C/L
CONTACT SEQUENCE	☑	Acceptable	NA
GROUND CONNECTION	☑	Acceptable	C/L
AUXILIARY DEVICES	☑	Acceptable	C

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
MILLIWATT LOSS TEST VOLTAGE kVac — HIGH POTENTIAL TEST VOLTAGE 38 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
POLE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LOAD TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO LOAD	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.13	0.16	0.14
HIGH POTENTIAL OPEN TEST	0.1	0.11	0.12

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE	RDG.	0.0289	0.0307	0.0305
☐ MICRO-OHMS ☑ MILLI-OHMS	20°C	0.0288	0.0306	0.0304
CONTACT RESISTANCE	RDG.			
☐ MICRO-OHMS ☐ MILLI-OHMS	20°C			

	POLE 1	POLE 2	POLE 3
OPENING SPEED			
CLOSING SPEED			

COUNTER READING: BEG. 00447
END 00449

COMMENTS: ONLY OPERATED ONCE ELECTRICALLY DUE TO CONTROL SYSTEM ISSUES. CONTROL ISSUES CORRECTED BY UIS & CUMMINS TECH.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER UIS #1563 DUCTOR UIS #1572 HI POT #156393

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 68
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 5/13/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB
SUBSTATION 13.2 kV — POSITION BUS 2 - MAIN BREAKER (52M 2)

MANUFACTURER SQUARE D — SERIAL NUMBER 17 77449
TYPE VR — MODEL NO. 17-28142137-002 — DATE MANUFACTURED 10/13
MAXIMUM VOLTAGE 15 kV — AMPACITY 1200 — OPERATING VOLTAGE 13.2 kV
INTERRUPTING CAPACITY 25 kA @ --- kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	C/L
INSULATING MEMBERS	☑	Acceptable	C/L
MECHANICAL CONNECTIONS	☑	Acceptable	C/L
STRUCTURAL MEMBERS	☑	Acceptable	C/L
CUBICLE	☑	Acceptable	C/L
RACKING DEVICES	☑	Acceptable	C/L
SHUTTER	☑	Acceptable	C/L

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Acceptable	C/L
VACUUM BOTTLE	☑	Acceptable	C/L
CONTACT EROSION INDICATOR	☑	Acceptable	C/L
OPERATING MECHANISM	☑	Acceptable	C/L
CONTACT SEQUENCE	☑	Acceptable	C/L
GROUND CONNECTION	☑	Acceptable	C/L
AUXILIARY DEVICES	☑	Acceptable	C/L

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
MILLIWATT LOSS TEST VOLTAGE kVac — HIGH POTENTIAL TEST VOLTAGE 38 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
POLE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LOAD TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO LOAD	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.22	0.24	0.48
HIGH POTENTIAL OPEN TEST	0.26	0.32	0.26

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE	RDG.	0.033	0.032	0.028
☐ MICRO-OHMS ☑ MILLI-OHMS	20°C	0.0329	0.0319	0.0279
CONTACT RESISTANCE	RDG.			
☐ MICRO-OHMS ☐ MILLI-OHMS	20°C			

	POLE 1	POLE 2	POLE 3
OPENING SPEED			
CLOSING SPEED			

COUNTER READING: BEG. 00394
END 00400

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #156386 DUCTOR #193764 HI POT #156393

Tested By: K. CUJAR Tested By: J. RYSENGA 16100, REVISED 5/18/2011

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 69
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/25/2020 — TEMPERATURE 70 °F — HUMIDITY 30 % — EQPT. LOCATION CEB
SUBSTATION 13.2 kV — POSITION SUB 1 - RSLS (52F 21)

MANUFACTURER SQUARE D — SERIAL NUMBER 17 77458
TYPE VR — MODEL NO. 17-28142137-002 — DATE MANUFACTURED 10 / 13
MAXIMUM VOLTAGE 15 kV — AMPACITY 1200 — OPERATING VOLTAGE 13.2 kV
INTERRUPTING CAPACITY 25 kA @ --- kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTIONS	☑	Acceptable	C/L
STRUCTURAL MEMBERS	☑	Acceptable	C
CUBICLE	☑	Acceptable	C
RACKING DEVICES	☑	Acceptable	C/L
SHUTTER	☑	Acceptable	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Acceptable	C/L
VACUUM BOTTLE	☑	Acceptable	C
CONTACT EROSION INDICATOR	☑	Acceptable	C
OPERATING MECHANISM	☑	Acceptable	C/L
CONTACT SEQUENCE	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
AUXILIARY DEVICES	☑	Acceptable	C

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
MILLIWATT LOSS TEST VOLTAGE kVac — HIGH POTENTIAL TEST VOLTAGE 38 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
POLE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LOAD TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO LOAD	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.21	0.22	0.62
HIGH POTENTIAL OPEN TEST	0.18	0.19	0.20

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE	RDG.	0.029	0.029	0.03
☐ MICRO-OHMS ☑ MILLI-OHMS	20°C	0.0289	0.0289	0.0299
CONTACT RESISTANCE	RDG.			
☐ MICRO-OHMS ☐ MILLI-OHMS	20°C			

	POLE 1	POLE 2	POLE 3
OPENING SPEED	---	---	---
CLOSING SPEED	---	---	---

COUNTER READING: BEG. 00397
END 00404

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480
DUCTOR #157082 HI POT #156393

Tested By: D. FLEMING Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 70

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/18/2020 — TEMPERATURE 66 °F — HUMIDITY 40 % — EQPT. LOCATION CEB

SUBSTATION 13.2 kV — POSITION SUB 2 - EQ (52F 12)

MANUFACTURER SQUARE D — SERIAL NUMBER 17 77443

TYPE VR — MODEL NO. 17-28142137-002 — DATE MANUFACTURED 10 / 13

MAXIMUM VOLTAGE 15 kV — AMPACITY 1200 — OPERATING VOLTAGE 13.2 kV

INTERRUPTING CAPACITY 25 kA @ --- kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTIONS	☑	Acceptable	C
STRUCTURAL MEMBERS	☑	Acceptable	C
CUBICLE	☑	Acceptable	C
RACKING DEVICES	☑	Acceptable	C
SHUTTER	☑	Acceptable	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Acceptable	C/L
VACUUM BOTTLE	☑	Acceptable	C
CONTACT EROSION INDICATOR	☑	Acceptable	C
OPERATING MECHANISM	☑	Acceptable	C
CONTACT SEQUENCE	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
AUXILIARY DEVICES	☑	Acceptable	C

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)

EQUIPMENT TEMPERATURE 19 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.95

MILLIWATT LOSS TEST VOLTAGE kVac — HIGH POTENTIAL TEST VOLTAGE 38 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	0.950	100,000+	95,000.00	100,000+	95,000.00	100,000+	95,000.00
POLE TO FRAME	1.000	0.950	100,000+	95,000.00	100,000+	95,000.00	100,000+	95,000.00
LINE TO FRAME	1.000	0.950	100,000+	95,000.00	100,000+	95,000.00	100,000+	95,000.00
LOAD TO FRAME	1.000	0.950	100,000+	95,000.00	100,000+	95,000.00	100,000+	95,000.00
LINE TO LOAD	1.000	0.950	100,000+	95,000.00	100,000+	95,000.00	100,000+	95,000.00

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.2	0.3	0.4
HIGH POTENTIAL OPEN TEST	0.14	0.15	0.16

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE	RDG.	0.034	0.033	0.032
☐ MICRO-OHMS ☑ MILLI-OHMS	20°C	0.0341	0.0331	0.0321
CONTACT RESISTANCE	RDG.			
☐ MICRO-OHMS ☐ MILLI-OHMS	20°C			

	POLE 1	POLE 2	POLE 3
OPENING SPEED			
CLOSING SPEED			

COUNTER READING: BEG. 00558

END 00565

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480 DUCTOR #157082 HI POT #156393

Tested By: D. FLEMING Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 71
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/19/2020 — TEMPERATURE 65 °F — HUMIDITY 40 % — EQPT. LOCATION CEB
SUBSTATION 13.2 kV — POSITION SUB 2 - EQ (52F 22)

MANUFACTURER SQUARE D — SERIAL NUMBER 17 77454
TYPE VR — MODEL NO. 17-28142137-002 — DATE MANUFACTURED 10/13
MAXIMUM VOLTAGE 15 kV — AMPACITY 1200 — OPERATING VOLTAGE 13.2 kV
INTERRUPTING CAPACITY 25 kA @ --- kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTIONS	☑	Acceptable	C/L
STRUCTURAL MEMBERS	☑	Acceptable	C
CUBICLE	☑	Acceptable	C
RACKING DEVICES	☑	Acceptable	C/L
SHUTTER	☑	Acceptable	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Acceptable	C/L
VACUUM BOTTLE	☑	Acceptable	C
CONTACT EROSION INDICATOR	☑	Acceptable	C
OPERATING MECHANISM	☑	Acceptable	C/L
CONTACT SEQUENCE	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
AUXILIARY DEVICES	☑	Acceptable	C

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 19 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.95
MILLIWATT LOSS TEST VOLTAGE kVac — HIGH POTENTIAL TEST VOLTAGE 38 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	0.950	100,000+	95,000.00	100,000+	95,000.00	100,000+	95,000.00
POLE TO FRAME	1.000	0.950	100,000+	95,000.00	100,000+	95,000.00	100,000+	95,000.00
LINE TO FRAME	1.000	0.950	100,000+	95,000.00	100,000+	95,000.00	100,000+	95,000.00
LOAD TO FRAME	1.000	0.950	100,000+	95,000.00	100,000+	95,000.00	100,000+	95,000.00
LINE TO LOAD	1.000	0.950	100,000+	95,000.00	100,000+	95,000.00	100,000+	95,000.00

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.14	0.30	0.15
HIGH POTENTIAL OPEN TEST	0.12	0.13	0.12

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE	RDG.	0.029	0.028	0.028
☐ MICRO-OHMS ☑ MILLI-OHMS	20°C	0.0291	0.0281	0.0281
CONTACT RESISTANCE	RDG.			
☐ MICRO-OHMS ☐ MILLI-OHMS	20°C			

	POLE 1	POLE 2	POLE 3
OPENING SPEED			
CLOSING SPEED			

COUNTER READING: BEG. 00405
END 00412

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480 DUCTOR #157082 HI POT #156393

Tested By: D. FLEMING Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 72
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/27/2020 — TEMPERATURE 70 °F — HUMIDITY 30 % — EQPT. LOCATION CEB
SUBSTATION 13.2 kV — POSITION SUB 3 - WBB (52F 23)

MANUFACTURER SQUARE D — SERIAL NUMBER 17 77457
TYPE VR — MODEL NO. 17-28142137-002 — DATE MANUFACTURED 10 / 13
MAXIMUM VOLTAGE 15 kV — AMPACITY 1200 — OPERATING VOLTAGE 13.2 kV
INTERRUPTING CAPACITY 25 kA @ --- kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTIONS	☑	Acceptable	C/L
STRUCTURAL MEMBERS	☑	Acceptable	C
CUBICLE	☑	Acceptable	C
RACKING DEVICES	☑	Acceptable	C/L
SHUTTER	☑	Acceptable	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Acceptable	C/L
VACUUM BOTTLE	☑	Acceptable	C
CONTACT EROSION INDICATOR	☑	Acceptable	C
OPERATING MECHANISM	☑	Acceptable	C/L
CONTACT SEQUENCE	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
AUXILIARY DEVICES	☑	Acceptable	C

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
MILLIWATT LOSS TEST VOLTAGE kVac — HIGH POTENTIAL TEST VOLTAGE 38 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
POLE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LOAD TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO LOAD	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.21	0.19	0.18
HIGH POTENTIAL OPEN TEST	0.18	0.17	0.18

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE ☐ MICRO-OHMS ☐ MILLI-OHMS	RDG.			
	20°C			
CONTACT RESISTANCE ☐ MICRO-OHMS ☑ MILLI-OHMS	RDG.	0.028	0.028	0.027
	20°C	0.0279	0.0279	0.0269

	POLE 1	POLE 2	POLE 3
OPENING SPEED			
CLOSING SPEED			

COUNTER READING: BEG. 00467
END 00475

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480 DUCTOR #157082 HI POT #156393

Tested By: D. FLEMING Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 73

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/20/2020 — TEMPERATURE 65 °F — HUMIDITY 40 % — EQPT. LOCATION CEB

SUBSTATION 13.2 kV — POSITION SUB 4 -TF (52F 14)

MANUFACTURER SQUARE D — SERIAL NUMBER 17 77447

TYPE VR — MODEL NO. 17-28142137-002 — DATE MANUFACTURED 10 / 13

MAXIMUM VOLTAGE 15 kV — AMPACITY 1200 — OPERATING VOLTAGE 13.2 kV

INTERRUPTING CAPACITY 25 kA @ --- kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTIONS	☑	Acceptable	C
STRUCTURAL MEMBERS	☑	Acceptable	C
CUBICLE	☑	Acceptable	C
RACKING DEVICES	☑	Acceptable	C/L
SHUTTER	☑	Acceptable	L

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Acceptable	C/L
VACUUM BOTTLE	☑	Acceptable	C
CONTACT EROSION INDICATOR	☑	Acceptable	C
OPERATING MECHANISM	☑	Acceptable	C/L
CONTACT SEQUENCE	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
AUXILIARY DEVICES	☑	Acceptable	C

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)

EQUIPMENT TEMPERATURE 18 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.9

MILLIWATT LOSS TEST VOLTAGE kVac — HIGH POTENTIAL TEST VOLTAGE 38 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	0.900	100,000+	90,000.00	100,000+	90,000.00	100,000+	90,000.00
POLE TO FRAME	1.000	0.900	100,000+	90,000.00	100,000+	90,000.00	100,000+	90,000.00
LINE TO FRAME	1.000	0.900	100,000+	90,000.00	100,000+	90,000.00	100,000+	90,000.00
LOAD TO FRAME	1.000	0.900	100,000+	90,000.00	100,000+	90,000.00	100,000+	90,000.00
LINE TO LOAD	1.000	0.900	100,000+	90,000.00	100,000+	90,000.00	100,000+	90,000.00

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.20	0.20	0.20
HIGH POTENTIAL OPEN TEST	0.18	0.19	0.19

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE	RDG.	0.03	0.032	0.03
☐ MICRO-OHMS ☑ MILLI-OHMS	20°C	0.0302	0.0323	0.0302
CONTACT RESISTANCE	RDG.			
☐ MICRO-OHMS ☐ MILLI-OHMS	20°C			

	POLE 1	POLE 2	POLE 3
OPENING SPEED	---	---	---
CLOSING SPEED	---	---	---

COUNTER READING: BEG. 00525

END 00532

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480 DUCTOR #157082 HI POT #156393

Tested By: D. FLEMING Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 74
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/21/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB
SUBSTATION 13.2 kV — POSITION SUB 4 -TF (52F 24)

MANUFACTURER SQUARE D — SERIAL NUMBER 17 77446
TYPE VR — MODEL NO. 17-28142137-002 — DATE MANUFACTURED 10/13
MAXIMUM VOLTAGE 15 kV — AMPACITY 1200 — OPERATING VOLTAGE 13.2 kV
INTERRUPTING CAPACITY 25 kA @ --- kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	C/L
INSULATING MEMBERS	☑	Acceptable	C/L
MECHANICAL CONNECTIONS	☑	Acceptable	C/L
STRUCTURAL MEMBERS	☑	Acceptable	C/L
CUBICLE	☑	Acceptable	C/L
RACKING DEVICES	☑	Acceptable	C/L
SHUTTER	☑	Acceptable	C/L

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Acceptable	C/L
VACUUM BOTTLE	☑	Acceptable	NA
CONTACT EROSION INDICATOR	☑	Acceptable	C/L
OPERATING MECHANISM	☑	Acceptable	C/L
CONTACT SEQUENCE	☑	Acceptable	NA
GROUND CONNECTION	☑	Acceptable	C/L
AUXILIARY DEVICES	☑	Acceptable	NA

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
MILLIWATT LOSS TEST VOLTAGE kVac — HIGH POTENTIAL TEST VOLTAGE 38 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
POLE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LOAD TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO LOAD	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	2.0	1.1	0.2
HIGH POTENTIAL OPEN TEST	0.19	0.2	0.2

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE	RDG.	0.027	0.029	0.027
☐ MICRO-OHMS ☑ MILLI-OHMS	20°C	0.0269	0.0289	0.0269
CONTACT RESISTANCE	RDG.			
☐ MICRO-OHMS ☐ MILLI-OHMS	20°C			

	POLE 1	POLE 2	POLE 3
OPENING SPEED	---	---	---
CLOSING SPEED	---	---	---

COUNTER READING: BEG. 00446
END 00452

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480 DUCTOR #157082 HI POT #156393

Tested By: T. DODGE Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 75
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 3/6/2020 | TEMPERATURE 70 °F | HUMIDITY 60 % | EQPT. LOCATION CEB
SUBSTATION 13.2 kV | POSITION SUB 5 - SH (52F 25)

MANUFACTURER SQUARE D | SERIAL NUMBER 17 77445
TYPE VR | MODEL NO. 17-28142137-002 | DATE MANUFACTURED 10 / 13
MAXIMUM VOLTAGE 15 kV | AMPACITY 1200 | OPERATING VOLTAGE 13.2 kV
INTERRUPTING CAPACITY 25 kA @ --- kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTIONS	☑	Acceptable	C/L
STRUCTURAL MEMBERS	☑	Acceptable	C
CUBICLE	☑	Acceptable	C
RACKING DEVICES	☑	Acceptable	C
SHUTTER	☑	Acceptable	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Acceptable	C/L
VACUUM BOTTLE	☑	Acceptable	C
CONTACT EROSION INDICATOR	☑	Acceptable	C
OPERATING MECHANISM	☑	Acceptable	C/L
CONTACT SEQUENCE	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
AUXILIARY DEVICES	☑	Acceptable	C

INSULATION TEST VOLTAGE 5 kVdc | TEST VOLTAGE MULTIPLIER, K1 = 1 | K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
MILLIWATT LOSS TEST VOLTAGE kVac | HIGH POTENTIAL TEST VOLTAGE 38 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
POLE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LOAD TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO LOAD	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	2.2	0.16	0.16
HIGH POTENTIAL OPEN TEST	0.12	0.15	0.16

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE ☐ MICRO-OHMS ☐ MILLI-OHMS	RDG.			
	20°C			
CONTACT RESISTANCE ☐ MICRO-OHMS ☑ MILLI-OHMS	RDG.	0.027	0.028	0.029
	20°C	0.0269	0.0279	0.0289

	POLE 1	POLE 2	POLE 3
OPENING SPEED			
CLOSING SPEED			

COUNTER READING: BEG. 00441
END 00448

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539 DUCTOR #193761 HI POT #191469

Tested By: D. FLEMING Tested By: TD, AS

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 76
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/3/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB
SUBSTATION 13.2 kV — POSITION SUB 7 - CEB (52F 27)

MANUFACTURER SQUARE D — SERIAL NUMBER 17 77452
TYPE VR — MODEL NO. 17-28142137-002 — DATE MANUFACTURED 10/13
MAXIMUM VOLTAGE 15 kV — AMPACITY 1200 — OPERATING VOLTAGE 13.2 kV
INTERRUPTING CAPACITY 25 kA @ --- kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTIONS	☑	Acceptable	C/L
STRUCTURAL MEMBERS	☑	Acceptable	C
CUBICLE	☑	Acceptable	C
RACKING DEVICES	☑	Acceptable	C/L
SHUTTER	☑	Acceptable	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Acceptable	C/L
VACUUM BOTTLE	☑	Acceptable	C
CONTACT EROSION INDICATOR	☑	Acceptable	C
OPERATING MECHANISM	☑	Acceptable	C/L
CONTACT SEQUENCE	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
AUXILIARY DEVICES	☑	Acceptable	C

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
MILLIWATT LOSS TEST VOLTAGE kVac — HIGH POTENTIAL TEST VOLTAGE 38 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
POLE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LOAD TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO LOAD	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	2.2	6.0	0.18
HIGH POTENTIAL OPEN TEST	0.16	0.18	1.3

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE	RDG.	0.03	0.029	0.028
☐ MICRO-OHMS ☑ MILLI-OHMS	20°C	0.0299	0.0289	0.0279
CONTACT RESISTANCE	RDG.			
☐ MICRO-OHMS ☐ MILLI-OHMS	20°C			

	POLE 1	POLE 2	POLE 3
OPENING SPEED			
CLOSING SPEED			

COUNTER READING: BEG. 00459
END 00456

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480 DUCTOR #157082 HI POT #156393

Tested By: D. FLEMING Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER: Ann Arbor, City of — PAGE: 77
ADDRESS: 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB #: AACI207024-1
USER: Ann Arbor WWTP
OWNER REPRESENTATIVE: Jeremy Holbrook — TELEPHONE:
DATE: 3/2/2020 — TEMPERATURE: 70 °F — HUMIDITY: 30 % — EQPT. LOCATION: CEB
SUBSTATION: 13.2 kV — POSITION: SUB 7 -CEB (52F 17)

MANUFACTURER: SQUARE D — SERIAL NUMBER: 17 77459
TYPE: VR — MODEL NO.: 17-28142137-002 — DATE MANUFACTURED: 10/13
MAXIMUM VOLTAGE: 15 kV — AMPACITY: 1200 — OPERATING VOLTAGE: 13.2 kV
INTERRUPTING CAPACITY: 25 kA @ --- kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTIONS	☑	Acceptable	C/L
STRUCTURAL MEMBERS	☑	Acceptable	C
CUBICLE	☑	Acceptable	C
RACKING DEVICES	☑	Acceptable	C/L
SHUTTER	☑	Acceptable	C

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Acceptable	C/L
VACUUM BOTTLE	☑	Acceptable	C
CONTACT EROSION INDICATOR	☑	Acceptable	C
OPERATING MECHANISM	☑	Acceptable	C/L
CONTACT SEQUENCE	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
AUXILIARY DEVICES	☑	Acceptable	C

INSULATION TEST VOLTAGE: 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE: 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 1.06
MILLIWATT LOSS TEST VOLTAGE: kVac — HIGH POTENTIAL TEST VOLTAGE: 38 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
POLE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LOAD TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO LOAD	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.36	0.39	1.5
HIGH POTENTIAL OPEN TEST	0.22	0.20	0.20

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE	RDG.	0.029	0.029	0.029
☐ MICRO-OHMS ☑ MILLI-OHMS	20°C	0.0289	0.0289	0.0289
CONTACT RESISTANCE	RDG.			
☐ MICRO-OHMS ☐ MILLI-OHMS	20°C			

	POLE 1	POLE 2	POLE 3
OPENING SPEED	---	---	---
CLOSING SPEED	---	---	---

COUNTER READING: BEG. 00525
END 00531

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480 DUCTOR #157082 HI POT #156393

Tested By: D. FLEMING Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 78

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/12/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB

SUBSTATION 13.2 kV — POSITION SUB 8 - EBB (52F 28)

MANUFACTURER SQUARE D — SERIAL NUMBER 17 77450

TYPE VR — MODEL NO. 17-28142137-002 — DATE MANUFACTURED 10 / 13

MAXIMUM VOLTAGE 15 kV — AMPACITY 1200 — OPERATING VOLTAGE 13.2 kV

INTERRUPTING CAPACITY 25 kA @ --- kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTIONS	☑	Acceptable	C
STRUCTURAL MEMBERS	☑	Acceptable	C
CUBICLE	☑	Acceptable	C
RACKING DEVICES	☑	Acceptable	C
SHUTTER	☑	Acceptable	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Acceptable	C/L
VACUUM BOTTLE	☑	Acceptable	C
CONTACT EROSION INDICATOR	☑	Acceptable	NA
OPERATING MECHANISM	☑	Acceptable	C/L
CONTACT SEQUENCE	☑	Acceptable	NA
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	NA

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

MILLIWATT LOSS TEST VOLTAGE kVac — HIGH POTENTIAL TEST VOLTAGE 38 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
POLE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LOAD TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO LOAD	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.72	0.72	0.72
HIGH POTENTIAL OPEN TEST	0.32	0.32	0.32

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE	RDG.	0.029	0.029	0.029
☐ MICRO-OHMS ☑ MILLI-OHMS	20°C	0.0289	0.0289	0.0289
CONTACT RESISTANCE	RDG.			
☐ MICRO-OHMS ☐ MILLI-OHMS	20°C			

	POLE 1	POLE 2	POLE 3
OPENING SPEED	---	---	---
CLOSING SPEED	---	---	---

COUNTER READING: BEG. 00389

END 00395

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #156375 DUCTOR #201071 HI POT #191469

Tested By: K. MURPHY Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER: Ann Arbor, City of | PAGE: 79
ADDRESS: 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB #: AACI207024-1
USER: Ann Arbor WWTP
OWNER REPRESENTATIVE: Jeremy Holbrook | TELEPHONE:
DATE: 3/11/2020 | TEMPERATURE: 70 °F | HUMIDITY: 40 % | EQPT. LOCATION: CEB
SUBSTATION: 13.2 kV | POSITION: SUB 8 -EBB (52F 18)

MANUFACTURER: SQUARE D | SERIAL NUMBER: 17 77463
TYPE: VR | MODEL NO.: 17-28142137-002 | DATE MANUFACTURED: 10 / 13
MAXIMUM VOLTAGE: 15 kV | AMPACITY: 1200 | OPERATING VOLTAGE: 13.2 kV
INTERRUPTING CAPACITY: 25 kA @ --- kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTIONS	☑	Acceptable	C/L
STRUCTURAL MEMBERS	☑	Acceptable	C
CUBICLE	☑	Acceptable	NA
RACKING DEVICES	☑	Acceptable	NA
SHUTTER	☑	Acceptable	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Acceptable	C/L
VACUUM BOTTLE	☑	Acceptable	C
CONTACT EROSION INDICATOR	☑	Acceptable	NA
OPERATING MECHANISM	☑	Acceptable	NA
CONTACT SEQUENCE	☑	Acceptable	NA
GROUND CONNECTION	☑	Acceptable	C/L
AUXILIARY DEVICES	☑	Acceptable	NA

INSULATION TEST VOLTAGE: 5 kVdc | TEST VOLTAGE MULTIPLIER, K1 = 1 | K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE: 21 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 1.06
MILLIWATT LOSS TEST VOLTAGE: kVac | HIGH POTENTIAL TEST VOLTAGE: 38 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
POLE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LOAD TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO LOAD	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.7	0.5	0.4
HIGH POTENTIAL OPEN TEST	0.3	0.3	0.3

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE ☐ MICRO-OHMS ☐ MILLI-OHMS	RDG.			
	20°C			
CONTACT RESISTANCE ☐ MICRO-OHMS ☑ MILLI-OHMS	RDG.	0.029	0.03	0.03
	20°C	0.0289	0.0299	0.0299

	POLE 1	POLE 2	POLE 3
OPENING SPEED			
CLOSING SPEED			

COUNTER READING: BEG. 00535
END 00542

COMMENTS: CAT #V5DB133Y000

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480 DUCTOR #157082

Tested By: E. TAPPAN Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 80
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/24/2020 — TEMPERATURE 70 °F — HUMIDITY 30 % — EQPT. LOCATION CEB
SUBSTATION 13.2 kV — POSITION UNIT SUB 1- RSLS (52F 11)

MANUFACTURER SQUARE D — SERIAL NUMBER 17 77455
TYPE VR — MODEL NO. 17-28142137-002 — DATE MANUFACTURED 10 / 13
MAXIMUM VOLTAGE 15 kV — AMPACITY 1200 — OPERATING VOLTAGE 13.2 kV
INTERRUPTING CAPACITY 25 kA @ --- kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTIONS	☑	Acceptable	C
STRUCTURAL MEMBERS	☑	Acceptable	C
CUBICLE	☑	Acceptable	C
RACKING DEVICES	☑	Acceptable	C/L
SHUTTER	☑	Acceptable	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Acceptable	C/L
VACUUM BOTTLE	☑	Acceptable	C
CONTACT EROSION INDICATOR	☑	Acceptable	C
OPERATING MECHANISM	☑	Acceptable	C/L
CONTACT SEQUENCE	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
AUXILIARY DEVICES	☑	Acceptable	C

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
MILLIWATT LOSS TEST VOLTAGE kVac — HIGH POTENTIAL TEST VOLTAGE 38 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
POLE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LOAD TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO LOAD	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.2	0.4	0.3
HIGH POTENTIAL OPEN TEST	0.2	0.2	0.3

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE ☐ MICRO-OHMS ☐ MILLI-OHMS	RDG.			
	20°C			
CONTACT RESISTANCE ☐ MICRO-OHMS ☑ MILLI-OHMS	RDG.	0.027	0.029	0.034
	20°C	0.0269	0.0289	0.0339

	POLE 1	POLE 2	POLE 3
OPENING SPEED			
CLOSING SPEED			

COUNTER READING: BEG. 00145
END 00155

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480 DUCTOR #157082 HI POT #156093

Tested By: E. TAPPAN Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER: Ann Arbor, City of | PAGE: 81
ADDRESS: 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB #: AACI207024-1
USER: Ann Arbor WWTP
OWNER REPRESENTATIVE: Jeremy Holbrook | TELEPHONE:
DATE: 2/26/2020 | TEMPERATURE: 70 °F | HUMIDITY: 50 % | EQPT. LOCATION: CEB
SUBSTATION: 13.2 kV | POSITION: UNIT SUB 3- WBB (52F 13)

MANUFACTURER: SQUARE D | SERIAL NUMBER: 17 77460
TYPE: VR | MODEL NO.: 17-28142137-002 | DATE MANUFACTURED: 10 / 13
MAXIMUM VOLTAGE: 15 kV | AMPACITY: 1200 | OPERATING VOLTAGE: 13.2 kV
INTERRUPTING CAPACITY: 25 kA @ --- kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTIONS	☑	Acceptable	C
STRUCTURAL MEMBERS	☑	Acceptable	C
CUBICLE	☑	Acceptable	C
RACKING DEVICES	☑	Acceptable	C
SHUTTER	☑	Acceptable	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Acceptable	C
VACUUM BOTTLE	☑	Acceptable	C
CONTACT EROSION INDICATOR	☑	Acceptable	NA
OPERATING MECHANISM	☑	Acceptable	C
CONTACT SEQUENCE	☑	Acceptable	NA
GROUND CONNECTION	☑	Acceptable	NA
AUXILIARY DEVICES	☑	Acceptable	NA

INSULATION TEST VOLTAGE: 5 kVdc | TEST VOLTAGE MULTIPLIER, K1 = 1 | K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE: 21 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 1.06
MILLIWATT LOSS TEST VOLTAGE: kVac | HIGH POTENTIAL TEST VOLTAGE: 38 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
POLE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LOAD TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO LOAD	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.3	0.3	0.8
HIGH POTENTIAL OPEN TEST	0.2	0.2	0.2

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE ☐ MICRO-OHMS ☐ MILLI-OHMS	RDG.			
	20°C			
CONTACT RESISTANCE ☐ MICRO-OHMS ☑ MILLI-OHMS	RDG.	0.035	0.036	0.036
	20°C	0.0349	0.0359	0.0359

	POLE 1	POLE 2	POLE 3
OPENING SPEED			
CLOSING SPEED			

COUNTER READING: BEG. 529
END 534

COMMENTS: CAT #V5DB133Y000

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480 DUCTOR #157082 HI POT #156393

Tested By: E. TAPPAN Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 82
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/28/2020 — TEMPERATURE 70 °F — HUMIDITY 30 % — EQPT. LOCATION CEB
SUBSTATION 13.2 kV — POSITION UNIT SUB 5 -SH (52F 15)

MANUFACTURER SQUARE D — SERIAL NUMBER 17 77442
TYPE VR — MODEL NO. 17-28142137-002 — DATE MANUFACTURED 10 / 13
MAXIMUM VOLTAGE 15 kV — AMPACITY 1200 — OPERATING VOLTAGE 13.2 kV
INTERRUPTING CAPACITY 25 kA @ --- kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTIONS	☑	Acceptable	C/L
STRUCTURAL MEMBERS	☑	Acceptable	C
CUBICLE	☑	Acceptable	C
RACKING DEVICES	☑	Acceptable	C/L
SHUTTER	☑	Acceptable	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Acceptable	C/L
VACUUM BOTTLE	☑	Acceptable	C
CONTACT EROSION INDICATOR	☑	Acceptable	C
OPERATING MECHANISM	☑	Acceptable	C/L
CONTACT SEQUENCE	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
AUXILIARY DEVICES	☑	Acceptable	C

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
MILLIWATT LOSS TEST VOLTAGE kVac — HIGH POTENTIAL TEST VOLTAGE 38 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
POLE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LOAD TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO LOAD	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	1.2	0.19	0.18
HIGH POTENTIAL OPEN TEST	0.17	0.18	0.18

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE ☐ MICRO-OHMS ☐ MILLI-OHMS	RDG.			
	20°C			
CONTACT RESISTANCE ☐ MICRO-OHMS ☑ MILLI-OHMS	RDG.	0.033	0.033	0.032
	20°C	0.0329	0.0329	0.0319

	POLE 1	POLE 2	POLE 3
OPENING SPEED			
CLOSING SPEED			

COUNTER READING: BEG. 00583
END 00590

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480 DUCTOR #157082 HI POT #156393

Tested By: D. FLEMING Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VOLTAGE TRANSFORMER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 83

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 5/13/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB

SUBSTATION 13.2 kV — POSITION VT2 (X,Y & Z)

NAMEPLATE DATA

MANUFACTURER INSTRUMENT TRANSFORMER INC. — CATALOG NO. PTG511101322FGC1 — TYPE --- — NAMEPLATE RATIO 110 : 1

PRIMARY VOLTAGE 13.2 — SECONDARY VOLTAGE 120 — kVA 110 — CLASS ---

Other ---

PRIMARY FUSE: MANUFACTURER BUSS MAN — TYPE E — SIZE 1A — NO. 1 PER PHASE

SECONDARY FUSE: MANUFACTURER BUSS — TYPE BAF — SIZE 5A — NO. 1 PER PHASE

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

VT IDENTIFICATION: VT2 X — **SERIAL NUMBER:** 53740853

TURNS RATIO TEST

CALCULATED TURNS RATIO 110

MEASURED TURNS RATIO 109.86

CONNECTIONS H_1 H_0 X_1 X_0

POLARITY H1 - X1 — ERROR 0.127273 %

INSULATION TEST

			RDG.	20°C	
PRI - SEC	@	kVdc	100,000.0	106,000.0	MEGOHMS
PRI - GRD	@	kVdc	100,000.0	106,000.0	MEGOHMS
SEC - GRD	@	kVdc	100,000.0	106,000.0	MEGOHMS

VT IDENTIFICATION: VT2 Y — **SERIAL NUMBER:** 53740852

TURNS RATIO TEST

CALCULATED TURNS RATIO 110

MEASURED TURNS RATIO 109.84

CONNECTIONS H_1 H_0 X_1 X_0

POLARITY H1 - X1 — ERROR 0.145455 %

INSULATION TEST

			RDG.	20°C	
PRI - SEC	@	kVdc	100,000.0	106,000.0	MEGOHMS
PRI - GRD	@	kVdc	100,000.0	106,000.0	MEGOHMS
SEC - GRD	@	kVdc	100,000.0	106,000.0	MEGOHMS

VT IDENTIFICATION: VT2 Z — **SERIAL NUMBER:** 53740851

TURNS RATIO TEST

CALCULATED TURNS RATIO 110

MEASURED TURNS RATIO 109.97

CONNECTIONS H_1 H_0 X_1 X_0

POLARITY H1 - X1 — ERROR 0.0272727 %

INSULATION TEST

			RDG.	20°C	
PRI - SEC	@	kVdc	100,000.0	106,000.0	MEGOHMS
PRI - GRD	@	kVdc	100,000.0	106,000.0	MEGOHMS
SEC - GRD	@	kVdc	100,000.0	106,000.0	MEGOHMS

VT CONNECTION: ○ 1 PHASE ◉ 3 PHASE — PRIMARY: ○ WYE ○ DELTA — SECONDARY: ○ WYE ○ DELTA

COMMENTS: PRI FUSE RESISTANCE X = 30.04 OHMS Y = 30.23 OHMS Z = 30.01 OHMS

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #156386 TTR #164425 DUCTOR #193764

Tested By: KC, DF — Tested By: JR

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VOLTAGE TRANSFORMER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 84

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 5/12/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB

SUBSTATION 13.2 kV — POSITION VT2 X, Y & Z

NAMEPLATE DATA

MANUFACTURER INSTRUMENT TRANSFORMER INC. — CATALOG NO. PTG511101322FGC1 — TYPE --- — NAMEPLATE RATIO 110 : 1

PRIMARY VOLTAGE 13.2 — SECONDARY VOLTAGE 120 — kVA 110 — CLASS ---

Other ---

PRIMARY FUSE: MANUFACTURER BUSSMANN — TYPE E — SIZE 1A — NO. 1 PER PHASE

SECONDARY FUSE: MANUFACTURER BUSSMANN — TYPE BAF — SIZE 5A — NO. 1 PER PHASE

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

VT IDENTIFICATION: VT2 X — **SERIAL NUMBER:** 53740856

TURNS RATIO TEST

CALCULATED TURNS RATIO 110

MEASURED TURNS RATIO 110.12

CONNECTIONS H_1 H_0 X_1 X_0

POLARITY H1 - X1 — ERROR 0.109091 %

INSULATION TEST

		RDG.	20°C	
PRI - SEC @ kVdc	100,000.0	106,000.0	MEGOHMS
PRI - GRD @ kVdc	100,000.0	106,000.0	MEGOHMS
SEC - GRD @ kVdc	100,000.0	106,000.0	MEGOHMS

VT IDENTIFICATION: VT2 Y — **SERIAL NUMBER:** 53740855

TURNS RATIO TEST

CALCULATED TURNS RATIO 110

MEASURED TURNS RATIO 109.91

CONNECTIONS H_1 H_0 X_1 X_0

POLARITY H1 - X1 — ERROR 0.0818182 %

INSULATION TEST

		RDG.	20°C	
PRI - SEC @ kVdc	100,000.0	106,000.0	MEGOHMS
PRI - GRD @ kVdc	100,000.0	106,000.0	MEGOHMS
SEC - GRD @ kVdc	100,000.0	106,000.0	MEGOHMS

VT IDENTIFICATION: VT2 Z — **SERIAL NUMBER:** 53740854

TURNS RATIO TEST

CALCULATED TURNS RATIO 110

MEASURED TURNS RATIO 109.93

CONNECTIONS H_1 H_0 X_1 X_0

POLARITY H1 - X1 — ERROR 0.0636364 %

INSULATION TEST

		RDG.	20°C	
PRI - SEC @ kVdc	100,000.0	106,000.0	MEGOHMS
PRI - GRD @ kVdc	100,000.0	106,000.0	MEGOHMS
SEC - GRD @ kVdc	100,000.0	106,000.0	MEGOHMS

VT CONNECTION: ○ 1 PHASE ◉ 3 PHASE — PRIMARY: ○ WYE ○ DELTA — SECONDARY: ○ WYE ○ DELTA

COMMENTS: PRIMARY FUSE RESISTANCE X = 33.2 OHMS Y = 34.7 OHMS Z = 37.4 OHMS

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #156386 TTR #164425 DUCTOR #193764

Tested By: J. RYSENGA — Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 85
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/18/2020 — TEMPERATURE 60 °F — HUMIDITY 50 % — EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 — POSITION MAIN A

MANUFACTURER	SQUARE D	SN / SO NO.	085249512101	FRAME SIZE(F)	800
BREAKER TYPE	MASTER PACT NW 08 H3	SENSOR TAPS	800	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0 A	CATALOG NO.	WA6AAR44A9CFFFWSEA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C/L
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C/L
AUXILIARY DEVICES	☐	N/A	N/A
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	800	LONG TIME PU	1	x	800	A =	800	A	DELAY	12		
SENSOR TAP	800	SHORT TIME PU	6	=	4800	A			DELAY	0.3	I²T ○ IN	◉ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	---	=	---	A	○ ON	◉ OFF				
		GRD. FLT. PU	B	=	240	A	◉ ON	○ OFF	DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	800	LONG TIME PU	1	x	800	A =	800	A	DELAY	12		
SENSOR TAP	800	SHORT TIME PU	6	=	4800	A			DELAY	0.3	I²T ○ IN	◉ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	---	=	---	A	○ ON	◉ OFF				
		GRD. FLT. PU	B	=	240	A	◉ ON	○ OFF	DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	6000	125%	---	---	0.278	0.278	---	---	---	---
	STPU									
LONG TIME	3467	433%	---	---	20.89	20.89	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	480	150%	---	---	0.160	0.160	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.848

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
POLE TO FRAME	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
LINE TO LOAD	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☑ MICRO-OHMS ☐ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.037	0.035	0.039

COMMENTS: DATE CODE: 14063. BREAKER PASSED THE AUTOMATIC TRIP CURVE TEST.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: SI #1512, MEGGER #206979, DLRO #1570

Tested By: ET / TD / NH — Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 86
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/19/2020 — TEMPERATURE 50 °F — HUMIDITY 45 % — EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 — POSITION MAIN B

MANUFACTURER	SQUARE D	SN / SO NO.	085249512103	FRAME SIZE(F)	800
BREAKER TYPE	MASTER PACT NW 08 H3	SENSOR TAPS	800	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	4B	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0 A	CATALOG NO.	WA6AAR44A9CFFFWSEA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C/L
OVERCURRENT DEV. BATTERY	☑	Acceptable	C/L

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C/L
AUXILIARY DEVICES	☐	N/A	N/A
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND		LONG TIME PU	1	x	800	A =	800	A	DELAY	12	
RATING PLUG(R)	800	SHORT TIME PU	6	=	4800	A			DELAY	0.3	I²T ○ IN ◉ OUT ○ N/A
SENSOR TAP	800	INST. PU	---	=	---	A	○ ON ◉ OFF				
GRD. FLT.	◉ 3W ○ 4W	GRD. FLT. PU	B	=	240	A	◉ ON ○ OFF		DELAY	0.2	I²T ○ IN ◉ OUT ○ N/A
SETTINGS AS LEFT		LONG TIME PU	1	x	800	A =	800	A	DELAY	12	
RATING PLUG(R)	800	SHORT TIME PU	6	=	4800	A			DELAY	0.3	I²T ○ IN ◉ OUT ○ N/A
SENSOR TAP	800	INST. PU	---	=	---	A	○ ON ◉ OFF				
GRD. FLT.	◉ 3W ○ 4W	GRD. FLT. PU	B	=	240	A	◉ ON ○ OFF		DELAY	0.2	I²T ○ IN ◉ OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	6000	125%	---	---	0.277	0.277	---	---	---	---
	STPU									
LONG TIME	3467	433%	---	---	19.906	19.906	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	480	200%	---	---	0.159	0.159	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 10 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.63

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,260.00	2,000	1,260.00	2,000	1,260.00
POLE TO FRAME	2,000	1,260.00	2,000	1,260.00	2,000	1,260.00
LINE TO LOAD	2,000	1,260.00	2,000	1,260.00	2,000	1,260.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.012	0.013	0.012

COMMENTS: DATE CODE: 14063. BREAKER PASSED THE AUTOMATIC TRIP CURVE TEST.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: SI #1512

Tested By: ET / NH / EK Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 87
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/18/2020 — TEMPERATURE 60 °F — HUMIDITY 50 % — EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 — POSITION MCC-E

MANUFACTURER	SQUARE D	SN / SO NO.	085249508001	FRAME SIZE(F)	800
BREAKER TYPE	MASTER PACT NW 08 H3	SENSOR TAPS	400	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	2C	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0 A	CATALOG NO.	WA6AAR44A9CXFXWXAA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C/L
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C/L
AUXILIARY DEVICES	☐	N/A	N/A
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND		LONG TIME PU	1	x	400	A =	400	A	DELAY	12	
RATING PLUG(R)	400	SHORT TIME PU	6	=	2400	A			DELAY	0.1	I²T ○ IN ◉ OUT ○ N/A
SENSOR TAP	400	INST. PU	10	=	4000	A	◉ ON	○ OFF			
GRD. FLT.	◉ 3W ○ 4W	GRD. FLT. PU	A	=	120	A	◉ ON	○ OFF	DELAY	0.0	I²T ○ IN ◉ OUT ○ N/A
SETTINGS AS LEFT		LONG TIME PU	1	x	400	A =	400	A	DELAY	12	
RATING PLUG(R)	400	SHORT TIME PU	6	=	2400	A			DELAY	0.1	I²T ○ IN ◉ OUT ○ N/A
SENSOR TAP	400	INST. PU	10	=	4000	A	◉ ON	○ OFF			
GRD. FLT.	◉ 3W ○ 4W	GRD. FLT. PU	A	=	120	A	◉ ON	○ OFF	DELAY	0.0	I²T ○ IN ◉ OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	5000	125%	---	---	0.037	0.037	---	---	---	---
	IPU									
SHORT TIME	3200	134%	---	---	0.106	0.106	---	---	---	---
	STPU									
LONG TIME	1733	433%	---	---	20.007	20.007	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	240	200%	---	---	0.037	0.037	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.848

INSULATION RESISTANCE	POLE 1 MΩ (P1-P2) READING	POLE 1 20°C	POLE 2 MΩ (P2-P3) READING	POLE 2 20°C	POLE 3 MΩ (P3-P1) READING	POLE 3 20°C
POLE TO POLE	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
POLE TO FRAME	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
LINE TO LOAD	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.013	0.013	0.012

COMMENTS: NO OCCS AT TIME OF TEST.
DATE CODE: 14063. BREAKER PASSED THE AUTOMATIC TRIP TEST.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: SI #1512, MEGGER #206979, DLRO #1570

Tested By: ET / TD / NH — Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 88
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/18/2020 — TEMPERATURE 60 °F — HUMIDITY 50 % — EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 — POSITION MCC-E

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — SERIAL NO. --- — TYPE 7700 LINE
CATALOG NO. 435X719M09 — DRAWING NO. * — VOLTAGE CLASS 460
MAIN BUS RATING SUPPLY=600 SEC.=300 A — MAIN BUS NEUTRAL RATING --- A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING --- — NUMBER OF SECTIONS 9 — LISTING [x] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER --- — MLO X — TYPE --- — AMPACITY --- — MAIN DISCONNECT --- — FUSE TYPE --- — SIZE ---
TOTAL POSITIONS EQUIPPED 40 — NO. OF SPARE SPACES 7 — TOTAL POSITIONS USED 30

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTIONS	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
SECTION 1 THRU SECTION 9	RDG.	39.2	1,090	37.5		1,082	102.5	1,055			
	20°C	41.552	1,155.4	39.75		1,146.92	108.65	1,118.3			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS: *213B9202. SH.46.44.47.21.
MEGGER WITH FEEDERS ATTACHED.

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: D. FLEMING Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 89
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/18/2020 — TEMPERATURE 60 °F — HUMIDITY 50 % — EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 — POSITION MCC-E (01)

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — SIZE VARIOUS — TYPE IC 7700 LINE
CATALOG NO. SEE COMMENTS — SERIES --- — MAX. VOLTS ---

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.8
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 0.8
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
FEEDER MCC-EE	FRS-R	125	9,097	1,018.6	821.6	39.2	1,090	37.5	1,082	102.5	
						31.36	872	30	865.6	82	
EQ RTN VALVE #2	FRS	12	2,229.4	2,448.8	3,440.6	39.2	1,090	37.5	1,082	102.5	
						31.36	872	30	865.6	82	
EQ RTN VALVE #1	FRS	12	2,198.2	3,483	2,197.2	39.2	1,090	37.5	1,082	102.5	
						31.36	872	30	865.6	82	
BASIN OUTGATE #3	FRS	7	3,247.4	1,545.1	1,993.2	39.2	1,090	37.5	1,082	102.5	
						31.36	872	30	865.6	82	
BASIN OUTGATE #1	FRS	7	2,003.6	1,537.8	1,781.3	39.2	1,090	37.5	1,082	102.5	
						31.36	872	30	865.6	82	
EQR-EUH-1	---	20 BRKR	6,541.5	6,264.5	7,900	39.2	1,090	37.5	1,082	102.5	
						31.36	872	30	865.6	82	
EQR-EUH-2	---	20 BRKR	6,265.5	10,726	10,595	39.2	1,090	37.5	1,082	102.5	
						31.36	872	30	865.6	82	
SPARE	---	---	1,767.3	4,871.8	1,926.7	39.2	1,090	37.5	1,082	102.5	
						31.36	872	30	865.6	82	

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: CAT #435X719M07. DIAGRAM: 213B9202.
VOLTS: 460.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 90
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/18/2020 — TEMPERATURE 60 °F — HUMIDITY 50 % — EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 — POSITION MCC-E (02)

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — SIZE VARIOUS — TYPE IC 7700 LINE
CATALOG NO. SEE COMMENTS — SERIES --- — MAX. VOLTS ---

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.8
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 0.8
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
BASIN INFL. GATE #3	FRS	7	74,215	3,795	4,118	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844
BASIN INFL. GATE #1	FRS	7	3,993	2,331	4,026	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844
EQ INFL. GATE #12	FRS	7	6,368	2,236	1,639	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844
EQ. INFL. GATE #10	TRS 7R	7	4,437	5,278	5,212	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844
EQ. INFL. GATE #4	FRS	7	2,058	1,776	3,980	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844
EQ. INFL. GATE #2	FRS	7	2,649	106,630	3,987	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844
SECURITY GATE	FRS-R	20	3,029	3,948.8	3,153.8	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844
RB DRAIN PUMP #4	FRS-R	90	104,340	10,399	201,700	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: CAT #435X719M07. DIAGRAM: 213B9202. 460 VOLTS.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 91

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/18/2020 — TEMPERATURE 60 °F — HUMIDITY 50 % — EQPT. LOCATION RETENTION BUILDING

SUBSTATION 2 — POSITION MCC-E (03)

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — SIZE VARIOUS — TYPE IC 7700 LINE

CATALOG NO. SEE COMMENTS — SERIES --- — MAX. VOLTS ---

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.8

K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 0.8

INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
EQ. INFL. GATE #11	FRS	7	36,938	7,450	9,954	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844
EQ. INFL. GATE #9	FRS-R	7	3,227	2,072	4,261	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844
EQ. INFL. GATE #3	FRS	7	1,717	1,874	3,867	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844
EQ. INFL. DATE #1	FRS	7	2,673	4,791	2,312	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844
LIGHTING PANEL E	FRS-R	80	1,065	1,367	1,741	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844
NO LABEL	---	30 BRKR	7,525	5,211	6,313	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844
RB DRAIN PUMP #2	FRS-R	90	575	2,261	4,536	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: CAT #435X719M07. DIAGRAM: 213B9202. VOLTS: 460.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 92
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/18/2020 — TEMPERATURE 60 °F — HUMIDITY 50 % — EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 — POSITION MCC-E (04)

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — SIZE VARIOUS — TYPE IC 7700 LINE
CATALOG NO. SEE COMMENTS — SERIES --- — MAX. VOLTS ---

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.8
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 0.8
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
RETENTION BASIN RETURN CONTROL VALVE	FRS	5	20,868	8,341	24,302	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844
CROSS COLLECTOR #1	NO FUSES	NOT IN USE	28,806	26,840	143,060	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844
MP PEW PUMP #1	LPS	125	880	881	1,222	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: CAT #435X719M08. DIAGRAM: 213B9202. VOLTS: 460.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 93
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/18/2020 — TEMPERATURE 60 °F — HUMIDITY 50 % — EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 — POSITION MCC-E (05)

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — SIZE VARIOUS — TYPE IC 7700 LINE
CATALOG NO. SEE COMMENTS — SERIES --- — MAX. VOLTS ---

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.8
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 0.8
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
WELDER OUTLETS	FRS	30	1,359	8,048	12,705	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844
CROSS COLLECTOR #3	NO FUSES	NOT IN USE	70,315	2,266	92,990	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844
HP PEW PUMP #1	LPS RK	200	1,253	962	956	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: CAT #435X719M08. DIAGRAM: 213B9202. VOLTS: 460.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 94

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/18/2020 — TEMPERATURE 60 °F — HUMIDITY 50 % — EQPT. LOCATION RETENTION BUILDING

SUBSTATION 2 — POSITION MCC-E (06)

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — SIZE VARIOUS — TYPE IC 7700 LINE

CATALOG NO. SEE COMMENTS — SERIES --- — MAX. VOLTS ---

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.8

K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 0.8

INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
SCREW PUMP #8	LPS-R	200	1,026	2,358	1,341	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: CAT #435X719M08. DIAGRAM: 213B9202. VOLTS: 460.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 95
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/18/2020 — TEMPERATURE 60 °F — HUMIDITY 50 % — EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 — POSITION MCC-E (07)

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — SIZE VARIOUS — TYPE IC 7700 LINE
CATALOG NO. SEE COMMENTS — SERIES --- — MAX. VOLTS ---

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.8
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 0.8
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
SCREW PUMP #7	LPS-R	200	910	843	928	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: CAT #435X719M09. DIAGRAM: 213B9202. VOLTS: 460.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 96

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE

DATE 2/18/2020 TEMPERATURE 60 °F HUMIDITY 50 % EQPT. LOCATION RETENTION BUILDING

SUBSTATION 2 POSITION MCC-E (08)

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC SIZE VARIOUS TYPE IC 7700 LINE

CATALOG NO. SEE COMMENTS SERIES --- MAX. VOLTS ---

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 16 °C

TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.8

K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1

K2 = (K1) (TCF) = 0.8

INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
SPARE	NO FUSES	NOT IN USE	2,604	33,070	2,714	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844
SLUDGE COLLECTOR #3	NO FUSES	NOT IN USE	28,780	12,862	1,932	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844
SPARE	NO FUSES	NOT IN USE	6,480	36,950	247,560	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844
SLUDGE COLLECTOR #1	NO FUSES	NOT IN USE	29,198	5,540	2,421	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844
SLUDGE PUMP #1	FRS	15	6,755	216	31,192	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844
NO LABEL	FRS	15	3,716	62,050	9,504	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: CAT #435X719M09. DIAGRAM: 213B9202. VOLTS: 460.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 97
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/18/2020 — TEMPERATURE 60 °F — HUMIDITY 50 % — EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 — POSITION MCC-E (09)

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — SIZE VARIOUS — TYPE IC 7700 LINE
CATALOG NO. SEE COMMENTS — SERIES --- — MAX. VOLTS ---

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.8
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 0.8
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
SUMP PUMP #1	FRS	15	57,080	7,822	31,002	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844
TEMP CHLORINE TAB MACHINE	FRS-R	25	18,520	12,144	1,591	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844
NO LABEL	NO FUSES	NOT IN USE	1,176.1	3,091.4	3,229.6	39.2	1,090	37.5	1,082	102.5	1,055
						31.36	872	30	865.6	82	844

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: CAT #435X719M09. DIAGRAM: 213B9202. VOLTS: 460.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 98
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/19/2020 — TEMPERATURE 50 °F — HUMIDITY 45 % — EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 — POSITION MCC-F

MANUFACTURER	SQUARE D	SN / SO NO.	085249508202	FRAME SIZE(F)	800 A
BREAKER TYPE	MASTER PACT NW 08 H3	SENSOR TAPS	400	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	3C	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0 A	CATALOG NO.	WA6AAR44A9CXFXWXAA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C/L
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C/L
AUXILIARY DEVICES	☐	N/A	N/A
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND		LONG TIME PU	1	x	400	A =	400	A	DELAY	12	
RATING PLUG(R)	400	SHORT TIME PU	6	=	2400	A			DELAY	0.1	I²T ○ IN ◉ OUT ○ N/A
SENSOR TAP	400	INST. PU	10	=	4000	A	◉ ON	○ OFF			
GRD. FLT.	◉ 3W ○ 4W	GRD. FLT. PU	A	=	120	A	◉ ON	○ OFF	DELAY	0.0	I²T ○ IN ◉ OUT ○ N/A
SETTINGS AS LEFT		LONG TIME PU	1	x	400	A =	400	A	DELAY	12	
RATING PLUG(R)	400	SHORT TIME PU	6	=	2400	A			DELAY	0.1	I²T ○ IN ◉ OUT ○ N/A
SENSOR TAP	400	INST. PU	10	=	4000	A	◉ ON	○ OFF			
GRD. FLT.	◉ 3W ○ 4W	GRD. FLT. PU	A	=	120	A	◉ ON	○ OFF	DELAY	0.0	I²T ○ IN ◉ OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	5000	125%	---	---	0.037	0.037	---	---	---	---
	IPU									
SHORT TIME	3200	133%	---	---	0.105	0.105	---	---	---	---
	STPU									
LONG TIME	1733	433%	---	---	20.297	20.297	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	240	200%	---	---	0.038	0.038	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 10 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.63

INSULATION RESISTANCE	POLE 1 MΩ (P1-P2) READING	POLE 1 20°C	POLE 2 MΩ (P2-P3) READING	POLE 2 20°C	POLE 3 MΩ (P3-P1) READING	POLE 3 20°C
POLE TO POLE	2,000	1,260.00	2,000	1,260.00	2,000	1,260.00
POLE TO FRAME	2,000	1,260.00	2,000	1,260.00	2,000	1,260.00
LINE TO LOAD	2,000	1,260.00	2,000	1,260.00	2,000	1,260.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.013	0.011	0.011

COMMENTS: DATE CODE: 14061. BREAKER PASSED THE AUTOMATIC TRIP TEST.
CAT. NO. WOULD INDICATE AN 800A SENSOR PLUG, BUT IT HAS A 400A.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: SI #1512

Tested By: ET / NH / EK Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 99
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/19/2020 — TEMPERATURE 50 °F — HUMIDITY 40 % — EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 — POSITION MCC-F

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — SERIAL NO. --- — TYPE 7700 LINE
CATALOG NO. 435X719M11 — DRAWING NO. 213B9202 — VOLTAGE CLASS 460
MAIN BUS RATING SUPPLY:600 SEC:300 A — MAIN BUS NEUTRAL RATING --- A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING --- — NUMBER OF SECTIONS 8 — LISTING [x] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER --- MLO X TYPE --- AMPACITY --- MAIN DISCONNECT --- FUSE TYPE --- SIZE ---
TOTAL POSITIONS EQUIPPED 41 — NO. OF SPARE SPACES 5 — TOTAL POSITIONS USED ---

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTIONS	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 10 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.5

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
SECTION 1 THRU SECTION 8	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	1,000	1,000	1,000		1,000	1,000	1,000			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS: MEGGER WITH FEEDERS ATTACHED.

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: N. HERRST Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 100
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/19/2020 — TEMPERATURE 50 °F — HUMIDITY 40 % — EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 — POSITION MCC-F (01)

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — SIZE VARIOUS — TYPE IC 7700 LINE
CATALOG NO. SEE COMMENTS — SERIES --- — MAX. VOLTS ---

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 10 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.5
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 0.5
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
SUMP PUMP #2	FRS	15	4,099	3,279	2,566	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
CROSS COLLECTOR #2	NO FUSES	NOT IN USE	1,888	1,242	2,197	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
SPARE	NO FUSES	NOT IN USE	2,060	3,433	2,337	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
SLUDGE COLLECTOR #2	NO FUSES	NOT IN USE	2,455	4,102	2,756	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: CAT #435X719M11. DIAGRAM: 213B9202. VOLTS: 460.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 101
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/19/2020 — TEMPERATURE 50 °F — HUMIDITY 40 % — EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 — POSITION MCC-F (02)

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — SIZE VARIOUS — TYPE IC 7700 LINE
CATALOG NO. SEE COMMENTS — SERIES --- — MAX. VOLTS ---

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 10 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.5
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 0.5
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
PUMP ROOM HOIST	FRS	17	2,317	4,486	6,592	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
EQUIPMENT ROOM HOIST	TRS	20R	4,485	2,585	1,509	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
SCREW PUMP #6	LPS-R	200	1,182	1,386	1,109	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: CAT #435X719M11. DIAGRAM: 213B9202. VOLTS: 460.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
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(734) 424-1200
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(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 102
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/19/2020 — TEMPERATURE 50 °F — HUMIDITY 40 % — EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 — POSITION MCC-F (03)

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — SIZE VARIOUS — TYPE IC 7700 LINE
CATALOG NO. SEE COMMENTS — SERIES --- — MAX. VOLTS ---

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 10 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.5
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 0.5
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
AIR COMP ALT	FRS	10	1,888	3,761	1,570	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
EQ. INFL. GATE #5	FRS	7	2,978	5,421	1,638	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
BASIN HOIST	*	*				2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
HP PEW PUMP #2	LPS-RK	200	1,121	1,260	1,152	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: CAT #435X719M11. DIAGRAM: 213B9202. VOLTS: 460.
BASIN HOIST: LOTO APPLIED, UNABLE TO OPEN DOOR.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 103

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE

DATE 2/19/2020 TEMPERATURE 50 °F HUMIDITY 40 % EQPT. LOCATION RETENTION BUILDING

SUBSTATION 2 POSITION MCC-F (04)

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC SIZE VARIOUS TYPE IC 7700 LINE

CATALOG NO. SEE COMMENTS SERIES --- MAX. VOLTS ---

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 10 °C

TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.5

K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1

K2 = (K1) (TCF) = 0.5

INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
SEWAGE EJECTION PUMP	---	30 BRKR	17,508	6,095	12,391	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
LIGHTING PANEL F	FRS-R	80	1,256	1,696	2,195	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
EQ. INFL. GATE #7	FRS	7	2,770	3,664	4,415	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
MP PEW PUMP #2	LPS	125	1,298	1,308	1,285	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: CAT #435X719M12. DIAGRAM: 213B9202. VOLTS: 460.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 104
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/19/2020 — TEMPERATURE 50 °F — HUMIDITY 40 % — EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 — POSITION MCC-F (05)

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — SIZE VARIOUS — TYPE IC 7700 LINE
CATALOG NO. SEE COMMENTS — SERIES --- — MAX. VOLTS ---

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 10 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.5
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 0.5
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
CONSTRUCTION TRAILERS LIFT STATION	---	100 BRKR	111,000	1,669	1,858	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
EQ. INFL. GATE #8	TRS	7R	189,000	2,153	77,000	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
EQ. INFL. GATE #6	FRS	7	73,240	6,974	5,347	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
NO LABEL	NO FUSES	NOT IN USE	2,056	4,723	95,000	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
ROOF FAN RF-5	2-TRS 1-FRS-R	2@3 1/2 R 1@2 3/10	43,046	6,513	30,000	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
RB DRAIN PUMP #1	FRS-R	90	2,758	1,667	2,080	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: CAT #435X719M12. DIAGRAM: 213B9202. VOLTS: 460.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
Dexter, Michigan
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(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 105
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/19/2020 — TEMPERATURE 50 °F — HUMIDITY 40 % — EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 — POSITION MCC-F (06)

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — SIZE VARIOUS — TYPE IC 7700 LINE
CATALOG NO. SEE COMMENTS — SERIES --- — MAX. VOLTS ---

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 10 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.5
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 0.5
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
BYPASS GATE #2	FRS	7	163,838	2,268	86,461	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
BYPASS GATE #1	FRS	7	111,630	13,838	2,121	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
SLUICE GATE #2	FRS	7	108,110	8,348	1,961	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
SLUICE GATE #1	FRS	7	107,410	50,490	2,043	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
ROOF FAN RF-6	2-FRS 1-FRS-R	ALL 2	3,756	3,340	127,000	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
RB DRAIN PUMP #3	FRS-R	90	2,736	2,305	1,959	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: CAT #435X719M12. DIAGRAM: 213B9202. VOLTS: 460.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
Dexter, Michigan
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Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 106
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/19/2020 — TEMPERATURE 50 °F — HUMIDITY 40 % — EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 — POSITION MCC-F (07)

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — SIZE VARIOUS — TYPE IC 7700 LINE
CATALOG NO. SEE COMMENTS — SERIES --- — MAX. VOLTS ---

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 10 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.5
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 0.5
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
TEMP ADMIN FACILITY FEED	---	80 BRKR	8,920	4,996	19,058	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
FEEDER MCC-FF	FRS-R	125	6,173	697	798	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
AIR COMP. #2	NOS	30	72,358	63,891	221,861	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
NO LABEL	2-FRS 1-TRS	2@45 1@45R	39,120	14,827	28,946	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
SLUDGE PUMP #3	FRS	15	2,335	4,710	3,713	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
						2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: CAT #435X719M13. DIAGRAM: 213B9202. VOLTS: 460.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
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(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 107
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/19/2020 — TEMPERATURE 50 °F — HUMIDITY 40 % — EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 — POSITION MCC-F (08)

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — SIZE VARIOUS — TYPE IC 7700 LINE
CATALOG NO. SEE COMMENTS — SERIES --- — MAX. VOLTS ---

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 10 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.5
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 0.5
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
TEMP ADMIN FACILITY FEED	---	80 BRKR	2,310	3,730	2,727	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
WELDER OUTLET	FRS	30	4,353	2,474	5,510	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
EQ. RTN VALVE #3	FRS	12	1,598	5,871	1,687	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
CONTROL PANEL CP-15	FRS	20	1,300	1,846	1,894	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
EQUALIZATION RETURN CONTROL VALVE	FRS	1 4/10	17,436	40,600	4,243	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
BASIN INFL. GATE #2	FRS	7	1,940	2,140	2,119	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
BASIN OUT GATE #2	FRS	7	1,635	6,885	5,306	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
EF-1	---	3 BRKR	281,400	272,000	280,120	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000
ENERGY RECOVERY UNIT HR-2	FRS-R	90	33,250	26,950	28,204	2,000	2,000	2,000	2,000	2,000	2,000
						1,000	1,000	1,000	1,000	1,000	1,000

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: CAT #435X719M13. DIAGRAM: 213B9202. VOLTS: 460.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

SWITCHBOARD BUS CONNECTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 108
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/18/2020 — TEMPERATURE 60 °F — HUMIDITY 50 % — EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 — POSITION N/A

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-010 — TYPE POWER ZONE 4
CATALOG NO. --- — DRAWING NO. 30951271-010 — VOLTAGE CLASS 600
PHASE AMPACITY 1600 A — WITHSTAND RATING 100 kA — CONDUCTOR (•) CU ( ) AL

BUS SECTION TESTED		RESISTANCE IN ☑ MICRO-OHMS ☐ MILLI-OHMS					BUS SECTION TESTED		RESISTANCE IN ☐ MICRO-OHMS ☐ MILLI-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
1	2	40.3	44.3	43.2		37.1							
3	4	15.0	15.3	46.6		32.3							

COMMENTS: NEUTRAL BUS ENDS IN CAB 1 AND DOES NOT EXTEND INTO THE OTHER SECTIONS.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: DLRO #1570

Tested By: ET / TD / NH Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 109
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/18/2020 — TEMPERATURE 60 °F — HUMIDITY 50 % — EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 — POSITION SPARE

MANUFACTURER	SQUARE D	SN / SO NO.	085249507901	FRAME SIZE(F)	800
BREAKER TYPE	MASTER PACT NW 08 H3	SENSOR TAPS	250	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	2 B	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0 A	CATALOG NO.	WA6PPR44A9CXFXWXAA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C/L
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C/L
AUXILIARY DEVICES	☐	N/A	N/A
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND		LONG TIME PU	1	x	250	A =	250	A	DELAY	24	
RATING PLUG(R)	250	SHORT TIME PU	10	=	2500	A			DELAY	0.1	I²T ○ IN ◉ OUT ○ N/A
SENSOR TAP	250	INST. PU	15	=	3750	A	◉ ON	○ OFF			
GRD. FLT.	◉ 3W ○ 4W	GRD. FLT. PU	A	=	75	A	◉ ON	○ OFF	DELAY	0.0	I²T ○ IN ◉ OUT ○ N/A
SETTINGS AS LEFT		LONG TIME PU	1	x	250	A =	250	A	DELAY	24	
RATING PLUG(R)	250	SHORT TIME PU	10	=	2500	A			DELAY	0.1	I²T ○ IN ◉ OUT ○ N/A
SENSOR TAP	250	INST. PU	15	=	3750	A	◉ ON	○ OFF			
GRD. FLT.	◉ 3W ○ 4W	GRD. FLT. PU	A	=	75	A	◉ ON	○ OFF	DELAY	0.0	I²T ○ IN ◉ OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	4688	125%	---	---	0.037	0.037	---	---	---	---
	IPU									
SHORT TIME	3125	125%	---	---	0.111	0.111	---	---	---	---
	STPU									
LONG TIME	1500	600%	---	---	21.214	21.214	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	150	200%	---	---	0.037	0.037	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.848

INSULATION RESISTANCE	POLE 1 MΩ (P1-P2) READING	POLE 1 20°C	POLE 2 MΩ (P2-P3) READING	POLE 2 20°C	POLE 3 MΩ (P3-P1) READING	POLE 3 20°C
POLE TO POLE	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
POLE TO FRAME	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
LINE TO LOAD	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.011	0.011	0.01

COMMENTS: DATE CODE: 14063. BREAKER PASSED THE AUTOMATIC TRIP CURVE TEST.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979, DLRO #1570, SI #1512

Tested By: ET / TD / NH Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE SWITCHBOARD INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 110
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/18/2020 — TEMPERATURE 60 °F — HUMIDITY 50 % — EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 — POSITION SUB 2 LV BUS

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. E-409951 — TYPE POWER ZONE 4
CATALOG NO. --- — DRAWING NO. 30951271-010 — VOLTAGE CLASS 480/277
PHASE AMPACITY 1600 A — WITHSTAND RATING 100 kA — CONDUCTOR ☑ Cu ☐ Al

INSTALLED DEVICES

DRAWOUT LVACB 6 — BOLT-IN LVACB --- — DRAWOUT MCCB --- — BOLT-IN MCCB ---
BOLTED PRESSURE SWITCHES --- — FUSED DISCONNECTS --- — PROTECTIVE RELAYS --- — PANEL METERS 2
kWh METERS --- — VT's 6 — CT's --- — CPT's ---
Other 2 SPD

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☐	N/A	NA

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.8

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
ALL (4)	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	1,600	1,600	1,600		1,600	1,600	1,600			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS: NEUTRAL BUS ENDS IN CAB 1 & CAB 4, AND DOES NOT EXTEND THROUGH FEEDER SECTIONS.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979

Tested By: ET / TD / NH — Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOADBREAK DISCONNECT TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 111
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/18/2020 — TEMPERATURE 50 °F — HUMIDITY 60 % — EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 — POSITION SUB 2 MAIN A

FUSE DATA

MANUFACTURER SEE COMMENTS — TYPE --- — HOLDER --- — MAX. AMPS ---
REFILL ELEMENT TYPE --- — SIZE --- — CAT. NO. --- — TCC NO. --- — VOLTAGE --- kV

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. ---
VOLTAGE 15 KV — TYPE --- — AMPERES 600 — INTERRUPTING RATING 40 kA
TYPE OPERATING MECHANISM MANUAL — AGE JAN 2014 — B.I.L. RATING 95 kV
MOMENTARY FAULT CLOSING AMPS 40 kA — OTHER NAMEPLATE DATA ---

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	NA
INSULATING MEMBERS	☑	Acceptable	NA
MECHANICAL CONNECTION	☑	Acceptable	NA
STRUCTURAL MEMBERS	☑	Acceptable	NA
CUBICLE	☑	Acceptable	NA
AUXILIARY DEVICES	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
MAIN CONTACTS	☑	Acceptable	NA
HEATERS	☐	N/A	NA
BEARINGS	☑	Acceptable	NA
CONTACT SEQUENCE	☑	Acceptable	NA
GROUND CONNECTION	☑	Acceptable	NA

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 10 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.5

INSULATION TESTS

	RANGE MULTIPLIER	K2	POLE 1 (P1-P2) MΩ READING	POLE 1 (P1-P2) MΩ 20°C	POLE 2 (P2-P3) MΩ READING	POLE 2 (P2-P3) MΩ 20°C	POLE 3 (P1-P3) MΩ READING	POLE 3 (P1-P3) MΩ 20°C
POLE TO POLE	1.000	0.500	100,000.0	50,000.00	100,000.0	50,000.00	100,000.0	50,000.00
POLE TO FRAME	1.000	0.500	100,000.0	50,000.00	80,500.00	40,250.00	91,600.00	45,800.00
LINE TO FRAME	1.000	0.500	100,000.0	50,000.00	87,200.00	43,600.00	100,000.0	50,000.00
LOAD TO FRAME	1.000	0.500	100,000.0	50,000.00	100,000.0	50,000.00	100,000.0	50,000.00
LINE TO LOAD	1.000	0.500	100,000.0	50,000.00	100,000.0	50,000.00	100,000.0	50,000.00

Contacts		POLE 1	POLE 2	POLE 3
CONTACT RESISTANCE SWITCH & FUSE ☐ MICRO-OHMS ☑ MILLI-OHMS		---	---	---
SWITCH CONTACT		0.039	0.0426	0.0429
FUSE		---	---	---
HI POT (MICRO AMPS)	37 KV	0.57	0.49	0.59

COMMENTS: NO FUSES AT TIME OF TEST. APPEARS TO BE FACTORY-BUILT FOR NON-FUSE USE.
ALL MEG WITH FEEDER CABLES ATTACHED. HIPOT AT 37 KV.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979, DLRO #1570, HIPOT #156393

Tested By: T. DODGE — Tested By: —

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LIGHTNING ARRESTER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 112
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/18/2020 — TEMPERATURE 50 °F — HUMIDITY 60 % — EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 — POSITION SUB 2 MAIN A & B

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — TYPE --- — MODEL 9L20FXX015XHS
CATALOG NO. 4Q13 — SERIAL NO. --- — RELIEF ---
RATED RMS VOLTAGE 15 kV — RATED MCOV 12.7 kV — RMS CURRENT RATING 0 kA — RATED CREST 0 kA
SYSTEM VOLTAGE 13.2 kV — ARRESTER TYPE STATION ○ INTERMEDIATE ● DISTRIBUTION ○ — MATERIAL TYPE PORCELAIN ○ POLYMER ●

INSULATION TEST VOLTAGE 5.00 kV DC — TEST VOLTAGE MULTIPLIER 1
RANGE MULTIPLIER 1.0 — EQUIPMENT TEMPERATURE 10 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.63

INSULATION TEST

POSITION	TOTAL CORRECTION MULTIPLIER	A PHASE TO GROUND		B PHASE TO GROUND		C PHASE TO GROUND	
		ACTUAL MEGOHMS	CORRECTED MEGOHMS	ACTUAL MEGOHMS	CORRECTED MEGOHMS	ACTUAL MEGOHMS	CORRECTED MEGOHMS
MAIN A	0.63	100,000	63,000.00	100,000	63,000.00	100,000	63,000.00
MAIN B	0.63	100,000	63,000.00	100,000	63,000.00	100,000	63,000.00

WATT LOSS TEST

TEST kV SWITCH SETTING
OUTPUT TEST VOLTAGE
READING CORRECTION FACTOR

○ GROUNDED SPECIMEN TEST
○ UNGROUNDED SPECIMEN TEST

MILLI-WATT LOSS

POSITION	A PHASE	B PHASE	C PHASE

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979

Tested By: T. DODGE Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOADBREAK DISCONNECT TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 113
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 2/19/2020 | TEMPERATURE 49 °F | HUMIDITY 25 % | EQPT. LOCATION EQUALIZATION BLDG
SUBSTATION 2 | POSITION SUB 2 MAIN B

FUSE DATA

MANUFACTURER * | TYPE --- | HOLDER --- | MAX. AMPS ---
REFILL ELEMENT TYPE --- | SIZE --- | CAT. NO. --- | TCC NO. --- | VOLTAGE --- kV

NAMEPLATE DATA

MANUFACTURER SQUARE D | SERIAL NO. ---
VOLTAGE 15 KV | TYPE --- | AMPERES 600 | INTERRUPTING RATING 40 kA
TYPE OPERATING MECHANISM MANUAL | AGE 1/2014 | B.I.L. RATING 95 kV
MOMENTARY FAULT CLOSING AMPS 40 kA | OTHER NAMEPLATE DATA ---

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	
INSULATING MEMBERS	☑	Acceptable	
MECHANICAL CONNECTION	☑	Acceptable	
STRUCTURAL MEMBERS	☑	Acceptable	
CUBICLE	☑	Acceptable	
AUXILIARY DEVICES	☐		

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
MAIN CONTACTS	☑	Acceptable	
HEATERS	☐		
BEARINGS	☑	Acceptable	
CONTACT SEQUENCE	☑	Acceptable	
GROUND CONNECTION	☑	Acceptable	

INSULATION TEST VOLTAGE 5 kVdc | TEST VOLTAGE MULTIPLIER, K1 = 1 | K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 10 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.5

INSULATION TESTS

	RANGE MULTIPLIER	K2	POLE 1 (P1-P2) MΩ READING	POLE 1 (P1-P2) MΩ 20°C	POLE 2 (P2-P3) MΩ READING	POLE 2 (P2-P3) MΩ 20°C	POLE 3 (P1-P3) MΩ READING	POLE 3 (P1-P3) MΩ 20°C
POLE TO POLE	1.000	0.500	100,000.0	50,000.00	100,000.0	50,000.00	100,000.0	50,000.00
POLE TO FRAME	1.000	0.500	100,000.0	50,000.00	100,000.0	50,000.00	100,000.0	50,000.00
LINE TO FRAME	1.000	0.500	100,000.0	50,000.00	100,000.0	50,000.00	100,000.0	50,000.00
LOAD TO FRAME	1.000	0.500	100,000.0	50,000.00	100,000.0	50,000.00	100,000.0	50,000.00
LINE TO LOAD	1.000	0.500	100,000.0	50,000.00	100,000.0	50,000.00	100,000.0	50,000.00

Contacts

		POLE 1	POLE 2	POLE 3
CONTACT RESISTANCE SWITCH & FUSE ☐ MICRO-OHMS ☑ MILLI-OHMS		---	---	---
SWITCH CONTACT		0.047	0.053	0.051
FUSE		---	---	---
HI POT (MICRO AMPS)	37 KVDC	50	35.5	36.5

COMMENTS: * = NO FUSES AT TIME OF TEST - APPEARS TO BE FACTORY BUILT FOR NON FUSED USE.
ARRESTOR # MD DIST-9L20FXX015XH5.
ARRESTORS 15kVA 100K+. TESTED AT 5kV.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206124, DLRO #156856

Tested By: ET / NH Tested By: EK / DF

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 114
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/18/2020 — TEMPERATURE 60 °F — HUMIDITY 50 % — EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 — POSITION TIE

MANUFACTURER	SQUARE D	SN / SO NO.	085249512102	FRAME SIZE(F)	800 A
BREAKER TYPE	MASTER PACT NW 08 H3	SENSOR TAPS	800 A	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	2 B	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0 A	CATALOG NO.	WA6AAR44A9CFFFWSEA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C/L
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C/L
AUXILIARY DEVICES	☐	N/A	N/A
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND		LONG TIME PU	0.9	x	800	A =	720	A	DELAY	8	
RATING PLUG(R)	800	SHORT TIME PU	5	=	3600	A			DELAY	0.2	I²T ○ IN ◉ OUT ○ N/A
SENSOR TAP	800	INST. PU	---	=	---	A	○ ON ◉ OFF				
GRD. FLT.	◉ 3W ○ 4W	GRD. FLT. PU	A	=	160	A	◉ ON ○ OFF		DELAY	0.1	I²T ○ IN ◉ OUT ○ N/A
SETTINGS AS LEFT		LONG TIME PU	0.9	x	800	A =	720	A	DELAY	8	
RATING PLUG(R)	800	SHORT TIME PU	5	=	3600	A			DELAY	0.2	I²T ○ IN ◉ OUT ○ N/A
SENSOR TAP	800	INST. PU	---	=	---	A	○ ON ◉ OFF				
GRD. FLT.	◉ 3W ○ 4W	GRD. FLT. PU	A	=	160	A	◉ ON ○ OFF		DELAY	0.1	I²T ○ IN ◉ OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	4500	125%	---	---	0.170	0.170	---	---	---	---
	STPU									
LONG TIME	2640	366%	---	---	18.561	18.561	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	320	200%	---	---	0.097	0.097	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.848

INSULATION RESISTANCE	POLE 1 MΩ (P1-P2) READING	POLE 1 20°C	POLE 2 MΩ (P2-P3) READING	POLE 2 20°C	POLE 3 MΩ (P3-P1) READING	POLE 3 20°C
POLE TO POLE	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
POLE TO FRAME	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
LINE TO LOAD	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.022	0.022	0.019

COMMENTS: DATE CODE: 14063. PASSED AUTOMATIC TRIP CURVE TEST.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: SI #1512, MEGGER #206124, DLRO #156856

Tested By: ET / TD / NH Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER DIELECTRIC ABSORPTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 115
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/18/2020 — TEMPERATURE 60 °F — HUMIDITY 50 % — EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 — POSITION TRANSFORMER 1

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-009-01-1
SPECIFICATION NO. --- — KVA 500 / / — TYPE VPI — CLASS AA
PHASE 3 — TEMPERATURE RISE 115 °C °C — IMPEDANCE 5.59 % — B.I.L. RATING 95 kV PRI. 10 kV SEC.
COOLANT AIR — CAPACITY --- GALLONS — TOTAL WEIGHT 6900
WINDING POLARITY SUBTRACTIVE — WINDING MATERIAL CU — K FACTOR ---
PRIMARY VOLTAGE 13,200 — (●) DELTA ( ) WYE — RATED CURRENT 22 / / AMPERES
SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 601 / / AMPERES
TAP VOLTAGES 13,860 | 13,530 | 13,200 | 12,870 | 12,540 | | | |
TAP CONNECTIONS E-F | D-F | E-G | D-G | C-G | --- | --- | ---
TAP SETTING E-G 13,200 VOLTS — # FANS --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL DRY TYPE [x]

TEST VOLTAGE:
PRIMARY TO SECONDARY 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 1 — K2=(TCF) (K1)
PRIMARY TO GROUND 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 1
SECONDARY TO GROUND 1 kVdc — TEST VOLTAGE MULTIPLIER, K1 1

CORE/COIL TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF — DRY 0.848 — LIQUID 0.800

MINUTES	PRIMARY TO SECONDARY GROUND GUARDED				PRIMARY TO GROUND SECONDARY GUARDED				SECONDARY TO GROUND PRIMARY GUARDED			
	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C
0.25	100,000.0	1	0.848	84,800.0	50,000.00	1	0.848	42,400.0	42,000.00	1	0.848	35,616.0
0.50	100,000.0	1	0.848	84,800.0	68,200.00	1	0.848	57,833.6	70,800.00	1	0.848	60,038.4
0.75	100,000.0	1	0.848	84,800.0	77,200.00	1	0.848	65,465.6	100,000.0	1	0.848	84,800.0
1.00	100,000.0	1	0.848	84,800.0	83,000.00	1	0.848	70,384.0	100,000.0	1	0.848	84,800.0
1.25	100,000.0	1	0.848	84,800.0	90,700.00	1	0.848	76,913.6	100,000.0	1	0.848	84,800.0
1.50	100,000.0	1	0.848	84,800.0	92,800.00	1	0.848	78,694.4	100,000.0	1	0.848	84,800.0
1.75	100,000.0	1	0.848	84,800.0	94,600.00	1	0.848	80,220.8	100,000.0	1	0.848	84,800.0
2.00	100,000.0	1	0.848	84,800.0	99,200.00	1	0.848	84,121.6	100,000.0	1	0.848	84,800.0
3.00	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0
4.00					100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0
5.00					100,000.0	1	0.848	84,800.0				
6.00					100,000.0	1	0.848	84,800.0				
7.00												
8.00												
9.00												
10.00												
POLARIZATION INDEX												

POLARIZATON INDEX = 10 MINUTE RDG. / 1 MINUTE RDG.

COMMENTS:

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979

Tested By: T. DODGE Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER INSPECTION

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 116

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/18/2020 — TEMPERATURE 60 °F — HUMIDITY 50 % — EQPT. LOCATION N/A

SUBSTATION 2 — POSITION TRANSFORMER 1

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-009-01-1

SPECIFICATION NO. --- — kVA 500 / / — TYPE VPI — CLASS AA

PHASE 3 — TEMPERATURE RISE 115 °C / °C — IMPEDANCE 5.59 % — B.I.L. RATING 95 kV PRI. / 10 kV SEC.

COOLANT AIR — CAPACITY --- / GALLONS — TOTAL WEIGHT 6900

WINDING POLARITY SUBTRACTIVE — WINDING MATERIAL CU — K FACTOR ---

PRIMARY VOLTAGE 13,200 — (●) DELTA ( ) WYE — RATED CURRENT 22 / / AMPERES

SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 601 / / AMPERES

TAP VOLTAGES	13,860	13,530	13,200	12,870	12,540			
TAP CONNECTIONS	E-F	D-F	E-G	D-G	C-G	---	---	---

TAP SETTING E-G 13,200 VOLTS — # FANS --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE [x]

GAUGES:

COOLANT TEMPERATURE AAB °C — MAXIMUM TEMPERATURE --- °C — RESET TEMPERATURE GAUGE [ ]

COOLANT LEVEL --- — PRESSURE VACUUM --- # — LCR COUNTER ---

OTHER GAUGES ---

VISUAL INSPECTION:

BUSHINGS GOOD — SUPPORT INSULATORS ACCEPTABLE — CONNECTIONS GOOD

PAINT ACCEPTABLE — RADIATORS --- — FANS ---

NO-LOAD TAP CHANGER --- — LEAKS ---

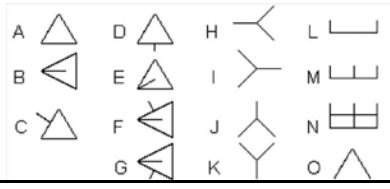
MAIN TANK DIELECTRIC SAMPLE SYRINGE # — BOTTLE #

LTC DIELECTRIC SAMPLE SYRINGE # — BOTTLE #

GROUND CONDUCTOR SIZE BUS AWG/kcm — NO. OF GROUND CONDUCTORS 1 — GROUND CONDUCTOR CONDITION ACC

ADDITIONAL EQUIPMENT

VECTOR DIAGRAM



PRI. VECTOR: E

SEC. VECTOR: H

POST TEST VOLTAGES

NO LOAD SECONDARY VOLTAGE			
X1 - X2	V	X0 - G	V
X1 - X3	V	X0 - X1	V
X2 - X3	V	X0 - X2	V
		X0 - X3	V

COMMENTS:

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: T. DODGE — Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER TURNS RATIO TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 117
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/18/2020 — TEMPERATURE 60 °F — HUMIDITY 50 % — EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 — POSITION TRANSFORMER 1

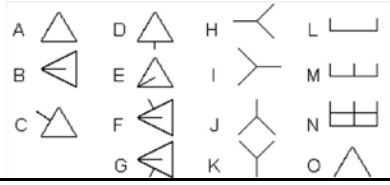
NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-009-01-1
SPECIFICATION NO. --- — KVA 500 / / — TYPE VPI — CLASS AA
PHASE 3 — TEMPERATURE RISE 115 °C °C — IMPEDANCE 5.59 % — B.I.L. RATING 95 kV PRI. 10 kV SEC.
COOLANT AIR — CAPACITY --- GALLONS — TOTAL WEIGHT 6900
WINDING POLARITY SUBTRACTIVE — WINDING MATERIAL CU — K FACTOR ---
PRIMARY VOLTAGE 13,200 — (●) DELTA ( ) WYE — RATED CURRENT 22 / / AMPERES
SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 601 / / AMPERES
TAP VOLTAGES 13,860 | 13,530 | 13,200 | 12,870 | 12,540 | | | |
TAP CONNECTIONS E-F | D-F | E-G | D-G | C-G | --- | --- | ---
TAP SETTING E-G 13,200 VOLTS — # FANS --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE [☑]

TRANSFORMER TURNS RATIO TESTS

TAP NUMBER		WINDING VOLTAGES	CALCULATED RATIO	MEASURED RATIO		
				H_1H_0/X_1X_0	H_1H_0/X_1X_0	H_1H_0/X_1X_0
1	E-F	13,860 / 277	50.0361			
2	D-F	13,530 / 277	48.8448			
3	E-G	13,200 / 277	47.6534	47.8200	47.7600	47.7000
4	D-G	12,870 / 277	46.4621			
5	C-G	12,540 / 277	45.2708			
6	---	/				
7	---	/				
8	---	/				

VECTOR DIAGRAM



PRI. VECTOR: E
SEC. VECTOR: H

CORRECTION FACTOR FOR UNACCESSIBLE NEUTRAL

PHASE TESTED	BLACK	RED	BLACK	RED	JUMPER	READING MULTIPLIER	TEST SHEET DESIGNATION
DELTA-WYE							
A	H1	H3	X1	X2	H2H3	1.547	H1-H3 X1-X2
B	H2	H1	X2	X3	H1H3	1.547	H2-H3 X2-X3
C	H3	H2	X3	X1	H1H2	1.547	H3-H2 X3-X1
WYE-DELTA							
A	H1	H3	X1	X2	X2X3	1.5000	H1-H3 X1-X2
B	H2	H1	X2	X3	X1X3	1.5000	H2-H1 X2-X3
C	H3	H2	X3	X1	X1X2	1.5000	H3-H2 X3-X1

COMMENTS:

DEFICIENCIES:

[☑] ACCEPTABLE [☐] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: TTR #177319

Tested By: T. DODGE Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER DIELECTRIC ABSORPTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 118
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/19/2020 — TEMPERATURE 50 °F — HUMIDITY 25 % — EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 — POSITION TRANSFORMER 2

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-012-01-1
SPECIFICATION NO. --- — KVA 500 / / — TYPE VPI — CLASS AA
PHASE 3 — TEMPERATURE RISE 115 °C °C — IMPEDANCE 5.6 % — B.I.L. RATING 95 kV PRI. 10 kV SEC.
COOLANT AIR — CAPACITY --- GALLONS — TOTAL WEIGHT 6900
WINDING POLARITY SUBTRACTIVE — WINDING MATERIAL CU — K FACTOR ---
PRIMARY VOLTAGE 13,200 — (●) DELTA ( ) WYE — RATED CURRENT 22 / / AMPERES
SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 601 / / AMPERES
TAP VOLTAGES 13,860 | 13,530 | 13,200 | 12,870 | 12,540 | | | |
TAP CONNECTIONS E-F | D-F | E-G | D-G | C-G | --- | --- | ---
TAP SETTING E-G 13,200 VOLTS — # FANS --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL DRY TYPE [x]

TEST VOLTAGE:
PRIMARY TO SECONDARY 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 1 — K2=(TCF) (K1)
PRIMARY TO GROUND 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 1
SECONDARY TO GROUND 1 kVdc — TEST VOLTAGE MULTIPLIER, K1 1

CORE/COIL TEMPERATURE 10 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF — DRY 0.63 — LIQUID 0.500

MINUTES	PRIMARY TO SECONDARY GROUND GUARDED				PRIMARY TO GROUND SECONDARY GUARDED				SECONDARY TO GROUND PRIMARY GUARDED			
	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C
0.25	100,000.0	1	0.63	63,000.0	100,000.0	1	0.63	63,000.0	2,680.00	1	0.63	1,688.4
0.50	100,000.0	1	0.63	63,000.0	100,000.0	1	0.63	63,000.0	3,390.00	1	0.63	2,135.7
0.75	100,000.0	1	0.63	63,000.0	100,000.0	1	0.63	63,000.0	3,800.00	1	0.63	2,394.0
1.00	100,000.0	1	0.63	63,000.0	100,000.0	1	0.63	63,000.0	4,050.00	1	0.63	2,551.5
1.25	100,000.0	1	0.63	63,000.0	100,000.0	1	0.63	63,000.0	4,150.00	1	0.63	2,614.5
1.50	100,000.0	1	0.63	63,000.0	100,000.0	1	0.63	63,000.0	4,380.00	1	0.63	2,759.4
1.75	100,000.0	1	0.63	63,000.0	100,000.0	1	0.63	63,000.0	4,500.00	1	0.63	2,835.0
2.00	100,000.0	1	0.63	63,000.0	100,000.0	1	0.63	63,000.0	4,600.00	1	0.63	2,898.0
3.00	100,000.0	1	0.63	63,000.0	100,000.0	1	0.63	63,000.0	4,870.00	1	0.63	3,068.1
4.00									5,030.00	1	0.63	3,168.9
5.00									5,130.00	1	0.63	3,231.9
6.00									5,200.00	1	0.63	3,276.0
7.00									5,260.00	1	0.63	3,313.8
8.00									5,310.00	1	0.63	3,345.3
9.00									5,340.00	1	0.63	3,364.2
10.00									5,380.00	1	0.63	3,389.4
POLARIZATION INDEX									1.33			

POLARIZATON INDEX = 10 MINUTE RDG. / 1 MINUTE RDG.

COMMENTS:

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206124

Tested By: ET / NH Tested By: EK / DF

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER INSPECTION

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 119
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 2/19/2020 | TEMPERATURE 50 °F | HUMIDITY 25 % | EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 | POSITION TRANSFORMER 2

NAMEPLATE DATA

MANUFACTURER SQUARE D | SERIAL NO. 30951271-012-01-1
SPECIFICATION NO. --- | kVA 500 / / | TYPE VPI | CLASS AA
PHASE 3 | TEMPERATURE RISE 115 °C °C | IMPEDANCE 5.6 % | B.I.L. RATING 95 kV PRI. 10 kV SEC.
COOLANT AIR | CAPACITY --- GALLONS | TOTAL WEIGHT 6900
WINDING POLARITY SUBTRACTIVE | WINDING MATERIAL CU | K FACTOR ---
PRIMARY VOLTAGE 13,200 | (●) DELTA ( ) WYE | RATED CURRENT 22 / / AMPERES
SECONDARY VOLTAGE 480 / 277 | ( ) DELTA (●) WYE | RATED CURRENT 601 / / AMPERES

TAP VOLTAGES	13,860	13,530	13,200	12,870	12,540			
TAP CONNECTIONS	E-F	D-F	E-G	D-G	C-G	---	---	---

TAP SETTING E-G 13,200 VOLTS | # FANS --- | TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL | DRY TYPE [x]

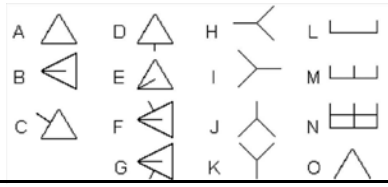
GAUGES:

COOLANT TEMPERATURE --- °C | MAXIMUM TEMPERATURE --- °C | RESET TEMPERATURE GAUGE [ ]
COOLANT LEVEL --- | PRESSURE VACUUM --- # | LCR COUNTER ---
OTHER GAUGES ---

VISUAL INSPECTION:

BUSHINGS --- | SUPPORT INSULATORS ACCEPTABLE | CONNECTIONS ---
PAINT ACCEPTABLE | RADIATORS --- | FANS ---
NO-LOAD TAP CHANGER --- | LEAKS ---
MAIN TANK DIELECTRIC SAMPLE SYRINGE # --- | BOTTLE # ---
LTC DIELECTRIC SAMPLE SYRINGE # --- | BOTTLE # ---
GROUND CONDUCTOR SIZE BUS AWG/kcm | NO. OF GROUND CONDUCTORS 1 | GROUND CONDUCTOR CONDITION ACC
ADDITIONAL EQUIPMENT ---

VECTOR DIAGRAM



PRI. VECTOR: E
SEC. VECTOR: H

POST TEST VOLTAGES

NO LOAD SECONDARY VOLTAGE			
X1 - X2	V	X0 - G	V
X1 - X3	V	X0 - X1	V
X2 - X3	V	X0 - X2	V
		X0 - X3	V

COMMENTS:
DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: ET / NH Tested By: EK / DF

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER TURNS RATIO TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 120
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/19/2020 — TEMPERATURE 50 °F — HUMIDITY 60 % — EQPT. LOCATION RETENTION BUILDING
SUBSTATION 2 — POSITION TRANSFORMER 2

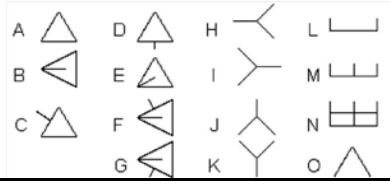
NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-012-01-1
SPECIFICATION NO. --- — KVA 500 / / — TYPE VPI — CLASS AA
PHASE 3 — TEMPERATURE RISE 115 °C °C — IMPEDANCE 5.6 % — B.I.L. RATING 95 kV PRI. 10 kV SEC.
COOLANT AIR — CAPACITY --- GALLONS — TOTAL WEIGHT 6900
WINDING POLARITY SUBTRACTIVE — WINDING MATERIAL CU — K FACTOR ---
PRIMARY VOLTAGE 13,200 — (●) DELTA ( ) WYE — RATED CURRENT 22 / / AMPERES
SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 601 / / AMPERES
TAP VOLTAGES 13,860 | 13,530 | 13,200 | 12,870 | 12,540 | | | |
TAP CONNECTIONS E-F | D-F | E-G | D-G | C-G | --- | --- | ---
TAP SETTING E-G 13,200 VOLTS — # FANS --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE [☑]

TRANSFORMER TURNS RATIO TESTS

TAP NUMBER		WINDING VOLTAGES	CALCULATED RATIO	MEASURED RATIO		
				H_1H_3/X_1X_0	H_2H_1/X_2X_0	H_3H_2/X_3X_0
1	E-F	13,860 / 277	50.0361			
2	D-F	13,530 / 277	48.8448			
3	E-G	13,200 / 277	47.6534	47.7770	47.7650	47.7460
4	D-G	12,870 / 277	46.4621			
5	C-G	12,540 / 277	45.2708			
6	---	/				
7	---	/				
8	---	/				

VECTOR DIAGRAM



PRI. VECTOR: E
SEC. VECTOR: H

CORRECTION FACTOR FOR UNACCESSIBLE NEUTRAL

PHASE TESTED	BLACK	RED	BLACK	RED	JUMPER	READING MULTIPLIER	TEST SHEET DESIGNATION
DELTA-WYE							
A	H1	H3	X1	X2	H2H3	1.547	H1-H3 X1-X2
B	H2	H1	X2	X3	H1H3	1.547	H2-H3 X2-X3
C	H3	H2	X3	X1	H1H2	1.547	H3-H2 X3-X1
WYE-DELTA							
A	H1	H3	X1	X2	X2X3	1.5000	H1-H3 X1-X2
B	H2	H1	X2	X3	X1X3	1.5000	H2-H1 X2-X3
C	H3	H2	X3	X1	X1X2	1.5000	H3-H2 X3-X1

COMMENTS:

DEFICIENCIES:

[☑] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: TTR #184970

Tested By: ET / NH Tested By: EK / DF

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 121
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/27/2020 — TEMPERATURE 65 °F — HUMIDITY 40 % — EQPT. LOCATION WEST BLOWER BLDG
SUBSTATION 3 — POSITION ISOLATION BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	085262996801	FRAME SIZE(F)	3200 A
BREAKER TYPE	MASTER PACT NW 32 H3	SENSOR TAPS	3000 A	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	4 BC	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0 A	CATALOG NO.	WA6JHR44A9SXFXXXAA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Poor	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	3000	LONG TIME PU	0.7	x	3000	A =	2100	A	DELAY	4	
SENSOR TAP	3,000	SHORT TIME PU	4	=	8400	A			DELAY	0.3	I²T ○ IN ● OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	---	=	---	A	○ ON ● OFF				
		GRD. FLT. PU	E	=	880	A	● ON ○ OFF		DELAY	0.3	I²T ○ IN ● OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	3000	LONG TIME PU	0.7	x	3000	A =	2100	A	DELAY	4	
SENSOR TAP	3,000	SHORT TIME PU	4	=	8400	A			DELAY	0.3	I²T ○ IN ● OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	---	=	---	A	○ ON ● OFF				
		GRD. FLT. PU	E	=	880	A	● ON ○ OFF		DELAY	0.3	I²T ○ IN ● OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	10500	125%	---	---	0.279	0.279	---	---	---	---
	STPU									
LONG TIME	6300	300%	---	---	14.796	14.796	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	1760	200%	---	---	0.264	0.264	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 18 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.924

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00
POLE TO FRAME	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00
LINE TO LOAD	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.013	0.015	0.013

COMMENTS: LOW BATTERY INDICATOR.
DATE CODE: 14214, PASSED THE AUTOMATIC TRIP CURVE TEST.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979, DLRO #1570, SI #1512

Tested By: E. TAPPAN Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 122
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/26/2020 — TEMPERATURE 65 °F — HUMIDITY 40 % — EQPT. LOCATION WEST BLOWER BLDG
SUBSTATION 3 — POSITION MAIN A

MANUFACTURER	SQUARE D	SN / SO NO.	085262996901	FRAME SIZE(F)	3200 A
BREAKER TYPE	MASTER PACT NW 32 H3	SENSOR TAPS	3000 A	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	1 BC	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0 A	CATALOG NO.	WA6JHR44A9CFFFWSAA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	3000	LONG TIME PU	0.9	x	3000	A =	2700	A	DELAY	4	
SENSOR TAP	3,000	SHORT TIME PU	4	=	10800	A			DELAY	0.4	I²T ○ IN ◉ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	---	=	---	A	○ ON ◉ OFF				
		GRD. FLT. PU	J	=	1200	A	◉ ON ○ OFF		DELAY	0.4	I²T ○ IN ◉ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	3000	LONG TIME PU	0.9	x	3000	A =	2700	A	DELAY	4	
SENSOR TAP	3,000	SHORT TIME PU	4	=	10800	A			DELAY	0.4	I²T ○ IN ◉ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	---	=	---	A	○ ON ◉ OFF				
		GRD. FLT. PU	J	=	1200	A	◉ ON ○ OFF		DELAY	0.4	I²T ○ IN ◉ OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	13500	125%	---	---	0.420	0.420	---	---	---	---
	STPU									
LONG TIME	8100	300%	---	---	14.587	14.587	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	2400	200%	---	---	0.403	0.403	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 18 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.924

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00
POLE TO FRAME	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00
LINE TO LOAD	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.005	0.007	0.005

COMMENTS: DATE CODE: 14214, PASSED THE AUTOMATIC TRIP CURVE TEST.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #156389, DLRO #193764, SI #1512

Tested By: E. TAPPAN Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOADBREAK DISCONNECT TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 123
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/26/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION WEST BLOWER BLDG
SUBSTATION 3 — POSITION MAIN A

FUSE DATA

MANUFACTURER * — TYPE --- — HOLDER --- — MAX. AMPS ---
REFILL ELEMENT TYPE --- — SIZE --- — CAT. NO. --- — TCC NO. --- — VOLTAGE --- kV

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. ---
VOLTAGE 15 KV — TYPE HVL — AMPERES 600 — INTERRUPTING RATING 40 kA
TYPE OPERATING MECHANISM MANUAL — AGE 5 /14 — B.I.L. RATING 95 kV
MOMENTARY FAULT CLOSING AMPS 40 kA — OTHER NAMEPLATE DATA ---

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTION	☑	Acceptable	C
STRUCTURAL MEMBERS	☑	Acceptable	C
CUBICLE	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
MAIN CONTACTS	☑	Acceptable	C
HEATERS	☐	N/A	NA
BEARINGS	☑	Acceptable	C
CONTACT SEQUENCE	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

INSULATION TESTS

	RANGE MULTIPLIER	K2	POLE 1 (P1-P2) MΩ READING	POLE 1 (P1-P2) MΩ 20°C	POLE 2 (P2-P3) MΩ READING	POLE 2 (P2-P3) MΩ 20°C	POLE 3 (P1-P3) MΩ READING	POLE 3 (P1-P3) MΩ 20°C
POLE TO POLE	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
POLE TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LINE TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LOAD TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LINE TO LOAD	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0

Contacts

		POLE 1	POLE 2	POLE 3
CONTACT RESISTANCE SWITCH & FUSE ☐ MICRO-OHMS ☑ MILLI-OHMS		---	---	---
SWITCH CONTACT		0.042	0.041	0.043
FUSE		---	---	---
HI POT (MICRO AMPS)	37 KVDC	63	43	72

COMMENTS: NO FUSES INSTALLED APPEARS TO BE FACTORY BUILT TO BE A NON FUSED UNIT

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #156386, DLRO #193764, HIPOT #191469

Tested By: T. DODGE Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LIGHTNING ARRESTER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 124
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/27/2020 — TEMPERATURE 60 °F — HUMIDITY 40 % — EQPT. LOCATION WEST BLOWER BLDG
SUBSTATION 3 — POSITION MAIN A & B

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — TYPE --- — MODEL 1Q14
CATALOG NO. 9L2UFXX015XHS — SERIAL NO. --- — RELIEF ---
RATED RMS VOLTAGE 15 kV — RATED MCOV 12.7 kV — RMS CURRENT RATING 0 kA — RATED CREST kA
SYSTEM VOLTAGE 13.2 kV — ARRESTER TYPE STATION ○ INTERMEDIATE ○ DISTRIBUTION ◉ — MATERIAL TYPE PORCELAIN ○ POLYMER ◉

INSULATION TEST VOLTAGE 5.00 kV DC — TEST VOLTAGE MULTIPLIER 1
RANGE MULTIPLIER 1.0 — EQUIPMENT TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.848

INSULATION TEST

POSITION	TOTAL CORRECTION MULTIPLIER	A PHASE TO GROUND		B PHASE TO GROUND		C PHASE TO GROUND	
		ACTUAL MEGOHMS	CORRECTED MEGOHMS	ACTUAL MEGOHMS	CORRECTED MEGOHMS	ACTUAL MEGOHMS	CORRECTED MEGOHMS
SUB 3 MAIN A	0.848	32,200	27,305.60	100,000	84,800.00	100,000	84,800.00
SUB 3 MAIN B	0.848	36,900	31,291.20	100,000	84,800.00	100,000	84,800.00

WATT LOSS TEST

TEST kV SWITCH SETTING
OUTPUT TEST VOLTAGE
READING CORRECTION FACTOR

○ GROUNDED SPECIMEN TEST
○ UNGROUNDED SPECIMEN TEST

MILLI-WATT LOSS

POSITION	A PHASE	B PHASE	C PHASE

COMMENTS: X-PHASE ARRESTER IS STARTING TO GO BAD. IT PASSES NETA SPEC ON BOTH A & B SUBS. RECOMMEND REPLACING IN THE NEAR FUTURE. GENERAL ELECTRIC 15KV ARRESTER MCOV HD DIST 9L20FXX0.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979

Tested By: E. KOEPFGEN Tested By: E. TAPPAN

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 125
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/27/2020 — TEMPERATURE 65 °F — HUMIDITY 40 % — EQPT. LOCATION WEST BLOWER BLDG
SUBSTATION 3 — POSITION MAIN B

MANUFACTURER	SQUARE D	SN / SO NO.	085262996903	FRAME SIZE(F)	3200 A
BREAKER TYPE	MASTER PACT NW 32 H3	SENSOR TAPS	3000 A	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	6 BC	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0 A	CATALOG NO.	WA6JHR44A9CFFFWSAA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Poor	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND		LONG TIME PU	0.9	x	3000	A =	2700	A	DELAY	4	
RATING PLUG(R)	3000	SHORT TIME PU	4	=	10800	A			DELAY	0.4	I²T ○ IN ◉ OUT ○ N/A
SENSOR TAP	3,000	INST. PU	---	=	---	A	○ ON ◉ OFF				
GRD. FLT.	◉ 3W ○ 4W	GRD. FLT. PU	J	=	1200	A	◉ ON ○ OFF		DELAY	0.4	I²T ○ IN ◉ OUT ○ N/A
SETTINGS AS LEFT		LONG TIME PU	0.9	x	3000	A =	2700	A	DELAY	4	
RATING PLUG(R)	3000	SHORT TIME PU	4	=	10800	A			DELAY	0.4	I²T ○ IN ◉ OUT ○ N/A
SENSOR TAP	3,000	INST. PU	---	=	---	A	○ ON ◉ OFF				
GRD. FLT.	◉ 3W ○ 4W	GRD. FLT. PU	J	=	1200	A	◉ ON ○ OFF		DELAY	0.4	I²T ○ IN ◉ OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	13500	125%	---	---	0.420	0.420	---	---	---	---
	STPU									
LONG TIME	8100	300%	---	---	14.813	14.813	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	2400	200%	---	---	0.405	0.405	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 18 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.924

INSULATION RESISTANCE	POLE 1 MΩ (P1-P2) READING	POLE 1 20°C	POLE 2 MΩ (P2-P3) READING	POLE 2 20°C	POLE 3 MΩ (P3-P1) READING	POLE 3 20°C
POLE TO POLE	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00
POLE TO FRAME	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00
LINE TO LOAD	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.013	0.011	0.013

COMMENTS: DATE CODE: 14214.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979, DLRO #1570, SI #1512

Tested By: E. TAPPAN Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOADBREAK DISCONNECT TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 126
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 2/27/2020 | TEMPERATURE 60 °F | HUMIDITY 40 % | EQPT. LOCATION WEST BLOWER BLDG
SUBSTATION 3 | POSITION MAIN B

FUSE DATA

MANUFACTURER * | TYPE --- | HOLDER --- | MAX. AMPS ---
REFILL ELEMENT TYPE --- | SIZE --- | CAT. NO. --- | TCC NO. --- | VOLTAGE --- kV

NAMEPLATE DATA

MANUFACTURER SQUARE D | SERIAL NO. ---
VOLTAGE 15 KV | TYPE HVL | AMPERES 600 | INTERRUPTING RATING 40 kA
TYPE OPERATING MECHANISM MANUAL | AGE 5 /14 | B.I.L. RATING 95 kV
MOMENTARY FAULT CLOSING AMPS 40 kA | OTHER NAMEPLATE DATA ---

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	NA
INSULATING MEMBERS	☑	Acceptable	NA
MECHANICAL CONNECTION	☑	Acceptable	NA
STRUCTURAL MEMBERS	☑	Acceptable	NA
CUBICLE	☑	Acceptable	NA
AUXILIARY DEVICES	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
MAIN CONTACTS	☑	Acceptable	NA
HEATERS	☐	N/A	NA
BEARINGS	☑	Acceptable	NA
CONTACT SEQUENCE	☑	N/A	NA
GROUND CONNECTION	☑	N/A	NA

INSULATION TEST VOLTAGE 5 kVdc | TEST VOLTAGE MULTIPLIER, K1 = 1 | K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 16 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.8

INSULATION TESTS

	RANGE MULTIPLIER	K2	POLE 1 (P1-P2) MΩ READING	POLE 1 (P1-P2) MΩ 20°C	POLE 2 (P2-P3) MΩ READING	POLE 2 (P2-P3) MΩ 20°C	POLE 3 (P1-P3) MΩ READING	POLE 3 (P1-P3) MΩ 20°C
POLE TO POLE	1.000	0.800	100,000.0	80,000.00	100,000.0	80,000.00	100,000.0	80,000.00
POLE TO FRAME	1.000	0.800	100,000.0	80,000.00	100,000.0	80,000.00	100,000.0	80,000.00
LINE TO FRAME	1.000	0.800	100,000.0	80,000.00	100,000.0	80,000.00	100,000.0	80,000.00
LOAD TO FRAME	1.000	0.800	100,000.0	80,000.00	100,000.0	80,000.00	100,000.0	80,000.00
LINE TO LOAD	1.000	0.800	100,000.0	80,000.00	100,000.0	80,000.00	100,000.0	80,000.00

Contacts		POLE 1	POLE 2	POLE 3
CONTACT RESISTANCE SWITCH & FUSE ☐ MICRO-OHMS ☑ MILLI-OHMS		---	---	---
SWITCH CONTACT		0.031	0.029	0.032
FUSE		---	---	---
HI POT (MICRO AMPS)	---	68	58	62

COMMENTS: * = NO FUSES INSTALLED - APPEARS TO BE FACTORY BUILT TO BE A NON FUSED UNIT.
GENERAL ELECTRIC HD DIST - 9220FXX0.
LIGHTNING ARRESTORS 15KV A-36900, B-100K+, C-100K+. A-PHASE GETTING WEAK.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979, DLRO #1570, HIPOT #191469

Tested By: E. TAPPAN Tested By: E. KOEPFGEN

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 127
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/26/2020 — TEMPERATURE 65 °F — HUMIDITY 40 % — EQPT. LOCATION WEST BLOWER BLDG
SUBSTATION 3 — POSITION MCC-WBB-A

MANUFACTURER	SQUARE D	SN / SO NO.	085262996601	FRAME SIZE(F)	1600 A
BREAKER TYPE	MASTER PACT NW 16 H3	SENSOR TAPS	1600 A	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	2 C	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0 A	CATALOG NO.	WA6EER44A9XFXXXAA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	1600	LONG TIME PU	0.9	x	1600	A =	1440	A	DELAY	4	
SENSOR TAP	1,600	SHORT TIME PU	4	=	5760	A			DELAY	0.2	I²T ○ IN ◉ OUT ○ N/A
GRD. FLT. ◉ 3W ○ 4W		INST. PU	---	=	---	A	○ ON ◉ OFF				
		GRD. FLT. PU	B	=	640	A	◉ ON ○ OFF		DELAY	0.2	I²T ○ IN ◉ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	1600	LONG TIME PU	0.9	x	1600	A =	1440	A	DELAY	4	
SENSOR TAP	1,600	SHORT TIME PU	4	=	5760	A			DELAY	0.2	I²T ○ IN ◉ OUT ○ N/A
GRD. FLT. ◉ 3W ○ 4W		INST. PU	---	=	---	A	○ ON ◉ OFF				
		GRD. FLT. PU	B	=	640	A	◉ ON ○ OFF		DELAY	0.2	I²T ○ IN ◉ OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	7200	125%	---	---	0.170	0.170	---	---	---	---
	STPU									
LONG TIME	4320	300%	---	---	15.030	15.030	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	1280	200%	---	---	0.156	0.156	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 18 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.924

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2) READING	POLE 1 20°C	POLE 2 MΩ (P2-P3) READING	POLE 2 20°C	POLE 3 MΩ (P3-P1) READING	POLE 3 20°C
POLE TO POLE	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00
POLE TO FRAME	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00
LINE TO LOAD	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.01	0.009	0.011

COMMENTS: DATE CODE: 14214. PASSED THE AUTOMATIC TRIP CURVE TEST.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #156386, DLRO #19364, SI #1512

Tested By: E. TAPPAN Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 128
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/20/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION WEST BLOWER BUILDING
SUBSTATION 3 — POSITION MCC-WBB-A

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-145 — TYPE MODEL 6
CATALOG NO. --- — DRAWING NO. --- — VOLTAGE CLASS 600
MAIN BUS RATING 2000 A — MAIN BUS NEUTRAL RATING 2000 A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING 65 — NUMBER OF SECTIONS 8 — LISTING [✓] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER --- MLO X TYPE --- AMPACITY --- MAIN DISCONNECT --- FUSE TYPE --- SIZE ---
TOTAL POSITIONS EQUIPPED 22 — NO. OF SPARE SPACES 4 — TOTAL POSITIONS USED 17

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
ALL (8)	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	2,120	2,120	2,120		2,120	2,120	2,120			
---	RDG.										
	20°C										
---	RDG.										
	20°C										
---	RDG.										
	20°C										
---	RDG.										
	20°C										
---	RDG.										
	20°C										

COMMENTS: 1) INCLUDES TIE BREAKER TO MCC WBB-B. 2) INCLUDES 2 - GE 469 MOTOR MANAGEMENT RELAYS. 3) IN THE MAIN LUG COMPARTMENT, GROUNDS WERE RUBBING AGAINST THE THREADS OF C-PHASE LUGS & HAD TO REROUTE GROUNDS FROM A-PHASE THAT WERE RUBBING ON A-PHASE BUS. CORRECTED ON 2/26/2020

DEFICIENCIES:

[✓] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 129

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE

DATE 2/26/2020 TEMPERATURE 70 °F HUMIDITY 60 % EQPT. LOCATION WEST BLOWER BUILDING

SUBSTATION 3 POSITION MCC-WBB-A (01)

NAMEPLATE DATA

MANUFACTURER SQUARE D SIZE --- TYPE MODEL 6

CATALOG NO. --- SERIES --- MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C

TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1

K2 = (K1) (TCF) = 1.06

INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
SURGE PROTECTION DEVICE	---	---	538.6	509.2	595.6	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
WEST AERATION ADP-W1	---	50A BRKR	1,096	911.9	1,312	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
WASP-W1	---	30A BRKR	8,410	4,556	5,015	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
PUMP-W1 RASP-W1	---	50A BRKR	2,381	2,346	2,585	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
PUMP-W3 RASP-W3	---	50A BRKR	2,597	2,369	2,327	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE 15A	---	15A BRKR	17,702	10,543	14,256	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE 15A	---	15A BRKR	10,866	10,294	10,526	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
WSE-SAP-3	---	30A	2,750	2,779	2,890	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
(2) SC-W1 DRIVE SC-DR-W1	---	30A	6,726	6,400	6,307	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 130
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/26/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION WEST BLOWER BUILDING
SUBSTATION 3 — POSITION MCC-WBB-A (02)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE --- — TYPE MODEL 6
CATALOG NO. --- — SERIES --- — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
(2) 10HP SPARE	---	30A BRKR	9,516	7,664	10,033	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SCUM PUMP-W1 SSCP-W1	---	30A BRKR	3,017	3,637	10,478	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
WBB-HV-1	---	30A BRKR	5,800	6,277	5,567	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
(3) SPARE 15A	---	15A BRKR	9,613	9,650	10,734	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
HOIST LCP WBB-H2	---	30A BRKR	4,403	6,243	4,381	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
TO ATS-WBB FOR PP-WBB-A	---	400A BRKR	273.2	305.2	270.5	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
EF-V WBB-EF-1	---	30A	4,554	3,244	3,102	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
(4) EF-3 WBB-EF-3	---	30A	2,639	4,138	2,896	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
RECIRCULATING PUMP 1 WBB-P-1	---	30A	4,068	2,948	3,414	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: HOIST LCP - *A-PHASE LUG WAS MISALIGNED & THE BREAKER TAB WAS BARELY UNDER THE LUG. CORRECTED 2/26/2020.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: N. HERRST Tested By: 15600, REVISED 1/2/2020

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 131
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/26/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION WEST BLOWER BUILDING
SUBSTATION 3 — POSITION MCC-WBB-A (03)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE --- — TYPE MODEL 6
CATALOG NO. --- — SERIES --- — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
(4) EF-7 WBB-EF-7	---	30A BRKR	4,102	5,182	4,673	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
(5) PAB-W1	---	800A BRKR	125.3	183.8	155.3	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
(6) PAB-W3	---	800A BRKR	188.9	143.5	190.1	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH TTR #1572

Tested By: N. HERRST — Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 132
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/27/2020 — TEMPERATURE 65 °F — HUMIDITY 40 % — EQPT. LOCATION WEST BLOWER BLDG
SUBSTATION 3 — POSITION MCC-WBB-B

MANUFACTURER	SQUARE D	SN / SO NO.	085262996602	FRAME SIZE(F)	1600A
BREAKER TYPE	MASTER PACT NW 16 H3	SENSOR TAPS	1600A	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	5 C	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0 A	CATALOG NO.	WA6EER44A95XFXXXAA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size	CU ○ AL ○	

SETTINGS AS FOUND

RATING PLUG(R)	1600	LONG TIME PU	0.9	x	1600	A =	1440	A	DELAY	4	
SENSOR TAP	1,600	SHORT TIME PU	4	=	5760	A			DELAY	0.2	I²T ○ IN ◉ OUT ○ N/A
GRD. FLT. ◉ 3W ○ 4W		INST. PU	---	=	---	A	○ ON ◉ OFF				
		GRD. FLT. PU	B	=	640	A	◉ ON ○ OFF		DELAY	0.2	I²T ○ IN ◉ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	1600	LONG TIME PU	0.9	x	1600	A =	1440	A	DELAY	4	
SENSOR TAP	1,600	SHORT TIME PU	4	=	5760	A			DELAY	0.2	I²T ○ IN ◉ OUT ○ N/A
GRD. FLT. ◉ 3W ○ 4W		INST. PU	---	=	---	A	○ ON ◉ OFF				
		GRD. FLT. PU	B	=	640	A	◉ ON ○ OFF		DELAY	0.2	I²T ○ IN ◉ OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	7200	125%	---	---	0.170	0.170	---	---	---	---
	STPU									
LONG TIME	4320	300%	---	---	15.085	15.085	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	1280	200%	---	---	0.160	0.160	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 18 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.924

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00
POLE TO FRAME	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00
LINE TO LOAD	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.018	0.019	0.018

COMMENTS: DATE CODE: 14214, PASSED THE AUTOMATIC TRIP CURVE TEST.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979, DLRO #1570, SI #1512

Tested By: E. TAPPAN Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 133
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/27/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION WEST BLOWER BUILDING
SUBSTATION 3 — POSITION MCC-WBB-B

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-146 — TYPE MODEL 6
CATALOG NO. --- — DRAWING NO. --- — VOLTAGE CLASS 600
MAIN BUS RATING 2000 A — MAIN BUS NEUTRAL RATING 2000 A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING 65 — NUMBER OF SECTIONS 8 — LISTING [x] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER --- MLO X TYPE --- AMPACITY --- MAIN DISCONNECT --- FUSE TYPE --- SIZE ---
TOTAL POSITIONS EQUIPPED 21 — NO. OF SPARE SPACES 5 — TOTAL POSITIONS USED 16

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
ALL (8)	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	2,120	2,120	2,120		2,120	2,120	2,120			
---	RDG.										
	20°C										
---	RDG.										
	20°C										
---	RDG.										
	20°C										
---	RDG.										
	20°C										
---	RDG.										
	20°C										

COMMENTS: INCLUDES 1 - GE 469 MOTOR MANAGEMENT RELAY

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 134
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/27/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION WEST BLOWER BUILDING
SUBSTATION 3 — POSITION MCC-WBB-B (01)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE --- — TYPE MODEL 6
CATALOG NO. --- — SERIES --- — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
WBB-P-2	---	30A BRKR	7,714	4,132	3,195	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
PUMP W2 RASP-W2	---	40A BRKR	5,728	2,797	4,534	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
PUMP W4 RASP W4	---	40A BRKR	3,623	3,079	3,604	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
PP-WBB-B	---	150A BRKR	3,372	1,485	974	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
WBB-EF-5	---	30A BRKR	7,522	5,706	5,935	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
HOIST LCP WBB-H1	---	30A BRKR	4,246	4,296	3,774	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SSCP-W2	---	30A BRKR	9,107	10,395	4,688	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SCDR-W2	---	30A BRKR	5,404	6,233	3,181	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
TO ATS-WBB FOR PP-WBB-A	---	400A BRKR	322.7	314.2	298.1	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: PP-WBB-B A-PHASE TERMINAL NOT TORQUED--CONDUCTOR PULLED FREE. RE-LANDED AND TORQUED.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 135
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/27/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION WEST BLOWER BUILDING
SUBSTATION 3 — POSITION MCC-WBB-B (02)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE --- — TYPE MODEL 6
CATALOG NO. --- — SERIES --- — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
WBB-EF-2	---	30A BRKR	4,423	6,270	6,824	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
WBB-EF-4	---	30A BRKR	5,292	4,570	6,646	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
(3) WBB-HV-2	---	45A BRKR	5,161	6,359	5,752	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE *	---	60A BRKR				2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE	---	15A BRKR	30,342	36,780	3,953	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
WASP-W2	---	30A BRKR	4,247	4,488	4,057	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE	---	15A BRKR	11,916	35,304	40,264	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
(4) PAB-W2	---	800A BRKR	124.4	141.8	134.1	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
(5) SPD	---	---	554.3	571.9	553.4	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES: *SPARE BUCKET WAS MOVED TO MCC-WPB-B (ATS-WPB). THE DEFECTIVE BUCKET FROM MCC-WPB-B WAS MOVED TO FILL THE SPARE SPACE IN THIS MCC. ALL LUGS WERE NEVER TIGHTENED ONTO THE WIRE, CAUSING MAJOR OVERHEATING / MELTING ON B-PHASE & EVIDENCE OF (OVER-->)

☐ ACCEPTABLE ☑ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of
PAGE 136
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105
JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook
TELEPHONE
DATE 2/27/2020
DESCRIPTION 3 / MCC-WBB-B (02)

ARCING ON A & C PHASES. BREAKER IN THE BUCKET IS AN HJ060. MUST REPLACE BREAKER BEFORE SPARE POSITION CAN BE USED.

Utilities Instrumentation Service, Inc.
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Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 137
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/27/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION WEST BLOWER BUILDING
SUBSTATION 3 — POSITION MCC-WBB-B (03)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE --- — TYPE MODEL 6
CATALOG NO. --- — SERIES --- — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
WBB-EF-6	---	30A BRKR	6,879	4,426	5,739	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
10HP SPARE	---	30A BRKR	10,987	14,370	16,689	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.

Dexter, Michigan
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Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 138
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/26/2020 — TEMPERATURE 65 °F — HUMIDITY 40 % — EQPT. LOCATION WEST BLOWER BLDG
SUBSTATION 3 — POSITION MCC-WPB-A

MANUFACTURER	SQUARE D	SN / SO NO.	085262996701	FRAME SIZE(F)	800 A
BREAKER TYPE	MASTER PACT NW 08 H3	SENSOR TAPS	400 A	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	2 B	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0 A	CATALOG NO.	WA6ASR44A95XFXXXAA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	400	LONG TIME PU	0.9	x	400	A =	360	A	DELAY	8		
SENSOR TAP	400	SHORT TIME PU	10	=	3600	A			DELAY	0.1	I²T ○ IN	◉ OUT ○ N/A
GRD. FLT. ◉ 3W ○ 4W		INST. PU	---	=	---	A	○ ON	◉ OFF				
		GRD. FLT. PU	C	=	160	A	◉ ON	○ OFF	DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	400	LONG TIME PU	0.9	x	400	A =	360	A	DELAY	8		
SENSOR TAP	400	SHORT TIME PU	10	=	3600	A			DELAY	0.1	I²T ○ IN	◉ OUT ○ N/A
GRD. FLT. ◉ 3W ○ 4W		INST. PU	---	=	---	A	○ ON	◉ OFF				
		GRD. FLT. PU	C	=	160	A	◉ ON	○ OFF	DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	4500	125%	---	---	0.111	0.111	---	---	---	---
	STPU									
LONG TIME	2520	700%	---	---	4.965	4.965	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	320	200%	---	---	0.155	0.155	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 18 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.924

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00
POLE TO FRAME	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00
LINE TO LOAD	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.008	0.006	0.008

COMMENTS: DATE CODE: 14214, PASSED THE AUTOMATIC TRIP CURVE TEST.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #156386, DLRO #193764, SI #1512

Tested By: E. TAPPAN Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 139
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/26/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION WEST PRIMARY BUILDING
SUBSTATION 3 — POSITION MCC-WPB-A

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-143 — TYPE MODEL 6
CATALOG NO. --- — DRAWING NO. --- — VOLTAGE CLASS 600
MAIN BUS RATING 600 A — MAIN BUS NEUTRAL RATING 600 A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING 65 — NUMBER OF SECTIONS 6 — LISTING [x] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER 1 — MLO --- — TYPE LJ600 — AMPACITY 600 — MAIN DISCONNECT --- — FUSE TYPE --- — SIZE ---
TOTAL POSITIONS EQUIPPED 27 — NO. OF SPARE SPACES 4 — TOTAL POSITIONS USED ---

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
ALL (6)	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	2,120	2,120	2,120		2,120	2,120	2,120			
---	RDG.										
	20°C										
---	RDG.										
	20°C										
---	RDG.										
	20°C										
---	RDG.										
	20°C										
---	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
Dexter, Michigan
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FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 140
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/26/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION WEST PRIMARY BUILDING
SUBSTATION 3 — POSITION MCC-WPB-A (01)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE 600A — TYPE MODEL 6
CATALOG NO. --- — SERIES --- — MAX. VOLTS 480

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
SPD	---	---	1,096	956	990	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
MAIN	BRKR	300A	0.446	0.4409	0.6523	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
PC-W1 DRIVE PDCR-W1	BRKR	30A	14,090	5,779	4,313	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
PSCP-W1	BRKR	30A	3,894	5,271	4,364	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
WPB-EF-1	BRKR	30A	4,879	4,028	6,257	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SWMX-W1	BRKR	30A	6,831	4,665	9,843	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
MIXER-W1A	BRKR	30A	4,407	6,792	7,196	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
MIXER-W1B	BRKR	30A	6,546	5,148	5,335	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
AXMX-W1C	BRKR	30A	7,232	6,284	3,860	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.

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FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 141

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE

DATE 2/26/2020 TEMPERATURE 70 °F HUMIDITY 60 % EQPT. LOCATION WEST PRIMARY BUILDING

SUBSTATION 3 POSITION MCC-WPB-A (02)

NAMEPLATE DATA

MANUFACTURER SQUARE D SIZE 600A TYPE MODEL 6

CATALOG NO. --- SERIES --- MAX. VOLTS 480

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C

TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1

K2 = (K1) (TCF) = 1.06

INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
ANMX-W1B	BRKR	30A	7,660	4,977	7,035	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ANMX	BRKR	30A	5,031	5,947	5,161	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ANMX-W1D	BRKR	30A	6,370	16,498	5,737	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
WPB-P-1	BRKR	30A	6,099	12,438	12,403	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE	BRKR	20A	31,724	46,440	44,782	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
10HP SPARE	BRKR	30A	47,760	47,248	27,176	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ATS-WPB	BRKR	60A	5,777	4,695	6,059	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
IFSAB-1	BRKR	35A	3,999	3,322	3,254	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
PC-W1 / VALVE P-53-1 / P-53-3	BRKR	20A	10,134	7,585	8,327	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 142
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/26/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION WEST PRIMARY BUILDING
SUBSTATION 3 — POSITION MCC-WPB-A (03)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE 600A — TYPE MODEL 6
CATALOG NO. --- — SERIES --- — MAX. VOLTS 480

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
GATES F-54-4, F-54-1, S-54-1	BRKR	20A	8,347	8,915	8,277	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
PSLPG-W1	BRKR	20A	11,476	12,889	7,984	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
PSLP-W1	BRKR	45A	3,221	3,257	2,844	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE	BRKR	30A	20,484	15,586	21,232	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
PDP-W1	BRKR	50A	5,119	4,065	4,495	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
RS-SAP-1	BRKR	30A	17,335	5,257	39,466	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ANMX-W1A	BRKR	30A	7,076	6,247	12,294	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1562, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOLDED CASE WITH SOLID STATE TRIP UNIT CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 143

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/26/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION WEST PRIMARY BUILDING

SUBSTATION 3 — POSITION MCC-WPB-A (MAIN)

MANUFACTURER	SQUARE D	SN / SO NO.	3N14110709	FRAME SIZE(F)	600
BREAKER TYPE	POWER PACT LG 600	SENSOR TAPS	600	MOUNTING	(●) B.I. ( ) D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	( ) ON ( ) OFF
TRIP UNIT TYPE	6.3 A MICROLOGIC	CATALOG NO.	LJP36600U44XENLH2	ZONE INTLK ☐	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		Cu ( ) Al ( )

SETTINGS AS FOUND

RATING PLUG(R)	600	LONG TIME PU	---	x	---	A =	300	A	DELAY	---	
SENSOR TAP	600	SHORT TIME PU	---	=	---	A			DELAY	---	I²T ( ) IN ( ) OUT ( ) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	8	=	---	A	(●) ON ( ) OFF				
		GRD. FLT. PU	---	=	---	A	( ) ON ( ) OFF		DELAY	---	I²T ( ) IN ( ) OUT ( ) N/A

SETTINGS AS LEFT

RATING PLUG(R)	600	LONG TIME PU	---	x	---	A =	300	A	DELAY	---	
SENSOR TAP	600	SHORT TIME PU	---	=	---	A			DELAY	---	I²T ( ) IN ( ) OUT ( ) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	8	=	---	A	(●) ON ( ) OFF				
		GRD. FLT. PU	---	=	---	A	( ) ON ( ) OFF		DELAY	---	I²T ( ) IN ( ) OUT ( ) N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	---	---	---	---	---	---	---	---	---	---
	STPU									
LONG TIME	---	---	---	---	---	---	---	---	---	---
	LTPU									
GROUND FAULT	---	---	---	---	---	---	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.056

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P4)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
POLE TO FRAME	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
LINE TO LOAD	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00

POLE RESISTANCE READING — ☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.446	0.4409	0.6523

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C	---	---

COMMENTS: MEGGER & DUCTOR ONLY.
MEGGER WITH CABLES & MCC BUS.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOLDED CASE WITH SOLID STATE TRIP UNIT CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 144

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/26/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION WEST PRIMARY BUILDING

SUBSTATION 3 — POSITION MCC-WPB-A (TIE BREAKER)

MANUFACTURER	SQUARE D	SN / SO NO.	---	FRAME SIZE(F)	600
BREAKER TYPE	POWER PACT LG 600	SENSOR TAPS	600	MOUNTING	(●) B.I. ( ) D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	( ) ON ( ) OFF
TRIP UNIT TYPE	MICRO LOGIC 6.3 A	CATALOG NO.	LJL36600U44XEN	ZONE INTLK [ ]	TARGETS [ ]

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	NA
CONTACT FINGERS	☑	Acceptable	NA
LOADING AND ARCING CONTACTS	☑	Acceptable	NA
OVERCURRENT DEV. BATTERY	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	NA
AUXILIARY DEVICES	☐	N/A	NA
GROUND CONNECTION	☑	Acceptable	NA
LOAD CONDUCTOR NO. 0	Size		Cu ( ) Al ( )

SETTINGS AS FOUND

RATING PLUG(R)	600	LONG TIME PU	---	x	---	A =	250	A	DELAY	---		
SENSOR TAP	600	SHORT TIME PU	---	=	---	A			DELAY	---	I²T	( ) IN ( ) OUT ( ) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	5	=	3000	A	(●) ON ( ) OFF					
		GRD. FLT. PU	---	=	---	A	( ) ON ( ) OFF		DELAY	---	I²T	( ) IN ( ) OUT ( ) N/A

SETTINGS AS LEFT

RATING PLUG(R)	600	LONG TIME PU	---	x	---	A =	250	A	DELAY	---		
SENSOR TAP	600	SHORT TIME PU	---	=	---	A			DELAY	---	I²T	( ) IN ( ) OUT ( ) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	5	=	3000	A	(●) ON ( ) OFF					
		GRD. FLT. PU	---	=	---	A	( ) ON ( ) OFF		DELAY	---	I²T	( ) IN ( ) OUT ( ) N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	---	---	---	---	---	---	---	---	---	---
	STPU									
LONG TIME	---	---	---	---	---	---	---	---	---	---
	LTPU									
GROUND FAULT	---	---	---	---	---	---	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.056

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P4)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
POLE TO FRAME	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
LINE TO LOAD						

POLE RESISTANCE READING — [ ] MICRO-OHMS [ ] MILLI-OHMS

POLE 1	POLE 2	POLE 3
---	---	---

CONTROL WIRING				COUNTER READING BEG/END	
READING		20°C		---	---

COMMENTS: UNABLE TO CLEAN, MEGGER, OR DUCTOR, DUE TO LINE OR LOAD BEING ENERGIZED FROM ALTERNATE SOURCES.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 145
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/27/2020 — TEMPERATURE 65 °F — HUMIDITY 40 % — EQPT. LOCATION WEST BLOWER BLDG
SUBSTATION 3 — POSITION MCC-WPB-B

MANUFACTURER	SQUARE D	SN / SO NO.	085262996702	FRAME SIZE(F)	800 A
BREAKER TYPE	MASTER PACT NW 08 H3	SENSOR TAPS	400 A	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	5 B	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0 A	CATALOG NO.	WA6ASR44A9SXFXXXAA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Poor	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND		LONG TIME PU	0.9	x	400	A =	360	A	DELAY	8	
RATING PLUG(R)	400	SHORT TIME PU	10	=	3600	A			DELAY	0.1	I²T ○ IN ◉ OUT ○ N/A
SENSOR TAP	400	INST. PU	---	=	---	A	○ ON ◉ OFF				
GRD. FLT. ◉ 3W ○ 4W		GRD. FLT. PU	C	=	160	A	◉ ON ○ OFF		DELAY	0.2	I²T ○ IN ◉ OUT ○ N/A
SETTINGS AS LEFT		LONG TIME PU	0.9	x	400	A =	360	A	DELAY	8	
RATING PLUG(R)	400	SHORT TIME PU	10	=	3600	A			DELAY	0.1	I²T ○ IN ◉ OUT ○ N/A
SENSOR TAP	400	INST. PU	---	=	---	A	○ ON ◉ OFF				
GRD. FLT. ◉ 3W ○ 4W		GRD. FLT. PU	C	=	160	A	◉ ON ○ OFF		DELAY	0.2	I²T ○ IN ◉ OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	4500	125%	---	---	0.111	0.111	---	---	---	---
	STPU									
LONG TIME	2520	700%	---	---	4.913	4.913	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	320	200%	---	---	0.151	0.151	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 18 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.924

INSULATION RESISTANCE	POLE 1 MΩ (P1-P2) READING	POLE 1 20°C	POLE 2 MΩ (P2-P3) READING	POLE 2 20°C	POLE 3 MΩ (P3-P1) READING	POLE 3 20°C
POLE TO POLE	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00
POLE TO FRAME	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00
LINE TO LOAD	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.0106	0.0103	0.011

COMMENTS: BATTERY INDICATOR LOW.
DATE CODE: 14214, PASSED THE AUTOMATIC TRIP CURVE TEST.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979, DLRO #1570, SI #1512

Tested By: E. TAPPAN Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 146
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/27/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION WEST PRIMARY BUILDING
SUBSTATION 3 — POSITION MCC-WPB-B

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-144 — TYPE MODEL 6
CATALOG NO. --- — DRAWING NO. --- — VOLTAGE CLASS 600
MAIN BUS RATING 600 A — MAIN BUS NEUTRAL RATING 600 A — CONDUCTOR ○ Cu ○ Al
CURRENT WITHSTAND RATING 65 — NUMBER OF SECTIONS 6 — LISTING ☑ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER 1 — MLO --- — TYPE * — AMPACITY 600 — MAIN DISCONNECT --- — FUSE TYPE --- — SIZE ---
TOTAL POSITIONS EQUIPPED 26 — NO. OF SPARE SPACES 4 — TOTAL POSITIONS USED ---

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTIONS	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
MAIN	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	2,120	2,120	2,120		2,120	2,120	2,120			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS: * = SQUARE D POWER PACT LJ600

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 147
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/27/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION WEST PRIMARY BUILDING
SUBSTATION 3 — POSITION MCC-WPB-B (01)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE 600A — TYPE MODEL 6
CATALOG NO. --- — SERIES --- — MAX. VOLTS 600V

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
1-1 PSLP-W2	BRKR	45A	6,169	8,760	5,109	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
1-2 SPD	BRKR N/A	N/A	470	476	799	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
1-3 MAIN	BRKR	300A	182	154	161	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
2-1 PCPR-W2	BRKR	30A	6,161	3,339	4,802	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ATS-WPB *	BRKR	60A	5,275	5,377	8,595	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
2-3 PC-W2, P-53-2, P-53-4	BRKR	20A	8,195	7,346	10,957	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
2-4 AERATION GATES F-54-5 / F-54-2 / S-54-2	BRKR	20A	8,897	7,713	8,817	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
2-5 PSCP-W2	BRKR	30A	2,660	2,642	2,452	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
2-6 PSLPG-W2	BRKR	20A	10,564	8,074	7,305	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES: *ATS-WPB LUGS NEVER TIGHTENED. DAMAGE TO OCPD B-PHASE. RECOMMEND REPLACEMENT. 60A POWERPACT HJ060 SINGLE BUCKET. UIS LOCATED AN HJ060 SPARE IN MCC-WBB-B. WE REMOVED THE DEFECTIVE BUCKET & REPLACED IT WITH THE SPARE THAT WAS LOCATED. (OVER-->

☐ ACCEPTABLE ☑ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of
PAGE 148
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105
JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook
TELEPHONE
DATE 2/27/2020
DESCRIPTION 3 / MCC-WPB-B (01)

CORRECTED ON 2/27/2020. DUCTOR READINGS AFTER BUCKET WAS REPLACED:
A = 3600, B = 5762, C = 5466.
READINGS ARE IN MICRO-OHMS. MEGGERED ALL 2K+.

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Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 149
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/27/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION WEST PRIMARY BUILDING
SUBSTATION 3 — POSITION MCC-WPB-B (02)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE 600A — TYPE MODEL 6
CATALOG NO. --- — SERIES --- — MAX. VOLTS 600V

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
2-7 WPB-HV-1	BRKR	30A	4,676	6,022	3,924	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
3-1 AXMX-W2A	BRKR	30A	6,078	3,773	4,608	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
3-2 AXMX-W2B	BRKR	30A	5,921	4,126	15,753	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
3-3 AXMX-W2C	BRKR	30A	3,558	6,230	4,715	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
3-4 WPE-SAP-2	BRKR	30A	2,816	3,561	2,423	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
4-1 ANMX-W2A	BRKR	30A	5,119	3,555	5,396	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
4-2 ANMX-W2B	BRKR	30A	10,843	7,778	3,804	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
4-3 ANMX-W2C	BRKR	30A	6,872	6,059	4,424	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
4-4 ANMX-W2D	BRKR	30A	5,033	5,155	4,223	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1512

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 150
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/27/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION WEST PRIMARY BUILDING
SUBSTATION 3 — POSITION MCC-WPB-B (03)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE 600A — TYPE MODEL 6
CATALOG NO. --- — SERIES --- — MAX. VOLTS 600V

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
5-1 WPB-P-2	BRKR	30A	7,667	4,136	6,375	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
5-2 WPB-H1	BRKR	30A	4,594	6,103	4,657	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
5-3 SPARE	BRKR	20A	35,956	60,690	62,785	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
5-4 SPARE	BRKR	20A	41,598	22,224	47,136	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
5-5 WPB-EF-2	BRKR	30A	6,085	5,326	4,465	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
5-0 SWMX-W2	BRKR	30A	6,117	5,310	6,190	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
6-1 10HP SPARE	BRKR	30A	39,418	33,054	25,776	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1512

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOLDED CASE WITH SOLID STATE TRIP UNIT CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 151

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/27/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION WEST PRIMARY BUILDING

SUBSTATION 3 — POSITION MCC-WPB-B MAIN

MANUFACTURER	SQUARE D	SN / SO NO.	---	FRAME SIZE(F)	600
BREAKER TYPE	POWER PACT LJ 600	SENSOR TAPS	600	MOUNTING	(●) B.I. ( ) D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	( ) ON ( ) OFF
TRIP UNIT TYPE	MICRO LOGIC 6.3 A	CATALOG NO.	LJP36600U44XENLH2	ZONE INTLK [ ]	TARGETS [ ]

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C
CONTACT FINGERS	☑	Acceptable	NA
LOADING AND ARCING CONTACTS	☑	Acceptable	NA
OVERCURRENT DEV. BATTERY	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	NA
AUXILIARY DEVICES	☐	N/A	NA
GROUND CONNECTION	☑	Acceptable	NA
LOAD CONDUCTOR NO. 0	Size		Cu ( ) Al ( )

SETTINGS AS FOUND

RATING PLUG(R)	600	LONG TIME PU	300	x	---	A =	300	A	DELAY	8			
SENSOR TAP	600	SHORT TIME PU	8	=	2400	A			DELAY	0	I²T	( ) IN	(●) OUT ( ) N/A
GRD. FLT. (●) 3W ( ) 4W		INST. PU	---	=	900	A	(●) ON ( ) OFF						
		GRD. FLT. PU	0.3	=	180	A	(●) ON ( ) OFF		DELAY	0.2	I²T	( ) IN	(●) OUT ( ) N/A

SETTINGS AS LEFT

RATING PLUG(R)	600	LONG TIME PU	300	x	---	A =	300	A	DELAY	8			
SENSOR TAP	600	SHORT TIME PU	8	=	2400	A			DELAY	0	I²T	( ) IN	(●) OUT ( ) N/A
GRD. FLT. (●) 3W ( ) 4W		INST. PU	---	=	900	A	(●) ON ( ) OFF						
		GRD. FLT. PU	---	=	---	A	(●) ON ( ) OFF		DELAY	0.2	I²T	( ) IN	(●) OUT ( ) N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	4875	8.12	0.011	0.08	0.04	0.04	0.04	0.04	0.04	0.04
	IPU									
SHORT TIME	2970	9.9	0.02	0.089	0.055	0.055	0.055	0.055	0.055	0.055
	1928									
LONG TIME	1928	6.42	5.567	6.955	6.211	6.211	6.211	6.211	6.211	6.211
	LTPU									
GROUND FAULT	360	0.6X IN	0.08	0.14	0.103	0.103	0.103	0.103	0.103	0.103
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.056

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P4)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
POLE TO FRAME	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
LINE TO LOAD	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00

POLE RESISTANCE READING — [ ] MICRO-OHMS [☑] MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.182	0.154	0.161

CONTROL WIRING				COUNTER READING BEG/END	
READING		20°C		---	---

COMMENTS:

DEFICIENCIES:

[☑] ACCEPTABLE [ ] NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 152

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/26/2020 — TEMPERATURE 65 °F — HUMIDITY 40 % — EQPT. LOCATION WEST BLOWER BLDG

SUBSTATION 3 — POSITION SPARE A

MANUFACTURER	SQUARE D	SN / SO NO.	0852 6299 7001	FRAME SIZE(F)	800 A
BREAKER TYPE	MASTER PACT NW 08 H3	SENSOR TAPS	800 A	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	2 D	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0 A	CATALOG NO.	WA6AAR44A9SXFXXXAA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R) 800 — SENSOR TAP 800 — GRD. FLT. ● 3W ○ 4W

LONG TIME PU	1	x	800	A =	800	A	DELAY	0.5	
SHORT TIME PU	1.5	=	1200	A			DELAY	0.1	I²T ● IN ○ OUT ○ N/A
INST. PU	2	=	1600	A	● ON	○ OFF			
GRD. FLT. PU	A	=	160	A	● ON	○ OFF	DELAY	0.1	I²T ● IN ○ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R) 800 — SENSOR TAP 800 — GRD. FLT. ● 3W ○ 4W

LONG TIME PU	1	x	800	A =	800	A	DELAY	0.5	
SHORT TIME PU	1.5	=	1200	A			DELAY	0.1	I²T ● IN ○ OUT ○ N/A
INST. PU	2	=	1600	A	● ON	○ OFF			
GRD. FLT. PU	A	=	160	A	● ON	○ OFF	DELAY	0.1	I²T ● IN ○ OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	2000	125%	---	---	0.036	0.036	---	---	---	---
	IPU									
SHORT TIME	1400	---	---	---	5.012	5.012	---	---	---	---
	STPU									
LONG TIME	2000	---	---	---	0.036	0.036	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	320	---	---	---	0.627	0.627	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 18 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.924

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00
POLE TO FRAME	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00
LINE TO LOAD	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.023	0.019	0.021

COMMENTS: DATE CODE: 14214, PASSED THE AUTOMATIC TRIP CURVE TEST.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #156386, DLRO #193764, SI #1512

Tested By: E. TAPPAN Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 153
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/27/2020 — TEMPERATURE 65 °F — HUMIDITY 40 % — EQPT. LOCATION WEST BLOWER BLDG
SUBSTATION 3 — POSITION SPARE B

MANUFACTURER	SQUARE D	SN / SO NO.	085262997002	FRAME SIZE(F)	800 A
BREAKER TYPE	MASTER PACT NW 08 H3	SENSOR TAPS	800 A	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	5 D	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0 A	CATALOG NO.	WA6AAR44A9SXFXXXAA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C/L
OVERCURRENT DEV. BATTERY	☑	Acceptable	C/L

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C/L
AUXILIARY DEVICES	☑	Acceptable	C/L
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	800	LONG TIME PU	1	x	800	A =	800	A	DELAY	0.5		
SENSOR TAP	800	SHORT TIME PU	1.5	=	1200	A			DELAY	0.1	I²T	◉ IN ○ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	2	=	1600	A	◉ ON ○ OFF					
		GRD. FLT. PU	A	=	160	A	◉ ON ○ OFF		DELAY	0.1	I²T	◉ IN ○ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	800	LONG TIME PU	1	x	800	A =	800	A	DELAY	0.5		
SENSOR TAP	800	SHORT TIME PU	1.5	=	1200	A			DELAY	0.1	I²T	◉ IN ○ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	2	=	1600	A	◉ ON ○ OFF					
		GRD. FLT. PU	A	=	160	A	◉ ON ○ OFF		DELAY	0.1	I²T	◉ IN ○ OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	2000	125%	---	---	0.036	0.036	---	---	---	---
	IPU									
SHORT TIME	1400	116%	---	---	5.123	5.123	---	---	---	---
	STPU									
LONG TIME	1067	133%	---	---	14.630	14.630	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	320	200%	---	---	0.618	0.618	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 18 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.924

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00
POLE TO FRAME	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00
LINE TO LOAD	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.023	0.02	0.018

COMMENTS: DATE CODE: 14214, PASSED THE AUTOMATIC TRIP CURVE TEST.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979, DLRO #1570, SI #1512

Tested By: E. TAPPAN Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER DIELECTRIC ABSORPTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 154
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/26/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION WEST BLOWER BUILDING
SUBSTATION 3 — POSITION SUB 3 TRANSFORMER 1

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-015-01
SPECIFICATION NO. --- — KVA 200 / / — TYPE VPI — CLASS AA
PHASE 3 — TEMPERATURE RISE 115 °C °C — IMPEDANCE 5.87 % — B.I.L. RATING 95 kV PRI. 10 kV SEC.
COOLANT DRY — CAPACITY --- GALLONS — TOTAL WEIGHT 12400
WINDING POLARITY --- — WINDING MATERIAL --- — K FACTOR ---
PRIMARY VOLTAGE 13,200 — (●) DELTA ( ) WYE — RATED CURRENT 9 / / AMPERES
SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 241 / / AMPERES
TAP VOLTAGES 13,860 | 13,530 | 13,200 | 12,870 | 12,540
TAP CONNECTIONS E-F | D-F | E-G | D-G | C-G
TAP SETTING E-G 13,200 VOLTS — # FANS --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE ☑

TEST VOLTAGE:
PRIMARY TO SECONDARY 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 1 — K2=(TCF) (K1)
PRIMARY TO GROUND 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 1
SECONDARY TO GROUND 1 kVdc — TEST VOLTAGE MULTIPLIER, K1 1

CORE/COIL TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF — DRY 1.05 — LIQUID 1.080

MINUTES	PRIMARY TO SECONDARY GROUND GUARDED				PRIMARY TO GROUND SECONDARY GUARDED				SECONDARY TO GROUND PRIMARY GUARDED			
	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C
0.25	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
0.50	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
0.75	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
1.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
1.25	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
1.50	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
1.75	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
2.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
3.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
4.00												
5.00												
6.00												
7.00												
8.00												
9.00												
10.00												
POLARIZATION INDEX												

POLARIZATON INDEX = 10 MINUTE RDG. / 1 MINUTE RDG.

COMMENTS: PRIMARY VOLTAGE RATED CURRENT: 83.3, 85.3, 87.5, 89.1, 97.1 AMPERES.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #156386

Tested By: T. DODGE Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER INSPECTION

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 155

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/26/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION WEST BLOWER BUILDING

SUBSTATION 3 — POSITION SUB 3 TRANSFORMER 1

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-015-01

SPECIFICATION NO. --- — kVA 200 / / — TYPE VPI — CLASS AA

PHASE 3 — TEMPERATURE RISE 115 °C / °C — IMPEDANCE 5.87 % — B.I.L. RATING 95 kV PRI. / 10 kV SEC.

COOLANT DRY — CAPACITY --- GALLONS — TOTAL WEIGHT 12400

WINDING POLARITY --- — WINDING MATERIAL --- — K FACTOR ---

PRIMARY VOLTAGE 13,200 — (●) DELTA ( ) WYE — RATED CURRENT 9 / / AMPERES

SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 241 / / AMPERES

TAP VOLTAGES	13,860	13,530	13,200	12,870	12,540			
TAP CONNECTIONS	E-F	D-F	E-G	D-G	C-G			

TAP SETTING E-G 13,200 VOLTS — # FANS --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE ☑

GAUGES:

COOLANT TEMPERATURE --- °C — MAXIMUM TEMPERATURE --- °C — RESET TEMPERATURE GAUGE ☐

COOLANT LEVEL --- — PRESSURE VACUUM --- # — LCR COUNTER ---

OTHER GAUGES ---

VISUAL INSPECTION:

BUSHINGS ACCEPTABLE — SUPPORT INSULATORS ACCEPTABLE — CONNECTIONS ACCEPTABLE

PAINT ACCEPTABLE — RADIATORS --- — FANS ---

NO-LOAD TAP CHANGER --- — LEAKS ---

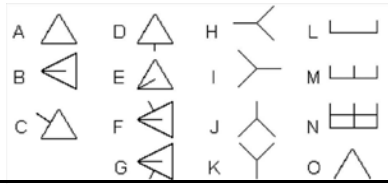
MAIN TANK DIELECTRIC SAMPLE SYRINGE # --- — BOTTLE # ---

LTC DIELECTRIC SAMPLE SYRINGE # --- — BOTTLE # ---

GROUND CONDUCTOR SIZE --- AWG/kcm — NO. OF GROUND CONDUCTORS --- — GROUND CONDUCTOR CONDITION ---

ADDITIONAL EQUIPMENT ---

VECTOR DIAGRAM



PRI. VECTOR: E

SEC. VECTOR: H

POST TEST VOLTAGES

NO LOAD SECONDARY VOLTAGE			
X1 - X2	V	X0 - G	V
X1 - X3	V	X0 - X1	V
X2 - X3	V	X0 - X2	V
		X0 - X3	V

COMMENTS: PRIMARY VOLTAGE RATED CURRENT: 88.3, 85.3, 87.5, 89.1, 97.1.
MAIN BONDING JUMPERS IN XFMR AND GEAR AT TIME OF TEST. BONDING JUMPER IN GEAR REMOVED PER CUSTOMER REQUEST.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: T. DODGE — Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER TURNS RATIO TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 156
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/26/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION WEST BLOWER BUILDING
SUBSTATION 3 — POSITION SUB 3 TRANSFORMER 1

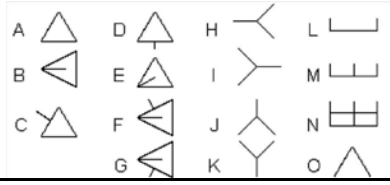
NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-015-01
SPECIFICATION NO. --- — KVA 200 / / — TYPE VPI — CLASS AA
PHASE 3 — TEMPERATURE RISE 115 °C °C — IMPEDANCE 5.87 % — B.I.L. RATING 95 kV PRI. 10 kV SEC.
COOLANT DRY — CAPACITY --- GALLONS — TOTAL WEIGHT 12400
WINDING POLARITY --- — WINDING MATERIAL --- — K FACTOR ---
PRIMARY VOLTAGE 13,200 — (●) DELTA ( ) WYE — RATED CURRENT 9 / / AMPERES
SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 241 / / AMPERES
TAP VOLTAGES 13,860 | 13,530 | 13,200 | 12,870 | 12,540
TAP CONNECTIONS E-F | D-F | E-G | D-G | C-G
TAP SETTING E-G 13,200 VOLTS — # FANS --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE ☑

TRANSFORMER TURNS RATIO TESTS

TAP NUMBER		WINDING VOLTAGES	CALCULATED RATIO	MEASURED RATIO		
				H_1H_3/X_1X_0	H_2H_1/X_2X_0	H_3H_2/X_3X_0
1	E-F	13,860 / 277	50.0361			
2	D-F	13,530 / 277	48.8448			
3	E-G	13,200 / 277	47.6534	47.6900	47.7050	47.7350
4	D-G	12,870 / 277	46.4621			
5	C-G	12,540 / 277	45.2708			
6		/				
7		/				
8		/				

VECTOR DIAGRAM



PRI. VECTOR: E
SEC. VECTOR: H

CORRECTION FACTOR FOR UNACCESSIBLE NEUTRAL

PHASE TESTED	BLACK	RED	BLACK	RED	JUMPER	READING MULTIPLIER	TEST SHEET DESIGNATION
DELTA-WYE							
A	H1	H3	X1	X2	H2H3	1.547	H1-H3 X1-X2
B	H2	H1	X2	X3	H1H3	1.547	H2-H3 X2-X3
C	H3	H2	X3	X1	H1H2	1.547	H3-H2 X3-X1
WYE-DELTA							
A	H1	H3	X1	X2	X2X3	1.5000	H1-H3 X1-X2
B	H2	H1	X2	X3	X1X3	1.5000	H2-H1 X2-X3
C	H3	H2	X3	X1	X1X2	1.5000	H3-H2 X3-X1

COMMENTS: PRIMARY VOLTAGE RATING CURRENT: 83.3, 85.3, 87.5, 89.1, 97.1 AMPERES.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: TTR #177319

Tested By: T. DODGE Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER DIELECTRIC ABSORPTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 157
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/27/2020 — TEMPERATURE 60 °F — HUMIDITY 40 % — EQPT. LOCATION WEST BLOWER
SUBSTATION 3 — POSITION SUB 3 TRANSFORMER 2

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-018-01
SPECIFICATION NO. TX11714001 — KVA 2,000 / / — TYPE VPI — CLASS AA
PHASE 3 — TEMPERATURE RISE 115 °C °C — IMPEDANCE 5.89 % — B.I.L. RATING 95 kV PRI. 10 kV SEC.
COOLANT --- — CAPACITY --- GALLONS — TOTAL WEIGHT 12400 LBS
WINDING POLARITY --- — WINDING MATERIAL --- — K FACTOR ---
PRIMARY VOLTAGE 13,200 — (●) DELTA ( ) WYE — RATED CURRENT 87 / / AMPERES
SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 2,406 / / AMPERES
TAP VOLTAGES 13,860 | 13,530 | 13,200 | 12,870 | 12,540
TAP CONNECTIONS E-F | D-F | E-G | D-G | C-G
TAP SETTING E-G 13,200 VOLTS — # FANS 0 — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE ☑

TEST VOLTAGE:
PRIMARY TO SECONDARY 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 1 — K2=(TCF) (K1)
PRIMARY TO GROUND 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 1
SECONDARY TO GROUND 1 kVdc — TEST VOLTAGE MULTIPLIER, K1 1

CORE/COIL TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF — DRY 0.848 — LIQUID 0.800

MINUTES	PRIMARY TO SECONDARY GROUND GUARDED				PRIMARY TO GROUND SECONDARY GUARDED				SECONDARY TO GROUND PRIMARY GUARDED			
	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C
0.25	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0
0.50	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0
0.75	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0
1.00	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0
1.25	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0
1.50	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0
1.75	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0
2.00	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0
3.00	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0
4.00												
5.00												
6.00												
7.00												
8.00												
9.00												
10.00												
POLARIZATION INDEX												

POLARIZATON INDEX = 10 MINUTE RDG. / 1 MINUTE RDG.

COMMENTS: PRIMARY VOLTAGE RATED CURRENT = 83.3, 85.3, 87.5, 89.7, 92.1.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979

Tested By: E. TAPPAN Tested By: E. KOEPFGEN

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER INSPECTION

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 158
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 2/27/2020 | TEMPERATURE 60 °F | HUMIDITY 40 % | EQPT. LOCATION WEST BLOWER
SUBSTATION 3 | POSITION SUB 3 TRANSFORMER 2

NAMEPLATE DATA

MANUFACTURER SQUARE D | SERIAL NO. 30951271-018-01
SPECIFICATION NO. TX11714001 | kVA 2,000 / / | TYPE VPI | CLASS AA
PHASE 3 | TEMPERATURE RISE 115 °C °C | IMPEDANCE 5.89 % | B.I.L. RATING 95 kV PRI. 10 kV SEC.
COOLANT --- | CAPACITY --- GALLONS | TOTAL WEIGHT 12400 LBS
WINDING POLARITY --- | WINDING MATERIAL --- | K FACTOR ---
PRIMARY VOLTAGE 13,200 | (●) DELTA ( ) WYE | RATED CURRENT 87 / / AMPERES
SECONDARY VOLTAGE 480 / 277 | ( ) DELTA (●) WYE | RATED CURRENT 2,406 / / AMPERES

TAP VOLTAGES	13,860	13,530	13,200	12,870	12,540			
TAP CONNECTIONS	E-F	D-F	E-G	D-G	C-G			

TAP SETTING E-G 13,200 VOLTS | # FANS 0 | TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL | DRY TYPE ☑

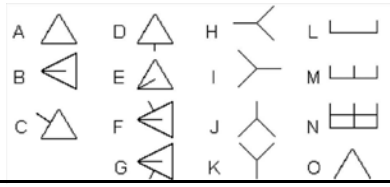
GAUGES:

COOLANT TEMPERATURE --- °C | MAXIMUM TEMPERATURE --- °C | RESET TEMPERATURE GAUGE ☐
COOLANT LEVEL --- | PRESSURE VACUUM --- # | LCR COUNTER ---
OTHER GAUGES ---

VISUAL INSPECTION:

BUSHINGS ACCEPTABLE | SUPPORT INSULATORS ACCEPTABLE | CONNECTIONS ACCEPTABLE
PAINT ACCEPTABLE | RADIATORS --- | FANS ---
NO-LOAD TAP CHANGER --- | LEAKS ---
MAIN TANK DIELECTRIC SAMPLE SYRINGE # --- | BOTTLE # ---
LTC DIELECTRIC SAMPLE SYRINGE # --- | BOTTLE # ---
GROUND CONDUCTOR SIZE ** AWG/kcm | NO. OF GROUND CONDUCTORS --- | GROUND CONDUCTOR CONDITION ---
ADDITIONAL EQUIPMENT ---

VECTOR DIAGRAM



PRI. VECTOR: E
SEC. VECTOR: H

POST TEST VOLTAGES

NO LOAD SECONDARY VOLTAGE			
X1 - X2	V	X0 - G	V
X1 - X3	V	X0 - X1	V
X2 - X3	V	X0 - X2	V
		X0 - X3	V

COMMENTS: TRANSFORMER LABELED AS SUB TRANSFORMER 3.
TOOK OUT REDUNDANT BONDING JUMPER IN GEAR, PER CUSTOMER REQUEST.
PRIMARY VOLTAGE RATED CURRENT = 83.3, 85.3, 87.5, 89.7, 92.1 AMPERES.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979

Tested By: E. TAPPAN Tested By: E. KOEPFGEN

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER TURNS RATIO TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 159
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 2/27/2020 | TEMPERATURE 60 °F | HUMIDITY 40 % | EQPT. LOCATION WEST BLOWER
SUBSTATION 3 | POSITION SUB 3 TRANSFORMER 2

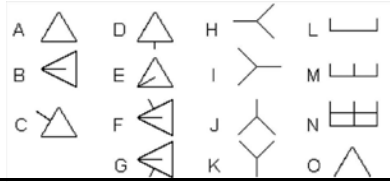
NAMEPLATE DATA

MANUFACTURER SQUARE D | SERIAL NO. 30951271-018-01
SPECIFICATION NO. TX11714001 | KVA 2,000 / / | TYPE VPI | CLASS AA
PHASE 3 | TEMPERATURE RISE 115 °C °C | IMPEDANCE 5.89 % | B.I.L. RATING 95 kV PRI. 10 kV SEC.
COOLANT --- | CAPACITY --- GALLONS | TOTAL WEIGHT 12400 LBS
WINDING POLARITY --- | WINDING MATERIAL --- | K FACTOR ---
PRIMARY VOLTAGE 13,200 | (●) DELTA ( ) WYE | RATED CURRENT 87 / / AMPERES
SECONDARY VOLTAGE 480 / 277 | ( ) DELTA (●) WYE | RATED CURRENT 2,406 / / AMPERES
TAP VOLTAGES 13,860 | 13,530 | 13,200 | 12,870 | 12,540
TAP CONNECTIONS E-F | D-F | E-G | D-G | C-G
TAP SETTING E-G 13,200 VOLTS | # FANS 0 | TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL | DRY TYPE ☑

TRANSFORMER TURNS RATIO TESTS

TAP NUMBER		WINDING VOLTAGES	CALCULATED RATIO	MEASURED RATIO		
				H_1H_3/X_1X_0	H_2H_1/X_2X_0	H_3H_2/X_3X_0
1	E-F	13,860 / 277	50.0361			
2	D-F	13,530 / 277	48.8448			
3	E-G	13,200 / 277	47.6534	47.8410	47.7380	47.7790
4	D-G	12,870 / 277	46.4621			
5	C-G	12,540 / 277	45.2708			
6		/				
7		/				
8		/				

VECTOR DIAGRAM



PRI. VECTOR: E
SEC. VECTOR: H

CORRECTION FACTOR FOR UNACCESSIBLE NEUTRAL

PHASE TESTED	BLACK	RED	BLACK	RED	JUMPER	READING MULTIPLIER	TEST SHEET DESIGNATION
DELTA-WYE							
A	H1	H3	X1	X2	H2H3	1.547	H1-H3 X1-X2
B	H2	H1	X2	X3	H1H3	1.547	H2-H3 X2-X3
C	H3	H2	X3	X1	H1H2	1.547	H3-H2 X3-X1
WYE-DELTA							
A	H1	H3	X1	X2	X2X3	1.5000	H1-H3 X1-X2
B	H2	H1	X2	X3	X1X3	1.5000	H2-H1 X2-X3
C	H3	H2	X3	X1	X1X2	1.5000	H3-H2 X3-X1

COMMENTS: PRIMARY VOLTAGE RATED CURRENT = 83.3, 85.3, 87.5, 89.7, 92.1 AMPERES.
TRANSFORMERS MARKED AS 3 WHEN THEY SHOULD BE 2.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: TTR #184970

Tested By: E. TAPPAN Tested By: E. KOEPFGEN

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE SWITCHBOARD INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 160
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/26/2020 — TEMPERATURE 65 °F — HUMIDITY 40 % — EQPT. LOCATION WEST BLOWER BUILDING
SUBSTATION 3 — POSITION SWBD A & B

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. G-726036 — TYPE POWER ZONE 4
CATALOG NO. --- — DRAWING NO. 3095127-016 — VOLTAGE CLASS 480/277
PHASE AMPACITY 3200 A — WITHSTAND RATING 100 kA — CONDUCTOR ☑ Cu ☐ Al

INSTALLED DEVICES

DRAWOUT LVACB 10 — BOLT-IN LVACB --- — DRAWOUT MCCB --- — BOLT-IN MCCB ---
BOLTED PRESSURE SWITCHES --- — FUSED DISCONNECTS --- — PROTECTIVE RELAYS --- — PANEL METERS 2
kWh METERS --- — VT's 6 — CT's 6 — CPT's 2
Other TVSS

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 18 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.9

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
1-3	RDG.	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
	20°C	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
4-6	RDG.	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
	20°C	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #156386

Tested By: E. TAPPAN — Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

SWITCHBOARD BUS CONNECTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 161
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/26/2020 — TEMPERATURE 65 °F — HUMIDITY 40 % — EQPT. LOCATION WEST BLOWER BUILDING
SUBSTATION 3 — POSITION SWBD A & B

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. G-726036 — TYPE POWER ZONE 4
CATALOG NO. --- — DRAWING NO. 30951271-016 — VOLTAGE CLASS 480/277
PHASE AMPACITY 3200 A — WITHSTAND RATING 100 kA — CONDUCTOR (•) CU ( ) AL

BUS SECTION TESTED		RESISTANCE IN [x] MICRO-OHMS [ ] MILLI-OHMS					BUS SECTION TESTED		RESISTANCE IN [ ] MICRO-OHMS [ ] MILLI-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
1	3	26	32	36	20	24							
4	6	28	36	37	19	30							

COMMENTS: NEUTRAL IS FROM XFMR TO SECTION 1 (A SIDE) AND XFMR TO SECTION 6 (B SIDE).

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: DLRO #193764

Tested By: E. TAPPAN Tested By: T. DODGE

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 162
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/26/2020 — TEMPERATURE 65 °F — HUMIDITY 40 % — EQPT. LOCATION WEST BLOWER BLDG
SUBSTATION 3 — POSITION TIE

MANUFACTURER	SQUARE D	SN / SO NO.	085262996902	FRAME SIZE(F)	3200 A
BREAKER TYPE	MASTER PACT NW 32 H3	SENSOR TAPS	3000 A	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	3 BC	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0 A	CATALOG NO.	WA6JHR44A9CFFFWSAA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C/L
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND		LONG TIME PU	0.7	x	3000	A =	2100	A	DELAY	4	
RATING PLUG(R)	3000	SHORT TIME PU	4	=	8400	A			DELAY	0.3	I²T ○ IN ◉ OUT ○ N/A
SENSOR TAP	3,000	INST. PU	---	=	---	A	○ ON ◉ OFF				
GRD. FLT.	◉ 3W ○ 4W	GRD. FLT. PU	E	=	880	A	◉ ON ○ OFF		DELAY	0.3	I²T ○ IN ◉ OUT ○ N/A
SETTINGS AS LEFT		LONG TIME PU	0.7	x	3000	A =	2100	A	DELAY	4	
RATING PLUG(R)	3000	SHORT TIME PU	4	=	8400	A			DELAY	0.3	I²T ○ IN ◉ OUT ○ N/A
SENSOR TAP	3,000	INST. PU	---	=	---	A	○ ON ◉ OFF				
GRD. FLT.	◉ 3W ○ 4W	GRD. FLT. PU	E	=	880	A	◉ ON ○ OFF		DELAY	0.3	I²T ○ IN ◉ OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	10500	125%	---	---	0.277	0.277	---	---	---	---
	STPU									
LONG TIME	6300	300%	---	---	15.155	15.155	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	1760	200%	---	---	0.263	0.263	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 18 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.924

INSULATION RESISTANCE	POLE 1 MΩ (P1-P2) READING	POLE 1 20°C	POLE 2 MΩ (P2-P3) READING	POLE 2 20°C	POLE 3 MΩ (P3-P1) READING	POLE 3 20°C
POLE TO POLE	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00
POLE TO FRAME	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00
LINE TO LOAD	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.014	0.013	0.016

COMMENTS: DATE CODE: 14214, PASSED THE AUTOMATIC TRIP CURVE TEST.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #156386, DLRO #193764, SI #1512

Tested By: E. TAPPAN Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan (734) 424-1200
Centerville, Ohio (937) 439-9660

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 163
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/26/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION WEST BLOWER BUILDING
SUBSTATION 3 — POSITION TIE MCC -WBB -A/B

MANUFACTURER	SQUARE D	SN / SO NO.	---	FRAME SIZE(F)	1600
BREAKER TYPE	POWER PACT RL 1600	SENSOR TAPS	1600	MOUNTING	(●) B.I. ( ) D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	( ) ON ( ) OFF
TRIP UNIT TYPE	MICRO LOGIC 5.0	CATALOG NO.	RLF 3616OU33AJK	ZONE INTLK ☐	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	N/A
CONTACT FINGERS	☑	Acceptable	N/A
LOADING AND ARCING CONTACTS	☑	Acceptable	N/A
OVERCURRENT DEV. BATTERY	☐	N/A	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	N/A
AUXILIARY DEVICES	☐	N/A	N/A
GROUND CONNECTION	☑	Acceptable	N/A
LOAD CONDUCTOR NO. 0	Size		CU ( ) AL ( )

SETTINGS AS FOUND

RATING PLUG(R)	1600	LONG TIME PU	0.8	x	1600	A =	1280	A	DELAY	4	
SENSOR TAP	1,600	SHORT TIME PU	3	=	5120	A			DELAY	0.1	I²T ( ) IN (●) OUT ( ) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	---	=	---	A	( ) ON (●) OFF				
		GRD. FLT. PU	---	=	---	A	( ) ON ( ) OFF		DELAY	---	I²T ( ) IN ( ) OUT ( ) N/A

SETTINGS AS LEFT

RATING PLUG(R)	1600	LONG TIME PU	0.8	x	1600	A =	1280	A	DELAY	4	
SENSOR TAP	1,600	SHORT TIME PU	3	=	5120	A			DELAY	0.1	I²T ( ) IN (●) OUT ( ) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	---	=	---	A	( ) ON (●) OFF				
		GRD. FLT. PU	---	=	---	A	( ) ON ( ) OFF		DELAY	---	I²T ( ) IN ( ) OUT ( ) N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	---	---	---	---	---	---	---	---	---	---
	STPU									
LONG TIME	---	---	---	---	---	---	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	---	---	---	---	---	---	---	---	---	---
	GFPU				---	---	---	---	---	---

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C	---	---

POLE RESISTANCE READING

☐ MICRO-OHMS ☐ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0	0	0

COMMENTS: UNABLE TO DLRO OR CLEAN DUE TO LINE OR LOAD ALWAYS BEING ENERGIZED FROM ALTERNATE SOURCES.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: N. HERRST Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 164
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/21/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION TERTIARY FILTER BUILDING
SUBSTATION 4 — POSITION BANK UNV-2B FB-7

MANUFACTURER	SQUARE D	SN / SO NO.	---	FRAME SIZE(F)	800
BREAKER TYPE	MP08H1	SENSOR TAPS	400	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	ST385	CATALOG NO.	54735	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☐	N/A	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	N/A
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND		LONG TIME PU	1	x	200	A =	200	A	DELAY N/A	
RATING PLUG(R)	400	SHORT TIME PU	6	=	1200	A			DELAY 0.3	I²T ○ IN ◉ OUT ○ N/A
SENSOR TAP	200	INST. PU	---	=	---	A	○ ON ◉ OFF			
GRD. FLT. ○ 3W ○ 4W		GRD. FLT. PU	---	=	---	A	○ ON ○ OFF		DELAY ---	I²T ○ IN ○ OUT ○ N/A
SETTINGS AS LEFT		LONG TIME PU	1	x	200	A =	200	A	DELAY N/A	
RATING PLUG(R)	400	SHORT TIME PU	6	=	1200	A			DELAY 0.3	I²T ○ IN ◉ OUT ○ N/A
SENSOR TAP	200	INST. PU	---	=	---	A	○ ON ◉ OFF			
GRD. FLT. ○ 3W ○ 4W		GRD. FLT. PU	---	=	---	A	○ ON ○ OFF		DELAY ---	I²T ○ IN ○ OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	2400	200%	---	---	0.276	0.276	0.276	0.276	0.276	0.276
	STPU									
LONG TIME	600	300%	---	---	25.96	25.96	25.75	25.75	25.02	25.02
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	---	---	---	---	---	---	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.848

INSULATION RESISTANCE	POLE 1 MΩ (P1-P2) READING	POLE 1 20°C	POLE 2 MΩ (P2-P3) READING	POLE 2 20°C	POLE 3 MΩ (P3-P1) READING	POLE 3 20°C
POLE TO POLE	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
POLE TO FRAME	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
LINE TO LOAD	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING
☑ MICRO-OHMS ☐ MILLI-OHMS

POLE 1	POLE 2	POLE 3
10	10	14

COMMENTS: E.O. BREAKER 120VAC CONTROL.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1570, PI (3 PIECE)

Tested By: E. KOEPFGEN Tested By: J. KIRCHNER

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 165
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/21/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION TERTIARY FILTER BUILDING
SUBSTATION 4 — POSITION BANK UV-2A FB-8

MANUFACTURER	SQUARE D	SN / SO NO.	T095428	FRAME SIZE(F)	800
BREAKER TYPE	MP08H1	SENSOR TAPS	400	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	AC PRO	CATALOG NO.	54735	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C/L
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	400	LONG TIME PU	---	x	200	A =	200	A	DELAY	120	
SENSOR TAP	200	SHORT TIME PU	6	=	1200	A			DELAY	0.3	I²T ○ IN ◉ OUT ○ N/A
GRD. FLT. ○ 3W ○ 4W		INST. PU	---	=	---	A	○ ON ◉ OFF				
		GRD. FLT. PU	---	=	---	A	○ ON ○ OFF		DELAY	---	I²T ○ IN ○ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	400	LONG TIME PU	---	x	200	A =	200	A	DELAY	120	
SENSOR TAP	200	SHORT TIME PU	6	=	1200	A			DELAY	0.3	I²T ○ IN ◉ OUT ○ N/A
GRD. FLT. ○ 3W ○ 4W		INST. PU	---	=	---	A	○ ON ◉ OFF				
		GRD. FLT. PU	---	=	---	A	○ ON ○ OFF		DELAY	---	I²T ○ IN ○ OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	2400	200%	---	---	0.229	0.229	0.238	0.238	0.238	0.238
	STPU									
LONG TIME	600	300%	---	---	22.75	22.75	22.50	22.50	22.25	22.25
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	---	---	---	---	---	---	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☑ MICRO-OHMS ☐ MILLI-OHMS

POLE 1	POLE 2	POLE 3
34	34	30

COMMENTS: E.O. BREAKER 120VAC CONTROL.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1570, PI (3 PIECE)

Tested By: E. KOEPFGEN Tested By: J. KIRCHNER

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VOLTAGE RELAY

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 166
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/24/2020 — TEMPERATURE 70 °F — HUMIDITY 30 % — EQPT. LOCATION TERTIARY BLDG
SUBSTATION 4 — POSITION DEV 60-1

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — TYPE NBV — MODEL / STYLE NO. 12NBV11A1A
VOLTAGE 120 — PICKUP RANGE 10-20 — DROPOUT RANGE -- — SEAL-IN RANGE --
INSTRUCTION BOOKLET GEI-50261 — CURVE -- — VT RATIO 480:120
DEVICE NO. 60

VISUAL INSPECTION

	YES	NO	N/A
COVER GASKET OK	●	○	○
GLASS CONDITION OK	●	○	○
FOREIGN MATERIAL	○	●	○
MOISTURE	○	●	○
SPIRAL SPRING OK	○	○	●
BEARING ENDPLAY OK	○	○	●
BEARING CONDITION OK	○	○	●
DISC CLEARANCE OK	○	○	●
RUST PRESENT	○	●	○

ROUTINE MAINTENANCE

	YES	NO	N/A
GLASS CLEANED	●	○	○
CASE CLEANED	●	○	○
RELAY CLEANED	●	○	○
CONNECTIONS TIGHTENED	●	○	○
TAPS TIGHTENED	●	○	○
CONTACTS CLEANED	●	○	○
TRIP CIRCUIT TESTED	○	●	○
INSULATION RES. MEGOHMS			

RELAY SETTINGS

	AS FOUND		AS SPECIFIED		AS LEFT	
VOLTAGE PICKUP	15	V	10-20	V	15	V
VOLTAGE DROPOUT	--	V	--	V	--	V
TIME DELAY	--		--		--	
TARGET SEAL-IN	--	ADC	--	ADC	--	ADC

PICKUP TESTS

	AS FOUND		AS SPECIFIED		AS LEFT	
PICKUP	15	V	10-20	V	15	V
DROPOUT	--	V	--	V	--	V
TARGET SEAL-IN	--	ADC	--	ADC	--	ADC

TIMING TESTS

	AS FOUND		AS SPECIFIED		AS LEFT	
3 PH. DROP-OUT TIME TO V	--	--	--	--	--	--
1 PH. DROP-OUT TIME TO V	--	--	--	--	--	--
PICKUP TIME 0.0 V TO RATED	--	--	--	--	--	--

COMMENTS: BALANCED 3 PHASE CHECK - 120V 3 PHASE ON TERMINALS 5 & 6 & 7. VOLTAGE ACROSS TERMINAL 3 & 4: AS FOUND 0.94 AS SPECIFIED <1.0V AS LEFT 0.94 PICKUP TEST = SINGLE PHASE ON TERMINAL 5-7 & 6. T1-T2 = 15V T8-T9 = 15 V T9-T10 = 13V FOUND IN AUTO. LEFT IN AUTO.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: SMRT46 # UIS 1589, FLUKE # 156396

Tested By: D. FLEMING Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VOLTAGE RELAY

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 167
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 2/24/2020 | TEMPERATURE 70 °F | HUMIDITY 30 % | EQPT. LOCATION TERTIARY BLDG
SUBSTATION 4 | POSITION DEV 60-2

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC | TYPE NBV | MODEL / STYLE NO. 12NBV11A1A
VOLTAGE 120 | PICKUP RANGE 10-20 | DROPOUT RANGE -- | SEAL-IN RANGE --
INSTRUCTION BOOKLET GEI-50261 | CURVE -- | VT RATIO 480:120
DEVICE NO. 60

VISUAL INSPECTION

	YES	NO	N/A
COVER GASKET OK	●	○	○
GLASS CONDITION OK	●	○	○
FOREIGN MATERIAL	○	●	○
MOISTURE	○	●	○
SPIRAL SPRING OK	○	○	●
BEARING ENDPLAY OK	○	○	●
BEARING CONDITION OK	○	○	●
DISC CLEARANCE OK	○	○	●
RUST PRESENT	○	●	○

ROUTINE MAINTENANCE

	YES	NO	N/A
GLASS CLEANED	●	○	○
CASE CLEANED	●	○	○
RELAY CLEANED	●	○	○
CONNECTIONS TIGHTENED	●	○	○
TAPS TIGHTENED	●	○	○
CONTACTS CLEANED	●	○	○
TRIP CIRCUIT TESTED	○	●	○
INSULATION RES. MEGOHMS			

RELAY SETTINGS

	AS FOUND		AS SPECIFIED		AS LEFT	
VOLTAGE PICKUP	16	V	10-20	V	16	V
VOLTAGE DROPOUT	--	V	--	V	--	V
TIME DELAY	--		--		--	
TARGET SEAL-IN	--	ADC	--	ADC	--	ADC

PICKUP TESTS

	AS FOUND		AS SPECIFIED		AS LEFT	
PICKUP	16	V	10-20	V	16	V
DROPOUT	--	V	--	V	--	V
TARGET SEAL-IN	--	ADC	--	ADC	--	ADC

TIMING TESTS

	AS FOUND		AS SPECIFIED		AS LEFT	
3 PH. DROP-OUT TIME TO V	--	--	--	--	--	--
1 PH. DROP-OUT TIME TO V	--	--	--	--	--	--
PICKUP TIME 0.0 V TO RATED	--	--	--	--	--	--

COMMENTS: BALANCED 3 PHASE CHECK - 120V 3 PHASE ON TERMINALS 5 & 6 & 7. VOLTAGE ACROSS TERMINAL 3 & 4: AS FOUND 1.17 AS SPECIFIED <1.0V AS LEFT 1.07 PICKUP TEST = SINGLE PHASE ON TERMINAL 5-7 & 6. T1-T2 = 16V T8-T9 = 18 V T9-T10 = 14V FOUND IN AUTO. LEFT IN AUTO.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: SMRT46 # UIS 1589, FLUKE # 156396

Tested By: D. FLEMING Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VOLTAGE RELAY

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 168

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/24/2020 — TEMPERATURE 70 °F — HUMIDITY 30 % — EQPT. LOCATION TERTIARY BLDG

SUBSTATION 4 — POSITION DEV 64-1

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — TYPE IAV — MODEL / STYLE NO. 12IAV51D2A

VOLTAGE 115 — PICKUP RANGE 10-40 — DROPOUT RANGE -- — SEAL-IN RANGE 0.2/2.0

INSTRUCTION BOOKLET GEK-45404 — CURVE -- — VT RATIO 480:120

DEVICE NO. 64

VISUAL INSPECTION

	YES	NO	N/A
COVER GASKET OK	●	○	○
GLASS CONDITION OK	●	○	○
FOREIGN MATERIAL	○	●	○
MOISTURE	○	●	○
SPIRAL SPRING OK	●	○	○
BEARING ENDPLAY OK	●	○	○
BEARING CONDITION OK	●	○	○
DISC CLEARANCE OK	●	○	○
RUST PRESENT	○	●	○

ROUTINE MAINTENANCE

	YES	NO	N/A
GLASS CLEANED	●	○	○
CASE CLEANED	●	○	○
RELAY CLEANED	●	○	○
CONNECTIONS TIGHTENED	●	○	○
TAPS TIGHTENED	●	○	○
CONTACTS CLEANED	●	○	○
TRIP CIRCUIT TESTED	○	●	○
INSULATION RES. MEGOHMS			

RELAY SETTINGS

	AS FOUND		AS SPECIFIED		AS LEFT	
VOLTAGE PICKUP	40	V	40	V	40	V
VOLTAGE DROPOUT	--	V	--	V	--	V
TIME DELAY	6.0		6.0		6.0	
TARGET SEAL-IN	0.2	ADC	0.2	ADC	0.2	ADC

PICKUP TESTS

	AS FOUND		AS SPECIFIED		AS LEFT	
PICKUP	40	V	40	V	40	V
DROPOUT	--	V	--	V	--	V
TARGET SEAL-IN	0.20	ADC	0.2	ADC	0.20	ADC

TIMING TESTS

			AS FOUND		AS SPECIFIED	AS LEFT	
1 PH. PICKUP TIME TO	80	V	4.997	SEC	--	4.997	SEC
1 PH. PICKUP TIME TO	120	V	3.367	SEC	--	3.367	SEC
1 PH. PICKUP TIME TO	160	V	2.794	SEC	--	2.794	SEC

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: SMRT46 # UIS 1589, FLUKE # 156396

Tested By: D. FLEMING Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VOLTAGE RELAY

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 169
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 2/24/2020 | TEMPERATURE 70 °F | HUMIDITY 30 % | EQPT. LOCATION TERTIARY BLDG
SUBSTATION 4 | POSITION DEV 64-2

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC | TYPE IAV | MODEL / STYLE NO. 12IAV51D2A
VOLTAGE 115 | PICKUP RANGE 10-40 | DROPOUT RANGE -- | SEAL-IN RANGE 0.2/2.0
INSTRUCTION BOOKLET GEK-45404 | CURVE -- | VT RATIO 480:120
DEVICE NO. 64

VISUAL INSPECTION

	YES	NO	N/A
COVER GASKET OK	●	○	○
GLASS CONDITION OK	●	○	○
FOREIGN MATERIAL	○	●	○
MOISTURE	○	●	○
SPIRAL SPRING OK	●	○	○
BEARING ENDPLAY OK	●	○	○
BEARING CONDITION OK	●	○	○
DISC CLEARANCE OK	●	○	○
RUST PRESENT	○	●	○

ROUTINE MAINTENANCE

	YES	NO	N/A
GLASS CLEANED	●	○	○
CASE CLEANED	●	○	○
RELAY CLEANED	●	○	○
CONNECTIONS TIGHTENED	●	○	○
TAPS TIGHTENED	●	○	○
CONTACTS CLEANED	●	○	○
TRIP CIRCUIT TESTED	○	●	○
INSULATION RES. MEGOHMS			

RELAY SETTINGS

	AS FOUND		AS SPECIFIED		AS LEFT	
VOLTAGE PICKUP	40	V	40	V	40	V
VOLTAGE DROPOUT	--	V	--	V	--	V
TIME DELAY	6.0		6.0		6.0	
TARGET SEAL-IN	0.2	ADC	0.2	ADC	0.2	ADC

PICKUP TESTS

	AS FOUND		AS SPECIFIED		AS LEFT	
PICKUP	40	V	40	V	40	V
DROPOUT	--	V	--	V	--	V
TARGET SEAL-IN	0.19	ADC	0.2	ADC	0.19	ADC

TIMING TESTS

			AS FOUND		AS SPECIFIED	AS LEFT	
1 PH. PICKUP TIME TO	80	V	5.098	SEC	--	5.098	SEC
1 PH. PICKUP TIME TO	120	V	3.317	SEC	--	3.317	SEC
1 PH. PICKUP TIME TO	160	V	2.705	SEC	--	2.705	SEC

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: SMRT46 # UIS 1589, FLUKE # 156396

Tested By: D. FLEMING Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 170

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/20/2020 — TEMPERATURE 60 °F — HUMIDITY 60 % — EQPT. LOCATION TERTIARY FILTER BUILDING

SUBSTATION 4 — POSITION FB-5

MANUFACTURER	GOULD / ITE	SN / SO NO.	53325-26-03364	FRAME SIZE(F)	800
BREAKER TYPE	K	SENSOR TAPS	400	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	TYPE SS	CATALOG NO.	K	ZONE INTLK ☐	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	N/A
CONTACT FINGERS	☑	Acceptable	N/A
LOADING AND ARCING CONTACTS	☑	Acceptable	N/A
OVERCURRENT DEV. BATTERY	☐	N/A	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	N/A
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND		LONG TIME PU	1	x	400	A =	400	A	DELAY MIN	
RATING PLUG(R)	400	SHORT TIME PU	6	=	2400	A			DELAY MIN	I²T ○ IN ○ OUT ○ N/A
SENSOR TAP	400	INST. PU	12	=	4800	A	◉ ON	○ OFF		
GRD. FLT. ○ 3W ○ 4W		GRD. FLT. PU	---	=	---	A	○ ON	○ OFF	DELAY ---	I²T ○ IN ○ OUT ○ N/A
SETTINGS AS LEFT		LONG TIME PU	1	x	400	A =	400	A	DELAY MIN	
RATING PLUG(R)	400	SHORT TIME PU	6	=	2400	A			DELAY MIN	I²T ○ IN ○ OUT ○ N/A
SENSOR TAP	400	INST. PU	12	=	4800	A	◉ ON	○ OFF		
GRD. FLT. ○ 3W ○ 4W		GRD. FLT. PU	---	=	---	A	○ ON	○ OFF	DELAY ---	I²T ○ IN ○ OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	4800	200%	---	---	0.055	0.055	0.055	0.055	0.042	0.042
	IPU									
SHORT TIME	4800	400%	---	---	0.135	0.135	0.189	0.189	0.133	0.133
	STPU									
LONG TIME	1200	300%	---	---	8.865	8.865	9.416	9.416	9.516	9.516
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	---	---	---	---	---	---	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.848

INSULATION RESISTANCE	POLE 1 MΩ (P1-P2) READING	POLE 1 20°C	POLE 2 MΩ (P2-P3) READING	POLE 2 20°C	POLE 3 MΩ (P3-P1) READING	POLE 3 20°C
POLE TO POLE	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
POLE TO FRAME	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
LINE TO LOAD	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☑ MICRO-OHMS ☐ MILLI-OHMS

POLE 1	POLE 2	POLE 3
86	72	79

COMMENTS: BUFFER BUSHINGS SHOULD BE REPLACED.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1570 PI (3 PIECE)

Tested By: E. TAPPAN Tested By: J. KIRCHNER

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOADBREAK DISCONNECT TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 171
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 2/20/2020 | TEMPERATURE 70 °F | HUMIDITY 50 % | EQPT. LOCATION TERTIARY BLD 2ND FLOOR ELEC RM
SUBSTATION 4 | POSITION MAIN A LOADBREAK

FUSE DATA

MANUFACTURER --- | TYPE --- | HOLDER --- | MAX. AMPS ---
REFILL ELEMENT TYPE --- | SIZE --- | CAT. NO. --- | TCC NO. --- | VOLTAGE --- kV

NAMEPLATE DATA

MANUFACTURER SQUARE D | SERIAL NO. ---
VOLTAGE 15.0 kV | TYPE HVL | AMPERES 600 | INTERRUPTING RATING 0.60 kA
TYPE OPERATING MECHANISM MANUAL | AGE MAY 2014 | B.I.L. RATING 95.0 kV
MOMENTARY FAULT CLOSING AMPS 40.0 kA | OTHER NAMEPLATE DATA F.O. #17-30951271-019

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	NA
INSULATING MEMBERS	☑	Acceptable	NA
MECHANICAL CONNECTION	☑	Acceptable	NA
STRUCTURAL MEMBERS	☑	Acceptable	NA
CUBICLE	☑	Acceptable	NA
AUXILIARY DEVICES	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
MAIN CONTACTS	☑	Acceptable	NA
HEATERS	☐	N/A	NA
BEARINGS	☐	N/A	NA
CONTACT SEQUENCE	☑	Acceptable	NA
GROUND CONNECTION	☑	Acceptable	NA

INSULATION TEST VOLTAGE 5 kVdc | TEST VOLTAGE MULTIPLIER, K1 = 1 | K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

INSULATION TESTS

	RANGE MULTIPLIER	K2	POLE 1 (P1-P2) MΩ READING	POLE 1 (P1-P2) MΩ 20°C	POLE 2 (P2-P3) MΩ READING	POLE 2 (P2-P3) MΩ 20°C	POLE 3 (P1-P3) MΩ READING	POLE 3 (P1-P3) MΩ 20°C
POLE TO POLE	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
POLE TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LINE TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LOAD TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LINE TO LOAD	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0

Contacts

	POLE 1	POLE 2	POLE 3
CONTACT RESISTANCE SWITCH & FUSE ☐ MICRO-OHMS ☑ MILLI-OHMS	---	---	---
SWITCH CONTACT	35.4	32.5	31.0
FUSE	---	---	---
HI POT (MICRO AMPS) CLOSE @ 38KVDC	86	42	68

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979, DLRO #1570, HIPOT #156393

Tested By: E. KOEPFGEN Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 172
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/20/2020 — TEMPERATURE 60 °F — HUMIDITY 60 % — EQPT. LOCATION TERTIARY FILTER BUILDING
SUBSTATION 4 — POSITION MAIN BRKR MB-1

MANUFACTURER	GOULD / ITE	SN / SO NO.	53325E-18-03364	FRAME SIZE(F)	1600
BREAKER TYPE	K	SENSOR TAPS	600, 1000, 1600	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	TYPE SS	CATALOG NO.	609903-T001	ZONE INTLK ☐	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C/L
OVERCURRENT DEV. BATTERY	☐	N/A	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C/L
AUXILIARY DEVICES	☑	Acceptable	C/L
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	1600	LONG TIME PU	1.0	x	1000	A =	1000	A	DELAY	INT	
SENSOR TAP	1,000	SHORT TIME PU	4	=	4000	A			DELAY	INT	I²T ○ IN ○ OUT ○ N/A
GRD. FLT. ○ 3W ○ 4W		INST. PU	---	=	---	A	○ ON ○ OFF				
		GRD. FLT. PU	---	=	---	A	○ ON ○ OFF		DELAY		I²T ○ IN ○ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	1600	LONG TIME PU	1.0	x	1000	A =	1000	A	DELAY	INT	
SENSOR TAP	1,000	SHORT TIME PU	4	=	4000	A			DELAY	INT	I²T ○ IN ○ OUT ○ N/A
GRD. FLT. ○ 3W ○ 4W		INST. PU	---	=	---	A	○ ON ○ OFF				
		GRD. FLT. PU	---	=	---	A	○ ON ○ OFF		DELAY		I²T ○ IN ○ OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	---	---	---	---	---	---	---	---	---	---
	STPU									
LONG TIME	---	---	---	---	---	---	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	---	---	---	---	---	---	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.848

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
POLE TO FRAME	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
LINE TO LOAD	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☑ MICRO-OHMS ☐ MILLI-OHMS

POLE 1	POLE 2	POLE 3
35	34	42

COMMENTS: TOP OF PHASE A AND PHASE B ARC SHOOTS ARE CRACKED.

DEFICIENCIES: BREAKER DOES NOT TRIP. DEFECTIVE ACTUATOR.

☐ ACCEPTABLE ☑ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #391242, PI # (3-PIECE)

Tested By: J. KIRCHNER Tested By: E. TAPPAN

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 173
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/21/2020 — TEMPERATURE 60 °F — HUMIDITY 60 % — EQPT. LOCATION TERTIARY FILTER BUILDING
SUBSTATION 4 — POSITION MAIN BRKR MB-2

MANUFACTURER	GOULD / ITE	SN / SO NO.	53325F-18-01364	FRAME SIZE(F)	1600
BREAKER TYPE	5	SENSOR TAPS	600, 1000, 1600	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	TYPE SS	CATALOG NO.	609903-T001	ZONE INTLK ☐	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C/L
OVERCURRENT DEV. BATTERY	☐	N/A	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C/L
AUXILIARY DEVICES	☑	Acceptable	C/L
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	1600	SHORT TIME PU	3X	=	4800	A		DELAY	MIN	I²T	○ IN ○ OUT ◉ N/A
SENSOR TAP	1,600	INST. PU	---	=	---	A	○ ON ○ OFF				
GRD. FLT.	○ 3W ○ 4W	GRD. FLT. PU	---	=	---	A	○ ON ○ OFF	DELAY	---	I²T	○ IN ○ OUT ○ N/A

LONG TIME PU 0.8 x 1600 A = 1280 A DELAY MIN

SETTINGS AS LEFT

RATING PLUG(R)	1600	SHORT TIME PU	3X	=	4800	A		DELAY	MIN	I²T	○ IN ○ OUT ◉ N/A
SENSOR TAP	1,600	INST. PU	---	=	---	A	○ ON ○ OFF				
GRD. FLT.	○ 3W ○ 4W	GRD. FLT. PU	---	=	---	A	○ ON ○ OFF	DELAY	---	I²T	○ IN ○ OUT ○ N/A

LONG TIME PU 0.8 x 1600 A = 1280 A DELAY MIN

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	9600	300%	0.09	0.17	0.13	0.13	0.13	0.13	0.14	0.14
	STPU									
LONG TIME	3840	300%	7.80	13.00	10.50	10.50	11.38	11.38	10.24	10.24
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	---	---	---	---	---	---	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.848

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
POLE TO FRAME	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
LINE TO LOAD	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.036	0.06	0.067

COMMENTS: BREAKER WAS IN THE TIE POSITION & WAS MOVED TO MAIN BECAUSE THE BREAKER WOULD NOT CLOSE IN THE CUBICLE. THE ISSUE SEEMS TO BE IN THE GEAR. BUFFER BUSHINGS SHOULD BE REPLACED.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1570, PI (3 PIECE)

Tested By: J. KIRCHNER Tested By: E. TAPPAN

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 174
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/21/2020 — TEMPERATURE 60 °F — HUMIDITY 60 % — EQPT. LOCATION TERTIARY FILTER BUILDING
SUBSTATION 4 — POSITION MAIN BRKR MB-2

MANUFACTURER	GOULD / ITE	SN / SO NO.	53325C-18-01364	FRAME SIZE(F)	1600
BREAKER TYPE	5	SENSOR TAPS	600, 1000, 1600	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	TYPE SS	CATALOG NO.	609903-T001	ZONE INTLK ☐	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C/L
OVERCURRENT DEV. BATTERY	☐	N/A	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C/L
AUXILIARY DEVICES	☑	Acceptable	C/L
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	1600	LONG TIME PU	1.0	x	1000	A =	1000	A	DELAY	INT	
SENSOR TAP	1,000	SHORT TIME PU	4	=	4000	A			DELAY	INT	I²T ○ IN ○ OUT ○ N/A
GRD. FLT. ○ 3W ○ 4W		INST. PU	---	=	---	A	○ ON ○ OFF				
		GRD. FLT. PU	---	=	---	A	○ ON ○ OFF		DELAY	---	I²T ○ IN ○ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	1600	LONG TIME PU	1.0	x	1000	A =	1000	A	DELAY	INT	
SENSOR TAP	1,000	SHORT TIME PU	4	=	4000	A			DELAY	INT	I²T ○ IN ○ OUT ○ N/A
GRD. FLT. ○ 3W ○ 4W		INST. PU	---	=	---	A	○ ON ○ OFF				
		GRD. FLT. PU	---	=	---	A	○ ON ○ OFF		DELAY	---	I²T ○ IN ○ OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	6000	300%	0.20	0.32	---	---	---	---	---	---
	STPU									
LONG TIME	3000	300%	20.00	40.00	---	---	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	---	---	---	---	---	---	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.848

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2) READING	POLE 1 20°C	POLE 2 MΩ (P2-P3) READING	POLE 2 20°C	POLE 3 MΩ (P3-P1) READING	POLE 3 20°C
POLE TO POLE						
POLE TO FRAME						
LINE TO LOAD						

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3

COMMENTS: REPAIRED MOTOR TOGGLE SWITCH.

DEFICIENCIES: ACTUATOR IS DEFECTIVE. BREAKER WILL NOT TRIP.

☐ ACCEPTABLE ☑ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: E. TAPPAN Tested By: J. KIRCHNER

Utilities Instrumentation Service, Inc.

Dexter, Michigan (734) 424-1200
Centerville, Ohio (937) 439-9660

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER: Ann Arbor, City of — PAGE: 175
ADDRESS: 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB #: AACI207024-1
USER: Ann Arbor WWTP
OWNER REPRESENTATIVE: Jeremy Holbrook — TELEPHONE:
DATE: 2/20/2020 — TEMPERATURE: 70 °F — HUMIDITY: 60 % — EQPT. LOCATION: TERTIARY FILTER BUILDING
SUBSTATION: 4 — POSITION: MAIN MB-1

MANUFACTURER	GOULD / ITE	SN / SO NO.	---	FRAME SIZE(F)	1600
BREAKER TYPE	K-LINE	SENSOR TAPS	1000	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	MAIN	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	TYPE SS	CATALOG NO.	K-16005	ZONE INTLK ☐	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Dirty	C/L
CONTACT FINGERS	☑	Dirty	C/L
LOADING AND ARCING CONTACTS	☑	Dirty	C/L
OVERCURRENT DEV. BATTERY	☐	N/A	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Dirty	C/L
AUXILIARY DEVICES	☑	Dirty	C/L
GROUND CONNECTION	☑	Dirty	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	---	SHORT TIME PU	2	=	2000	A		DELAY	INT	I²T	○ IN ○ OUT ● N/A
SENSOR TAP	1,000	INST. PU	---	=	---	A	○ ON ○ OFF				
GRD. FLT.	○ 3W ○ 4W	GRD. FLT. PU	---	=	---	A	○ ON ○ OFF	DELAY	---	I²T	○ IN ○ OUT ○ N/A
		LONG TIME PU	1	x	1000	A = 1000 A		DELAY	INT		

SETTINGS AS LEFT

RATING PLUG(R)	---	SHORT TIME PU	2	=	2000	A		DELAY	INT	I²T	○ IN ○ OUT ● N/A
SENSOR TAP	1,000	INST. PU	---	=	---	A	○ ON ○ OFF				
GRD. FLT.	○ 3W ○ 4W	GRD. FLT. PU	---	=	---	A	○ ON ○ OFF	DELAY	---	I²T	○ IN ○ OUT ○ N/A
		LONG TIME PU	1	x	1000	A = 1000 A		DELAY	INT		

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	4000	200%	---	---	0.262	0.262	0.263	0.263	0.263	0.263
	STPU									
LONG TIME	3000	300%	---	---	22.98	22.98	24.74	24.74	23.94	23.94
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	---	---	---	---	---	---	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE: 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 1.05

INSULATION RESISTANCE	POLE 1 MΩ (P1-P2) READING	POLE 1 20°C	POLE 2 MΩ (P2-P3) READING	POLE 2 20°C	POLE 3 MΩ (P3-P1) READING	POLE 3 20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
40.2	78.8	60.6

COMMENTS: THIS WAS A SPARE. THE MAIN THAT WAS IN SERVICE WAS DEFECTIVE. BUFFER BUSHINGS SHOULD BE REPLACED.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1570, PI (3 PIECE)

Tested By: E. TAPPAN Tested By: J. KIRCHNER

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 176
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/20/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION TERTIARY BUILDING
SUBSTATION 4 — POSITION MCC-M

NAMEPLATE DATA

MANUFACTURER GOULD — SERIAL NO. --- — TYPE ITE
CATALOG NO. --- — DRAWING NO. --- — VOLTAGE CLASS 480
MAIN BUS RATING 1000 A — MAIN BUS NEUTRAL RATING --- A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING --- — NUMBER OF SECTIONS 8 — LISTING [ ] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER X — MLO --- — TYPE --- — AMPACITY --- — MAIN DISCONNECT --- — FUSE TYPE --- — SIZE ---
TOTAL POSITIONS EQUIPPED 22 — NO. OF SPARE SPACES 3 — TOTAL POSITIONS USED 15

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Poor	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
MCC-M	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	2,120	2,120	2,120		2,120	2,120	2,120			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 177
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/20/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION TERTIARY BUILDING
SUBSTATION 4 — POSITION MCC-M (01)

NAMEPLATE DATA

MANUFACTURER GOULD — SIZE 1000A — TYPE ITE
CATALOG NO. --- — SERIES --- — MAX. VOLTS 480

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Poor	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
1-1 ATS	NO FUSE	NO FUSE	155.9	205.8	179.4	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
2-1 FLOOR DRAIN SUMP NO. 3	TRS 15R	15A	1.3e+007	3,896	10,971	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
2-2 PEW PUMP NO. 2	TRS 300R	300A	990.3	1,016.2	984.5	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
3-1 E SE SAMPLE PUMP	FRS-R 17.5	17.5A	19,896	4,773	31,612	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
3-2 SECONDARY EFFL PUMP NO. 5	TRS 300R	300A	568.7	586.7	565.1	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
4-1 E PLANT BLOWER	NO FUSE	NO FUSE	5,678	7,864	5,175	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
4-2 BACK WASH PUMP NO. 1	TRS 200R	200A	612.5	470.5	461.4	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
5-1 E PLANT SE GATE (E) S-6-2	TRS 15R	15A	1,622.6	54,525		2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
5-2 FPP-C	FRS-R 20	20A	2,553	21,926	36,222	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: FPP-C NO FUSE IN A-PHASE.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 178
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/20/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION TERTIARY BUILDING
SUBSTATION 4 — POSITION MCC-M (02)

NAMEPLATE DATA

MANUFACTURER GOULD — SIZE 1000A — TYPE ITE
CATALOG NO. --- — SERIES --- — MAX. VOLTS 480

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Poor	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
5-3 E PLANT SE GATE (W) S-6-1	NO FUSE	NO FUSE	1,442	31,598	1,935	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
5-4 UNIT HEATER EUH-1	TRS 20R	20A	2,306	2,354	2,354	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
5-5 EQUIP RECEPTACLE	TRS 30R	30A	17,720	16,076	2,219	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
5-6 WET WELL BYPASS GATE WEST S-1-1	TRS 20R	20A	8,620	2,753	2,639	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
5-7 WATER HEATER	NO FUSE	NO FUSE	185,220	8,897	67,040	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
6-1A EF-1, EF-2	FRS-R 20	20A	1,929	2,638	2,143	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
6-1B MOD VALVES 6110111112	FRS R30	30A	1,679	1,559	1,496	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
6-2 LIGHTING PANEL M	TRS 125R	125A	747.6	737.1	781.8	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
6-3 SEC EFFL PUMP NO. 1	TRS 300R	300A	604.9	700.9	606.6	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: REPLACED BROKEN CLIP ON WET WELL BYPASS GT WEST 5-1-1.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
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FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 179
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/20/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION TERTIARY BUILDING
SUBSTATION 4 — POSITION MCC-M (03)

NAMEPLATE DATA

MANUFACTURER GOULD — SIZE 1000A — TYPE ITE
CATALOG NO. --- — SERIES --- — MAX. VOLTS 480

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Poor	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
7-3 NO NAME	NO FUSE	NO FUSE	21,558	10,400	128,900	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
7-4 WASH WATER DRAINAGE PUMP NO. 1	TRS 60R	60A	995.6	21,650	1,097	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
7-5 FASB-1	NO FUSE	NO FUSE	1,099	1,177	1,153	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: WASH WATER DRAINAGE PUMP NO. 1 BUCKET HAS EVIDENCE OF ARCING FAULT AT TIME OF TEST. UNKNOWN TIME OR CAUSE.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
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LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 180
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/20/2020 — TEMPERATURE 60 °F — HUMIDITY 60 % — EQPT. LOCATION TERTIARY FILTER BUILDING
SUBSTATION 4 — POSITION MCC-M FB-1

MANUFACTURER	GOULD / ITE	SN / SO NO.	53325E-24-02364	FRAME SIZE(F)	800
BREAKER TYPE	K	SENSOR TAPS	300/600/800	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	TYPE SS	CATALOG NO.	609907-T002	ZONE INTLK ☐	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C/L
OVERCURRENT DEV. BATTERY	☐	N/A	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C/L
AUXILIARY DEVICES	☑	Acceptable	C/L
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	800	LONG TIME PU	1	x	800	A =	800	A	DELAY	MIN	
SENSOR TAP	800	SHORT TIME PU	4	=	3200	A			DELAY	MIN	I²T ○ IN ○ OUT ○ N/A
GRD. FLT. ○ 3W ○ 4W		INST. PU	10	=	8000	A	◉ ON ○ OFF				
		GRD. FLT. PU	---	=	---	A	○ ON ○ OFF		DELAY	---	I²T ○ IN ○ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	800	LONG TIME PU	1	x	800	A =	800	A	DELAY	MIN	
SENSOR TAP	800	SHORT TIME PU	4	=	3200	A			DELAY	MIN	I²T ○ IN ○ OUT ○ N/A
GRD. FLT. ○ 3W ○ 4W		INST. PU	10	=	8000	A	◉ ON ○ OFF				
		GRD. FLT. PU	---	=	---	A	○ ON ○ OFF		DELAY	---	I²T ○ IN ○ OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	6400	200%	---	<0.06	0.06	0.06	0.06	0.06	0.06	0.06
	IPU									
SHORT TIME	4800	300%	0.09	0.17	0.131	0.131	0.12	0.12	0.131	0.131
	STPU									
LONG TIME	2400	300%	7.80	13.00	8.351	8.351	8.425	8.425	9.089	9.089
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	---	---	---	---	---	---	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.848

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2) READING	POLE 1 20°C	POLE 2 MΩ (P2-P3) READING	POLE 2 20°C	POLE 3 MΩ (P3-P1) READING	POLE 3 20°C
POLE TO POLE	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
POLE TO FRAME	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
LINE TO LOAD	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☑ MICRO-OHMS ☐ MILLI-OHMS

POLE 1	POLE 2	POLE 3
73	68	78

COMMENTS: BUFFER BUSHINGS SHOULD BE REPLACED.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1570, PI (3 PIECE)

Tested By: J. KIRCHNER Tested By: E. TAPPAN

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 181
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/21/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION TERTIARY BUILDING
SUBSTATION 4 — POSITION MCC-N

NAMEPLATE DATA

MANUFACTURER GOULD — SERIAL NO. --- — TYPE ITC
CATALOG NO. --- — DRAWING NO. --- — VOLTAGE CLASS 480
MAIN BUS RATING 600 A — MAIN BUS NEUTRAL RATING --- A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING --- — NUMBER OF SECTIONS 7 — LISTING ☐ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER --- — MLO X — TYPE --- — AMPACITY --- — MAIN DISCONNECT --- — FUSE TYPE --- — SIZE ---
TOTAL POSITIONS EQUIPPED 21 — NO. OF SPARE SPACES 3 — TOTAL POSITIONS USED 20

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTIONS	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
SECTION 1 THRU SECTION 7	RDG.	1,577	1,622	2,000		2,000	2,000	2,000			
	20°C	1,671.62	1,719.32	2,120		2,120	2,120	2,120			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
Dexter, Michigan
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(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 182
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/21/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION TERTIARY BUILDING
SUBSTATION 4 — POSITION MCC-N (01)

NAMEPLATE DATA

MANUFACTURER GOULD — SIZE 600 — TYPE ITE
CATALOG NO. --- — SERIES --- — MAX. VOLTS 480

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
ATS	---	---	202.9	149	185.5	1,577	1,622	2,000	2,000	2,000	2,000
						1,671.62	1,719.32	2,120	2,120	2,120	2,120
FLOOR DRAIN SUMP PUMP #4	TRS	15R	26,644	27,970	32,436	1,577	1,622	2,000	2,000	2,000	2,000
						1,671.62	1,719.32	2,120	2,120	2,120	2,120
PEW PUMP #3	TRS	300R	1,205	963	1,019.9	1,577	1,622	2,000	2,000	2,000	2,000
						1,671.62	1,719.32	2,120	2,120	2,120	2,120
RF-14	TRS	20R	70,010	4,020	2,606	1,577	1,622	2,000	2,000	2,000	2,000
						1,671.62	1,719.32	2,120	2,120	2,120	2,120
SECONDARY EFFL PUMP #6	TRS	300R	605	590	583.2	1,577	1,622	2,000	2,000	2,000	2,000
						1,671.62	1,719.32	2,120	2,120	2,120	2,120
ROOF FAN RF-10	TRS	12R	2,486	3,552	2,929	1,577	1,622	2,000	2,000	2,000	2,000
						1,671.62	1,719.32	2,120	2,120	2,120	2,120
BACKWASH WATER PUMP #2	TRS	200R	566	491.8	520	1,577	1,622	2,000	2,000	2,000	2,000
						1,671.62	1,719.32	2,120	2,120	2,120	2,120
W PLANT SE GATE (E) S-2-2	FRS-R	15	22,020	56,055	20,018	1,577	1,622	2,000	2,000	2,000	2,000
						1,671.62	1,719.32	2,120	2,120	2,120	2,120
EF-3, EF-4, SF-1	FRS-R	30	3,350	3,092	4,674	1,577	1,622	2,000	2,000	2,000	2,000
						1,671.62	1,719.32	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.

Dexter, Michigan
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FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 183

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/21/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION TERTIARY BUILDING

SUBSTATION 4 — POSITION MCC-N (02)

NAMEPLATE DATA

MANUFACTURER GOULD — SIZE 600 — TYPE ITE

CATALOG NO. --- — SERIES --- — MAX. VOLTS 480

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06

INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
W PLANT SE GATE (W) S-2-1	TRS	15R	2,188	6,881	55,470	1,577	1,622	2,000	2,000	2,000	2,000
						1,671.62	1,719.32	2,120	2,120	2,120	2,120
EQUIP. RECEPTACLES	TRS	30R	1,845	1,962	39,246	1,577	1,622	2,000	2,000	2,000	2,000
						1,671.62	1,719.32	2,120	2,120	2,120	2,120
WET WELL BYPASS GT EASR S-1-2	TRS	20R	2,391	2,338	3,009	1,577	1,622	2,000	2,000	2,000	2,000
						1,671.62	1,719.32	2,120	2,120	2,120	2,120
FCB-1	---	100 BRKR	2,189	2,464	2,866	1,577	1,622	2,000	2,000	2,000	2,000
						1,671.62	1,719.32	2,120	2,120	2,120	2,120
FPP-B	2 FRS-R	20	2,015	4,210	9,020	1,577	1,622	2,000	2,000	2,000	2,000
						1,671.62	1,719.32	2,120	2,120	2,120	2,120
MODULATION VALVES 2, 4, 6, 8	FRS-R	20	1,670	1,665	1,516	1,577	1,622	2,000	2,000	2,000	2,000
						1,671.62	1,719.32	2,120	2,120	2,120	2,120
LIGHTING PANEL N *	TRS	125R	712	745.5	736.5	1,577	1,622	2,000	2,000	2,000	2,000
						1,671.62	1,719.32	2,120	2,120	2,120	2,120
SECONDARY EFFL PUMP #2	TRS	300R	734	715.7	799.9	1,577	1,622	2,000	2,000	2,000	2,000
						1,671.62	1,719.32	2,120	2,120	2,120	2,120
DE-CHLORINE XFMR & PANEL	FRS-R	40	1,022	1,135	102,370	1,577	1,622	2,000	2,000	2,000	2,000
						1,671.62	1,719.32	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES: *GOULD ITE MOLDED CASE SWITCH. TYPE: ETS 225A. CAT #FJ3-S225. BREAKER WILL NOT SHUT OFF.

☐ ACCEPTABLE ☑ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 184
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/21/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION TERTIARY BUILDING
SUBSTATION 4 — POSITION MCC-N (03)

NAMEPLATE DATA

MANUFACTURER GOULD — SIZE 600 — TYPE ITE
CATALOG NO. --- — SERIES --- — MAX. VOLTS 480

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
RF-12	TRS	30R	1,739	62,760	2,224	1,577	1,622	2,000	2,000	2,000	2,000
						1,671.62	1,719.32	2,120	2,120	2,120	2,120
CP-70 *	---	30 BRKR	22,756		22,590	1,577	1,622	2,000	2,000	2,000	2,000
						1,671.62	1,719.32	2,120	2,120	2,120	2,120
WASH WATER RESERVOIR DRAINAGE PUMP #2	TRS	60R	2,946	3,804	3,732	1,577	1,622	2,000	2,000	2,000	2,000
						1,671.62	1,719.32	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES: CP-70: BROKEN DISCONNECT HANDLE. B-PHASE NO WIRE.

☐ ACCEPTABLE ☑ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.

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LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 185
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/20/2020 — TEMPERATURE 60 °F — HUMIDITY 60 % — EQPT. LOCATION TERTIARY FILTER BUILDING
SUBSTATION 4 — POSITION MCC-N FB-11

MANUFACTURER	GOULD / ITE	SN / SO NO.	53325E-24-01364	FRAME SIZE(F)	800
BREAKER TYPE	K	SENSOR TAPS	300/600/800	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	TYPE SS	CATALOG NO.	K-8005	ZONE INTLK ☐	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C/L
OVERCURRENT DEV. BATTERY	☐	N/A	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C/L
AUXILIARY DEVICES	☐	N/A	N/A
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	800	LONG TIME PU	1	x	800	A =	800	A	DELAY	MIN	
SENSOR TAP	800	SHORT TIME PU	4	=	3200	A			DELAY	MINT	I²T ○ IN ○ OUT ◉ N/A
GRD. FLT. ○ 3W ○ 4W		INST. PU	10	=	8000	A	◉ ON ○ OFF				
		GRD. FLT. PU	---	=	---	A	○ ON ○ OFF		DELAY	---	I²T ○ IN ○ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	800	LONG TIME PU	1	x	800	A =	800	A	DELAY	MIN	
SENSOR TAP	800	SHORT TIME PU	4	=	3200	A			DELAY	MINT	I²T ○ IN ○ OUT ◉ N/A
GRD. FLT. ○ 3W ○ 4W		INST. PU	10	=	8000	A	◉ ON ○ OFF				
		GRD. FLT. PU	---	=	---	A	○ ON ○ OFF		DELAY	---	I²T ○ IN ○ OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	9600	300%	---	<0.06	0.06	0.06	0.05	0.05	0.06	0.06
	IPU									
SHORT TIME	4800	200%	0.09	0.17	0.14	0.14	0.13	0.13	0.14	0.14
	STPU									
LONG TIME	2400	300%	7.80	13.00	8.274	8.274	8.124	8.124	8.506	8.506
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	---	---	---	---	---	---	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.848

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
POLE TO FRAME	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
LINE TO LOAD	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☑ MICRO-OHMS ☐ MILLI-OHMS

POLE 1	POLE 2	POLE 3
43	41	38

COMMENTS: BUFFER BUSHINGS NEED TO BE REPLACED.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1570, PI (3 PIECE)

Tested By: E. TAPPAN Tested By: J. KIRCHNER

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Dexter, Michigan
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MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 186
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/21/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION TERTIARY BUILDING
SUBSTATION 4 — POSITION MCC-P

NAMEPLATE DATA

MANUFACTURER GOULD — SERIAL NO. --- — TYPE ITC
CATALOG NO. --- — DRAWING NO. 64321-09 — VOLTAGE CLASS 480
MAIN BUS RATING 600 A — MAIN BUS NEUTRAL RATING --- A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING --- — NUMBER OF SECTIONS 5 — LISTING ☐ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER --- MLO X TYPE --- AMPACITY --- MAIN DISCONNECT --- FUSE TYPE --- SIZE ---
TOTAL POSITIONS EQUIPPED 19 — NO. OF SPARE SPACES 1 — TOTAL POSITIONS USED 13

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTIONS	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
SECTION 1 THRU SECTION 5	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	2,120	2,120	2,120		2,120	2,120	2,120			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 187
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/21/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION TERTIARY BUILDING
SUBSTATION 4 — POSITION MCC-P (01)

NAMEPLATE DATA

MANUFACTURER GOULD — SIZE 600 — TYPE ITE
CATALOG NO. --- — SERIES --- — MAX. VOLTS 480

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
NO LABEL	NO FUSES	NO FUSES	1,102	1,633	1,483	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
WASH WATER RESERVOIR DRAINAGE PUMP #3	TRS	60R	1,106	1,333	1,134	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
UNDER DRAIN SUMP PUMP #1	TRS	20R	19,466	5,352	13,599	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
PEW PUMP #1	FRS-R	250	7,165	571.8	519.7	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
FLOOR DRAIN SUMP PUMP #1	TRS	15R	1,811	1,871	2,610	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SECONDARY EFFL PUMP #3	TRS	300R	634.6	710.4	677.4	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ALTERNATING CUBICLE	2 FRS-R	8	3,265		4,137	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SE ISOLATE VALVE B-2-1	TRS	15R	3,185	2,062	15,706	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
RIVER VALVE B-3-1	TRS	15R	2,375	582,551	2,599	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 188

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/21/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION TERTIARY BUILDING

SUBSTATION 4 — POSITION MCC-P (02)

NAMEPLATE DATA

MANUFACTURER GOULD — SIZE 600 — TYPE ITE

CATALOG NO. --- — SERIES --- — MAX. VOLTS 480

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06

INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
FILTER EFFL SAMPLE PUMP	TRS	20R	127,610	68,920	254,500	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
NO LABEL *	TRS	15R			3,501	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
PEW STRAINER	FRS-R	20	2,442	2,877	2,858	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CP-70 NORMAL POWER	2 FRS-R	30	114,860	2,581	2,304	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
HOIST	TRS	20R	2,027	1,920	11,167	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CONTACT TANK INTERCON. GATE S-16-1	TRS	15R	2,485	2,480	2,961	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
TEMP PUMPS	NO FUSES	NO FUSES	1,370	1,475	1,658	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
NO NAME TAG (TEMP POWER TO TRAILER)	FRS-R	60	14,052	3,338	3,500	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
AIR COMPRESSOR #1	TRS	30R	33,002	17,396	23,562	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: NO LABEL TRS 15R PHASES A & B: DUCT TAPE ON THE DOOR THAT SAYS PHASE-B CONTACT IS BAD. NO LABEL WILL NOT DLRO ON A OR B.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 189
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/21/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION TERTIARY BUILDING
SUBSTATION 4 — POSITION MCC-P (03)

NAMEPLATE DATA

MANUFACTURER GOULD — SIZE 600 — TYPE ITE
CATALOG NO. --- — SERIES --- — MAX. VOLTS 480

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
POWER SOURCE PP-UV-2	---	60 BRKR	4,459	5,103	5,018	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.

Dexter, Michigan
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LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 190
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/21/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION TERTIARY FILTER BUILDING
SUBSTATION 4 — POSITION MCC-P FB-12

MANUFACTURER	GOULD / ITE	SN / SO NO.	53325F-26-04364	FRAME SIZE(F)	800
BREAKER TYPE	K	SENSOR TAPS	250/400/600	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	TYPE SS	CATALOG NO.	609902 T002	ZONE INTLK ☐	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C/L
OVERCURRENT DEV. BATTERY	☐	N/A	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C/L
AUXILIARY DEVICES	☑	Acceptable	C/L
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	400	LONG TIME PU	1	x	400	A =	400	A	DELAY	INT	
SENSOR TAP	400	SHORT TIME PU	4	=	1600	A			DELAY	INT	I²T ○ IN ○ OUT ○ N/A
GRD. FLT. ○ 3W ○ 4W		INST. PU	12	=	4800	A	◉ ON ○ OFF				
		GRD. FLT. PU	---	=	---	A	○ ON ○ OFF		DELAY	---	I²T ○ IN ○ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	400	LONG TIME PU	1	x	400	A =	400	A	DELAY	INT	
SENSOR TAP	400	SHORT TIME PU	4	=	1600	A			DELAY	INT	I²T ○ IN ○ OUT ○ N/A
GRD. FLT. ○ 3W ○ 4W		INST. PU	12	=	4800	A	◉ ON ○ OFF				
		GRD. FLT. PU	---	=	---	A	○ ON ○ OFF		DELAY	---	I²T ○ IN ○ OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	4000	300%	---	<0.06	0.06	0.06	0.06	0.06	0.05	0.05
	IPU									
SHORT TIME	2400	200%	0.20	0.32	0.26	0.26	0.23	0.23	0.26	0.26
	STPU									
LONG TIME	1200	300%	20.00	40.00	21.46	21.46	21.50	21.50	23.41	23.41
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	---	---	---	---	---	---	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☑ MICRO-OHMS ☐ MILLI-OHMS

POLE 1	POLE 2	POLE 3
70	95	78

COMMENTS: HAD TO USE A SPARE, AS THE BREAKER THAT WAS IN SERVICE FAILED LT TRIP. BUFFER BUSHINGS NEED TO BE REPLACED.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1570, PI (3 PIECE)

Tested By: E. TAPPAN Tested By: J. KIRCHNER

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 191
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/20/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION TERTIARY BUILDING
SUBSTATION 4 — POSITION MCC-Q

NAMEPLATE DATA

MANUFACTURER GOULD — SERIAL NO. --- — TYPE ITE
CATALOG NO. --- — DRAWING NO. 64321-10 — VOLTAGE CLASS 480
MAIN BUS RATING 600 A — MAIN BUS NEUTRAL RATING N/A A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING --- — NUMBER OF SECTIONS 5 — LISTING ☐ UL ☐ CSA ☐ Other

INSTALLED DEVICES

MAIN BREAKER --- MLO X TYPE --- AMPACITY --- MAIN DISCONNECT --- FUSE TYPE --- SIZE ---
TOTAL POSITIONS EQUIPPED 20 — NO. OF SPARE SPACES 3 — TOTAL POSITIONS USED 11

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Poor	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
SECTION 1 THRU SECTION 5	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	2,120	2,120	2,120		2,120	2,120	2,120			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS: ORDER #84-64321.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: NH / TD / DF Tested By:

Utilities Instrumentation Service, Inc.
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FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 192
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/20/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION TERTIARY BUILDING
SUBSTATION 4 — POSITION MCC-Q (01)

NAMEPLATE DATA

MANUFACTURER GOULD — SIZE 600A — TYPE ITE
CATALOG NO. --- — SERIES --- — MAX. VOLTS 480

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Poor	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
1-1 AIR COMPRESSOR 2	TRS ISR	30A	212,440	34,498	256,280	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
1-2 NO NAME	NO FUSE	NO FUSE	3,180		2,090	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
1-3 CE WET WELL GATE S-11-1	FRS-R 15R	15A	3,187	2,475	4,011	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
1-4 E CONTACT TANK GATE S-15-1	TRS ISR	15A	2,386	5,381	3,436	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
1-5 W CONTACT TANK GATE S-19-1	NO FUSE	NO FUSE	3,369	2,717	5,086	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
2-1 FLOOR DRAIN SUMP PUMP NO. 2	TRS ISR	15A	25,460	23,646	28,646	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
2-2 SECONDARY EFF-4 PUMP 4	TRS 300R	300A				2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
3-1 NO NAME	NO FUSE	NO FUSE	7,593	1,328	3,560	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
3-2 WASH WATER PUMP 4	TRS 60R	60A	1,129	35,000	1,294	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: 1-2 NO NAME PHASE B: NO B-PHASE CONDUCTOR FROM BUS TO DISC.
2-2 SECONDARY EFF-4 PUMP 4: LOTO APPLIED, UNABLE TO OPERATE.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: NH / TD / DF Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
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FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 193

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/20/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION TERTIARY BUILDING

SUBSTATION 4 — POSITION MCC-Q (02)

NAMEPLATE DATA

MANUFACTURER GOULD — SIZE 600A — TYPE ITE

CATALOG NO. --- — SERIES --- — MAX. VOLTS 480

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Poor	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Dirty	C/L
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06

INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
3-3A FPP-A	FRS R20	20A	2,583	4,645	3,016	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
3-3B MOD VALVES 1, 3, 5, 7	FRS R30	30A	2,126	2,046	1,980	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
3-4 UNDER DRAIN SUMP NO. 2	TRS 20R	20A	71,205	63,885	15,924	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
4-1A HEATING BOOSTER PUMP	FRS-R 20	20A	3,012	2,385	2,854	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
4-1B AIR WASH MOD VALVE	FRS-R 20	20A	2,125	2,117	2,446	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
5-1 MAKE UP UNIT HV-2	TRS 20R	20A	2,214	2,273	2,615	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
5-2 HOIST	TRS 20R	20A	2,885	3,515	17,232	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
5-3 ROOF FAN II	TRS 20R	20A	2,183	2,957	23,112	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: FPP-A NO B-PHASE FUSE.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: NH / TD / DF — Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 194
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/20/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION TERTIARY BUILDING
SUBSTATION 4 — POSITION MCC-Q (03)

NAMEPLATE DATA

MANUFACTURER GOULD — SIZE 600A — TYPE ITE
CATALOG NO. --- — SERIES --- — MAX. VOLTS 480

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Poor	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
5-4 NO NAME	FRS-R 60	60A	1,258	5,329	2,095	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
5-5 LR-Q	NO FUSE	NO FUSE	1,700.1	2,017	1,768	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: NH / TD / DF Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan (734) 424-1200
Centerville, Ohio (937) 439-9660

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 195

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/20/2020 — TEMPERATURE 60 °F — HUMIDITY 60 % — EQPT. LOCATION TERTIARY FILTER BUILDING

SUBSTATION 4 — POSITION MCC-Q FB-2

MANUFACTURER	GOULD / ITE	SN / SO NO.	53325E-26-01364	FRAME SIZE(F)	800
BREAKER TYPE	K	SENSOR TAPS	250/400/600	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	TYPE SS	CATALOG NO.	609902-T002	ZONE INTLK ☐	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C/L
OVERCURRENT DEV. BATTERY	☐	N/A	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C/L
AUXILIARY DEVICES	☑	Acceptable	C/L
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	600	LONG TIME PU	1	x	600	A =	600	A	DELAY	INT		
SENSOR TAP	600	SHORT TIME PU	4	=	2400	A			DELAY	INT	I²T	○ IN ○ OUT ● N/A
GRD. FLT.	○ 3W ○ 4W	INST. PU	12	=	7200	A	● ON ○ OFF					
		GRD. FLT. PU	---	=	---	A	○ ON ○ OFF		DELAY	---	I²T	○ IN ○ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	600	LONG TIME PU	1	x	600	A =	600	A	DELAY	INT		
SENSOR TAP	600	SHORT TIME PU	4	=	2400	A			DELAY	INT	I²T	○ IN ○ OUT ● N/A
GRD. FLT.	○ 3W ○ 4W	INST. PU	12	=	7200	A	● ON ○ OFF					
		GRD. FLT. PU	---	=	---	A	○ ON ○ OFF		DELAY	---	I²T	○ IN ○ OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	7200	300%	---	<0.06	0.045	0.045	0.058	0.058	0.043	0.043
	IPU									
SHORT TIME	3600	300%	0.20	0.32	0.261	0.261	0.276	0.276	0.266	0.266
	STPU									
LONG TIME	1800	300%	20.00	40.00	24.55	24.55	22.38	22.38	23.68	23.68
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	---	---	---	---	---	---	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.848

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
POLE TO FRAME	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
LINE TO LOAD	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☑ MICRO-OHMS ☐ MILLI-OHMS

POLE 1	POLE 2	POLE 3
128.6	130.1	116.6

COMMENTS: BUFFER BUSHINGS SHOULD BE REPLACED.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1570, PI (3 PIECE)

Tested By: E. TAPPAN Tested By: J. KIRCHNER

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER DIELECTRIC ABSORPTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 196

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/21/2020 — TEMPERATURE 60 °F — HUMIDITY 40 % — EQPT. LOCATION TERTIARY BUILDING

SUBSTATION 4 — POSITION PT-UV-2A

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. ---

SPECIFICATION NO. 158685 — KVA 150 / / — TYPE K — CLASS ANN

PHASE 3 — TEMPERATURE RISE 150 °C °C — IMPEDANCE 4.1 % — B.I.L. RATING --- kV PRI. --- kV SEC.

COOLANT AIR — CAPACITY --- GALLONS — TOTAL WEIGHT 1100

WINDING POLARITY SUBTRACTIVE — WINDING MATERIAL CU/AL — K FACTOR ---

PRIMARY VOLTAGE 480 — (●) DELTA ( ) WYE — RATED CURRENT 180 / / AMPERES

SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 180 / / AMPERES

TAP VOLTAGES 504 | 492 | 480 | 468 | 456

TAP CONNECTIONS 1 | 2 | 3 | 4 | 5

TAP SETTING 3 — 480 VOLTS — # FANS --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE ☑

TEST VOLTAGE:

PRIMARY TO SECONDARY	1 kVdc	TEST VOLTAGE MULTIPLIER, K1	1	K2=(TCF) (K1)
PRIMARY TO GROUND	1 kVdc	TEST VOLTAGE MULTIPLIER, K1	1	
SECONDARY TO GROUND	1 kVdc	TEST VOLTAGE MULTIPLIER, K1	1	

CORE/COIL TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF — DRY 0.848 — LIQUID 0.800

MINUTES	PRIMARY TO SECONDARY GROUND GUARDED				PRIMARY TO GROUND SECONDARY GUARDED				SECONDARY TO GROUND PRIMARY GUARDED			
	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C
0.25	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0
0.50	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0
0.75	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0
1.00	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0
1.25	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0
1.50	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0
1.75	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0
2.00	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0
3.00	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0
4.00												
5.00												
6.00												
7.00												
8.00												
9.00												
10.00												
POLARIZATION INDEX												

POLARIZATON INDEX = 10 MINUTE RDG. / 1 MINUTE RDG.

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480

Tested By: D. FLEMING Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER TURNS RATIO TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 197

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/21/2020 — TEMPERATURE 60 °F — HUMIDITY 40 % — EQPT. LOCATION TERTIARY BUILDING

SUBSTATION 4 — POSITION PT-UV-2A

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. ---

SPECIFICATION NO. 158685 — kVA 150 / / — TYPE K — CLASS ANN

PHASE 3 — TEMPERATURE RISE 150 °C / °C — IMPEDANCE 4.1 % — B.I.L. RATING --- kV PRI. --- kV SEC.

COOLANT AIR — CAPACITY --- / GALLONS — TOTAL WEIGHT 1100

WINDING POLARITY SUBTRACTIVE — WINDING MATERIAL CU/AL — K FACTOR ---

PRIMARY VOLTAGE 480 — (●) DELTA ( ) WYE — RATED CURRENT 180 / / AMPERES

SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 180 / / AMPERES

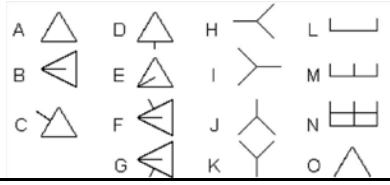
TAP VOLTAGES	504	492	480	468	456			
TAP CONNECTIONS	1	2	3	4	5			

TAP SETTING 3 — 480 VOLTS — # FANS --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE [☑]

TRANSFORMER TURNS RATIO TESTS

TAP NUMBER		WINDING VOLTAGES	CALCULATED RATIO	MEASURED RATIO		
				H_1H_3/X_1X_3	H_2H_1/X_2X_1	H_3H_2/X_3X_2
1	1	504 / 277	1.8195			
2	2	492 / 277	1.7762			
3	3	480 / 277	1.7329	1.0046	1.1638	0.9676
4	4	468 / 277	1.6895			
5	5	456 / 277	1.6462			
6		/				
7		/				
8		/				

VECTOR DIAGRAM



PRI. VECTOR: E

SEC. VECTOR: H

CORRECTION FACTOR FOR UNACCESSIBLE NEUTRAL

PHASE TESTED	BLACK	RED	BLACK	RED	JUMPER	READING MULTIPLIER	TEST SHEET DESIGNATION
DELTA-WYE							
A	H1	H3	X1	X2	H2H3	1.547	H1-H3 X1-X2
B	H2	H1	X2	X3	H1H3	1.547	H2-H3 X2-X3
C	H3	H2	X3	X1	H1H2	1.547	H3-H2 X3-X1
WYE-DELTA							
A	H1	H3	X1	X2	X2X3	1.5000	H1-H3 X1-X2
B	H2	H1	X2	X3	X1X3	1.5000	H2-H1 X2-X3
C	H3	H2	X3	X1	X1X2	1.5000	H3-H2 X3-X1

COMMENTS: POST-ENERGIZED VOLTAGE CHECK: A-B=496, B-C=497, C-A=496, A-G=284.1, B-G=285.5, C-G=284.7.

DEFICIENCIES:

[☑] ACCEPTABLE [☐] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: RAYTECH TTR #177319, FLUKE #156396

Tested By: D. FLEMING — Tested By: _____

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER DIELECTRIC ABSORPTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 198
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/21/2020 — TEMPERATURE 60 °F — HUMIDITY 40 % — EQPT. LOCATION TERTIARY BUILDING
SUBSTATION 4 — POSITION PT-UV-2B

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. ---
SPECIFICATION NO. 158684 — KVA 150 / / — TYPE K — CLASS ANN
PHASE 3 — TEMPERATURE RISE 150 °C °C — IMPEDANCE 5.1 % — B.I.L. RATING --- kV PRI. --- kV SEC.
COOLANT AIR — CAPACITY --- GALLONS — TOTAL WEIGHT 1150
WINDING POLARITY SUBTRACTIVE — WINDING MATERIAL CU/AL — K FACTOR ---
PRIMARY VOLTAGE 480 — (●) DELTA ( ) WYE — RATED CURRENT 180 / / AMPERES
SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 180 / / AMPERES

TAP VOLTAGES	504	492	480	468	456			
TAP CONNECTIONS	1	2	3	4	5			

TAP SETTING 3 480 VOLTS — # FANS --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE ☑

TEST VOLTAGE:
PRIMARY TO SECONDARY 1 kVdc — TEST VOLTAGE MULTIPLIER, K1 1 — K2=(TCF) (K1)
PRIMARY TO GROUND 1 kVdc — TEST VOLTAGE MULTIPLIER, K1 1
SECONDARY TO GROUND 1 kVdc — TEST VOLTAGE MULTIPLIER, K1 1

CORE/COIL TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF — DRY 0.848 — LIQUID 0.800

MINUTES	PRIMARY TO SECONDARY GROUND GUARDED				PRIMARY TO GROUND SECONDARY GUARDED				SECONDARY TO GROUND PRIMARY GUARDED			
	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C
0.25	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0
0.50	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0
0.75	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0
1.00	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0
1.25	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0
1.50	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0
1.75	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0
2.00	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0
3.00	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0	100,000.0	1	0.848	84,800.0
4.00												
5.00												
6.00												
7.00												
8.00												
9.00												
10.00												
POLARIZATION INDEX												

POLARIZATON INDEX = 10 MINUTE RDG. / 1 MINUTE RDG.

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480

Tested By: D. FLEMING Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER TURNS RATIO TEST

NETA ACCREDITED COMPANY

CUSTOMER: Ann Arbor, City of | PAGE: 199
ADDRESS: 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB #: AACI207024-1
USER: Ann Arbor WWTP
OWNER REPRESENTATIVE: Jeremy Holbrook | TELEPHONE:
DATE: 2/21/2020 | TEMPERATURE: 60 °F | HUMIDITY: 40 % | EQPT. LOCATION: TERTIARY BUILDING
SUBSTATION: 4 | POSITION: PT-UV-2B

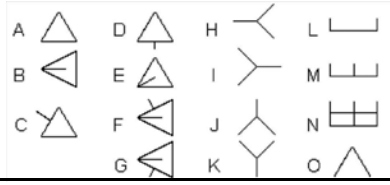
NAMEPLATE DATA

MANUFACTURER: SQUARE D | SERIAL NO.: ---
SPECIFICATION NO.: 158684 | kVA: 150 / / | TYPE: K | CLASS: ANN
PHASE: 3 | TEMPERATURE RISE: 150 °C / °C | IMPEDANCE: 5.1 % | B.I.L. RATING: --- kV PRI. / --- kV SEC.
COOLANT: AIR | CAPACITY: --- GALLONS | TOTAL WEIGHT: 1150
WINDING POLARITY: SUBTRACTIVE | WINDING MATERIAL: CU/AL | K FACTOR: ---
PRIMARY VOLTAGE: 480 | (●) DELTA ( ) WYE | RATED CURRENT: 180 / / AMPERES
SECONDARY VOLTAGE: 480 / 277 | ( ) DELTA (●) WYE | RATED CURRENT: 180 / / AMPERES
TAP VOLTAGES: 504 | 492 | 480 | 468 | 456
TAP CONNECTIONS: 1 | 2 | 3 | 4 | 5
TAP SETTING: 3 | 480 VOLTS | # FANS: --- | TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL | DRY TYPE: ☑

TRANSFORMER TURNS RATIO TESTS

TAP NUMBER		WINDING VOLTAGES	CALCULATED RATIO	MEASURED RATIO		
				H_1H_3/X_1X_3	H_2H_1/X_2X_1	H_3H_2/X_3X_2
1	1	504 / 277	1.8195			
2	2	492 / 277	1.7762			
3	3	480 / 277	1.7329	1.0046	1.0040	1.0046
4	4	468 / 277	1.6895			
5	5	456 / 277	1.6462			
6		/				
7		/				
8		/				

VECTOR DIAGRAM



PRI. VECTOR: E
SEC. VECTOR: H

CORRECTION FACTOR FOR UNACCESSIBLE NEUTRAL

PHASE TESTED	BLACK	RED	BLACK	RED	JUMPER	READING MULTIPLIER	TEST SHEET DESIGNATION
DELTA-WYE							
A	H1	H3	X1	X2	H2H3	1.547	H1-H3 X1-X2
B	H2	H1	X2	X3	H1H3	1.547	H2-H3 X2-X3
C	H3	H2	X3	X1	H1H2	1.547	H3-H2 X3-X1
WYE-DELTA							
A	H1	H3	X1	X2	X2X3	1.5000	H1-H3 X1-X2
B	H2	H1	X2	X3	X1X3	1.5000	H2-H1 X2-X3
C	H3	H2	X3	X1	X1X2	1.5000	H3-H2 X3-X1

COMMENTS: POST ENERGIZED SECONDARY VOLTAGE: A-B=496, B-C=496, C-A=495, A-G=284.3, B-G=285.4, C-G=284.0.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: RAYTECH TTR #177319, FLUKE #156396

Tested By: D. FLEMING Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LIGHTNING ARRESTER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 200
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/20/2020 — TEMPERATURE 70 °F — HUMIDITY 50 % — EQPT. LOCATION TERTIARY ELECTRIC RM
SUBSTATION 4 — POSITION SUB 4 MAIN A LOADBREAK

NAMEPLATE DATA

MANUFACTURER SQUARE D — TYPE HD — MODEL ---
CATALOG NO. 9L20FXX015XHS — SERIAL NO. --- — RELIEF ---
RATED RMS VOLTAGE 15 kV — RATED MCOV 12.7 kV — RMS CURRENT RATING kA — RATED CREST kA
SYSTEM VOLTAGE 13.2 kV — ARRESTER TYPE STATION ○ INTERMEDIATE ○ DISTRIBUTION ◉ — MATERIAL TYPE PORCELAIN ○ POLYMER ◉

INSULATION TEST VOLTAGE 5.00 kV DC — TEST VOLTAGE MULTIPLIER 1
RANGE MULTIPLIER 1.0 — EQUIPMENT TEMPERATURE 18 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.924

INSULATION TEST

POSITION	TOTAL CORRECTION MULTIPLIER	A PHASE TO GROUND		B PHASE TO GROUND		C PHASE TO GROUND	
		ACTUAL MEGOHMS	CORRECTED MEGOHMS	ACTUAL MEGOHMS	CORRECTED MEGOHMS	ACTUAL MEGOHMS	CORRECTED MEGOHMS
SUB 4 MAIN A	0.924	100,000	92,400.00	36,900	34,095.60	100,000	92,400.00

WATT LOSS TEST

TEST kV SWITCH SETTING
OUTPUT TEST VOLTAGE
READING CORRECTION FACTOR

○ GROUNDED SPECIMEN TEST
○ UNGROUNDED SPECIMEN TEST

MILLI-WATT LOSS

POSITION	A PHASE	B PHASE	C PHASE

COMMENTS: Y-PHASE TO GROUND IS SUBSTANTIALLY LOWER THAN THE OTHER TWO, BUT STILL PASSING.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979

Tested By: E. KOEPFGEN Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOADBREAK DISCONNECT TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 201
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 2/21/2020 | TEMPERATURE 70 °F | HUMIDITY 70 % | EQPT. LOCATION TERTIARY ELECTRIC RM
SUBSTATION 4 | POSITION SUB 4 MAIN B

FUSE DATA

MANUFACTURER --- | TYPE --- | HOLDER --- | MAX. AMPS ---
REFILL ELEMENT TYPE --- | SIZE --- | CAT. NO. --- | TCC NO. --- | VOLTAGE --- kV

NAMEPLATE DATA

MANUFACTURER SQUARE D | SERIAL NO. ---
VOLTAGE 15KV | TYPE HVL | AMPERES 600 | INTERRUPTING RATING 600 kA
TYPE OPERATING MECHANISM MANUAL | AGE 5114 | B.I.L. RATING 95 kV
MOMENTARY FAULT CLOSING AMPS 40 kA | OTHER NAMEPLATE DATA PART #44036-325-51

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	NA
INSULATING MEMBERS	☑	Acceptable	NA
MECHANICAL CONNECTION	☑	Acceptable	NA
STRUCTURAL MEMBERS	☑	Acceptable	NA
CUBICLE	☑	Acceptable	NA
AUXILIARY DEVICES	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
MAIN CONTACTS	☑	Acceptable	NA
HEATERS	☐	N/A	NA
BEARINGS	☑	Acceptable	NA
CONTACT SEQUENCE	☑	Acceptable	NA
GROUND CONNECTION	☑	Acceptable	NA

INSULATION TEST VOLTAGE 5 kVdc | TEST VOLTAGE MULTIPLIER, K1 = 1 | K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

INSULATION TESTS

	RANGE MULTIPLIER	K2	POLE 1 (P1-P2) MΩ READING	POLE 1 (P1-P2) MΩ 20°C	POLE 2 (P2-P3) MΩ READING	POLE 2 (P2-P3) MΩ 20°C	POLE 3 (P1-P3) MΩ READING	POLE 3 (P1-P3) MΩ 20°C
POLE TO POLE	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
POLE TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LINE TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LOAD TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LINE TO LOAD	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0

Contacts

		POLE 1	POLE 2	POLE 3
CONTACT RESISTANCE SWITCH & FUSE ☐ MICRO-OHMS ☑ MILLI-OHMS		---	---	---
SWITCH CONTACT		0.068	0.066	0.068
FUSE		---	---	---
HI POT (MICRO AMPS)	38KVDC	78	42	76

COMMENTS: NO FUSES BUS CONNECTIONS

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979, DLRO #1572, HIPOT #156393

Tested By: E. KOEPFGEN Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LIGHTNING ARRESTER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 202
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/21/2020 — TEMPERATURE 70 °F — HUMIDITY 70 % — EQPT. LOCATION TERTIARY
SUBSTATION 4 — POSITION SUB 4 MAIN B

NAMEPLATE DATA

MANUFACTURER GE — TYPE HD DIST — MODEL 1Q14
CATALOG NO. 9L20FXX015XHS — SERIAL NO. --- — RELIEF ---
RATED RMS VOLTAGE 15 kV — RATED MCOV 12.7 kV — RMS CURRENT RATING 0 kA — RATED CREST 0 kA
SYSTEM VOLTAGE 13.2 kV — ARRESTER TYPE STATION ○ INTERMEDIATE ○ DISTRIBUTION ◉ — MATERIAL TYPE PORCELAIN ○ POLYMER ◉

INSULATION TEST VOLTAGE 5.00 kV DC — TEST VOLTAGE MULTIPLIER 1
RANGE MULTIPLIER 1.0 — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION TEST

POSITION	TOTAL CORRECTION MULTIPLIER	A PHASE TO GROUND		B PHASE TO GROUND		C PHASE TO GROUND	
		ACTUAL MEGOHMS	CORRECTED MEGOHMS	ACTUAL MEGOHMS	CORRECTED MEGOHMS	ACTUAL MEGOHMS	CORRECTED MEGOHMS
SUB 4 MAIN B	1.05	33,800	35,490.00	100,000	105,000.0	100,000	105,000.0

WATT LOSS TEST

TEST kV SWITCH SETTING
OUTPUT TEST VOLTAGE
READING CORRECTION FACTOR

○ GROUNDED SPECIMEN TEST
○ UNGROUNDED SPECIMEN TEST

MILLI-WATT LOSS

POSITION	A PHASE	B PHASE	C PHASE

COMMENTS: A-PHASE IS MUCH LOWER THAN B & C PHASES, BUT STILL PASSING.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979

Tested By: N. HERRST Tested By: E. KOEPFGEN

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER DIELECTRIC ABSORPTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 203

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/21/2020 — TEMPERATURE 70 °F — HUMIDITY 70 % — EQPT. LOCATION TERTIARY

SUBSTATION 4 — POSITION SUB 4 TRANSFORMER 2

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-022-01

SPECIFICATION NO. -- — KVA 750 / / — TYPE VPI — CLASS AA

PHASE 3 — TEMPERATURE RISE 115 °C °C — IMPEDANCE 5.77 % — B.I.L. RATING 95 kV PRI. 10 kV SEC.

COOLANT AIR — CAPACITY --- GALLONS — TOTAL WEIGHT 7000

WINDING POLARITY --- — WINDING MATERIAL CU — K FACTOR ---

PRIMARY VOLTAGE 13,200 — (●) DELTA ( ) WYE — RATED CURRENT 33 / / AMPERES

SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 902 / / AMPERES

TAP VOLTAGES	13,860	13,530	13,200	12,870	12,540			
TAP CONNECTIONS	E-F	D-F	E-G	D-G	C-G			

TAP SETTING E-G 13,200 VOLTS — # FANS --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE [☑]

TEST VOLTAGE:

PRIMARY TO SECONDARY	5	kVdc	TEST VOLTAGE MULTIPLIER, K1	1	K2=(TCF) (K1)
PRIMARY TO GROUND	5	kVdc	TEST VOLTAGE MULTIPLIER, K1	1	
SECONDARY TO GROUND	1	kVdc	TEST VOLTAGE MULTIPLIER, K1	1	

CORE/COIL TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF — DRY 1.05 — LIQUID 1.080

MINUTES	PRIMARY TO SECONDARY GROUND GUARDED				PRIMARY TO GROUND SECONDARY GUARDED				SECONDARY TO GROUND PRIMARY GUARDED			
	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C
0.25	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	51,400.00	1	1.05	53,970.0
0.50	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	69,100.00	1	1.05	72,555.0
0.75	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	95,300.00	1	1.05	100,065.0
1.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	112,000.0	1	1.05	117,600.0
1.25	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
1.50	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
1.75	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
2.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
3.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
4.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
5.00												
6.00												
7.00												
8.00												
9.00												
10.00												
POLARIZATION INDEX												

POLARIZATON INDEX = 10 MINUTE RDG. / 1 MINUTE RDG.

COMMENTS:

DEFICIENCIES:

[☑] ACCEPTABLE [☐] NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979

Tested By: E. KOEPFGEN Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER INSPECTION

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 204

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE

DATE 2/21/2020 | TEMPERATURE 70 °F | HUMIDITY 70 % | EQPT. LOCATION TERTIARY

SUBSTATION 4 | POSITION SUB 4 TRANSFORMER 2

NAMEPLATE DATA

MANUFACTURER SQUARE D | SERIAL NO. 30951271-022-01

SPECIFICATION NO. -- | kVA 750 / / | TYPE VPI | CLASS AA

PHASE 3 | TEMPERATURE RISE 115 °C / °C | IMPEDANCE 5.77 % | B.I.L. RATING 95 kV PRI. / 10 kV SEC.

COOLANT AIR | CAPACITY --- GALLONS | TOTAL WEIGHT 7000

WINDING POLARITY --- | WINDING MATERIAL CU | K FACTOR ---

PRIMARY VOLTAGE 13,200 | (●) DELTA ( ) WYE | RATED CURRENT 33 / / AMPERES

SECONDARY VOLTAGE 480 / 277 | ( ) DELTA (●) WYE | RATED CURRENT 902 / / AMPERES

TAP VOLTAGES	13,860	13,530	13,200	12,870	12,540			
TAP CONNECTIONS	E-F	D-F	E-G	D-G	C-G			

TAP SETTING E-G 13,200 VOLTS | # FANS --- | TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL | DRY TYPE [x]

GAUGES:

COOLANT TEMPERATURE --- °C | MAXIMUM TEMPERATURE --- °C | RESET TEMPERATURE GAUGE [ ]

COOLANT LEVEL --- | PRESSURE VACUUM --- # | LCR COUNTER ---

OTHER GAUGES ---

VISUAL INSPECTION:

BUSHINGS ACC | SUPPORT INSULATORS ACC | CONNECTIONS ACC

PAINT NEW | RADIATORS --- | FANS ---

NO-LOAD TAP CHANGER --- | LEAKS ---

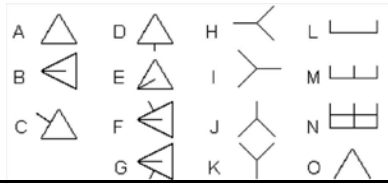
MAIN TANK DIELECTRIC SAMPLE SYRINGE # | BOTTLE #

LTC DIELECTRIC SAMPLE SYRINGE # | BOTTLE #

GROUND CONDUCTOR SIZE 4/0 AWG/kcm | NO. OF GROUND CONDUCTORS 1 | GROUND CONDUCTOR CONDITION ACC

ADDITIONAL EQUIPMENT

VECTOR DIAGRAM



PRI. VECTOR: E

SEC. VECTOR: H

POST TEST VOLTAGES

NO LOAD SECONDARY VOLTAGE			
X1 - X2	V	X0 - G	V
X1 - X3	V	X0 - X1	V
X2 - X3	V	X0 - X2	V
		X0 - X3	V

COMMENTS:

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: E. KOEPFGEN Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER TURNS RATIO TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 205

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/21/2020 — TEMPERATURE 70 °F — HUMIDITY 70 % — EQPT. LOCATION TERTIARY

SUBSTATION 4 — POSITION SUB 4 TRANSFORMER 2

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-022-01

SPECIFICATION NO. -- — KVA 750 / / — TYPE VPI — CLASS AA

PHASE 3 — TEMPERATURE RISE 115 °C °C — IMPEDANCE 5.77 % — B.I.L. RATING 95 kV PRI. 10 kV SEC.

COOLANT AIR — CAPACITY --- GALLONS — TOTAL WEIGHT 7000

WINDING POLARITY --- — WINDING MATERIAL CU — K FACTOR ---

PRIMARY VOLTAGE 13,200 — (●) DELTA ( ) WYE — RATED CURRENT 33 / / AMPERES

SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 902 / / AMPERES

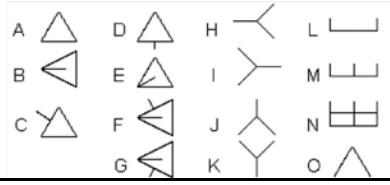
TAP VOLTAGES	13,860	13,530	13,200	12,870	12,540			
TAP CONNECTIONS	E-F	D-F	E-G	D-G	C-G			

TAP SETTING E-G 13,200 VOLTS — # FANS --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE [☑]

TRANSFORMER TURNS RATIO TESTS

TAP NUMBER		WINDING VOLTAGES	CALCULATED RATIO	MEASURED RATIO		
				H_1H_3/X_1X_0	H_2H_1/X_2X_0	H_3H_2/X_3X_0
1	E-F	13,860 / 277	50.0361			
2	D-F	13,530 / 277	48.8448			
3	E-G	13,200 / 277	47.6534	47.6950	47.7150	47.7040
4	D-G	12,870 / 277	46.4621			
5	C-G	12,540 / 277	45.2708			
6		/				
7		/				
8		/				

VECTOR DIAGRAM



PRI. VECTOR: E

SEC. VECTOR: H

CORRECTION FACTOR FOR UNACCESSIBLE NEUTRAL

PHASE TESTED	BLACK	RED	BLACK	RED	JUMPER	READING MULTIPLIER	TEST SHEET DESIGNATION
DELTA-WYE							
A	H1	H3	X1	X2	H2H3	1.547	H1-H3 X1-X2
B	H2	H1	X2	X3	H1H3	1.547	H2-H3 X2-X3
C	H3	H2	X3	X1	H1H2	1.547	H3-H2 X3-X1
WYE-DELTA							
A	H1	H3	X1	X2	X2X3	1.5000	H1-H3 X1-X2
B	H2	H1	X2	X3	X1X3	1.5000	H2-H1 X2-X3
C	H3	H2	X3	X1	X1X2	1.5000	H3-H2 X3-X1

COMMENTS:

DEFICIENCIES:

[☑] ACCEPTABLE [☐] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: TTR20 #184970

Tested By: E. KOEPFGEN Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE SWITCHBOARD INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 206
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/20/2020 — TEMPERATURE 70 °F — HUMIDITY 50 % — EQPT. LOCATION TERTIARY BUILDING
SUBSTATION 4 — POSITION SUB 4A & SUB 4B

NAMEPLATE DATA

MANUFACTURER GOULD — SERIAL NO. --- — TYPE ITE
CATALOG NO. --- — DRAWING NO. --- — VOLTAGE CLASS 480
PHASE AMPACITY --- A — WITHSTAND RATING --- kA — CONDUCTOR ☐ Cu ☐ Al

INSTALLED DEVICES

DRAWOUT LVACB 10 — BOLT-IN LVACB --- — DRAWOUT MCCB --- — BOLT-IN MCCB ---
BOLTED PRESSURE SWITCHES --- — FUSED DISCONNECTS --- — PROTECTIVE RELAYS 4 — PANEL METERS 6
kWh METERS 2 — VT's 6 — CT's 6 — CPT's 2
Other ---

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
MAIN 4A TO TIE	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	2,120	2,120	2,120		2,120	2,120	2,120			
MAIN 4B TO TIE	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	2,120	2,120	2,120		2,120	2,120	2,120			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS: NAMEPLATE NOT AVAILABLE. MAIN 4B TO TIE: NEEDS XFMR A-B PHASE REMOVED FROM BUS IN REAR CUBICLES, ALL FUSES FROM METERING CUBICLE & CT CUBICLE TO MEGGER THESE BUSES.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979

Tested By: T. DODGE Tested By: E. KOEPFGEN

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

SWITCHBOARD BUS CONNECTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 207
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/20/2020 — TEMPERATURE 70 °F — HUMIDITY 50 % — EQPT. LOCATION TERTIARY BUILDING
SUBSTATION 4 — POSITION SUB 4A & SUB 4B

NAMEPLATE DATA

MANUFACTURER GOULD — SERIAL NO. --- — TYPE ITE
CATALOG NO. --- — DRAWING NO. --- — VOLTAGE CLASS 480
PHASE AMPACITY --- A — WITHSTAND RATING --- kA — CONDUCTOR (•) CU ( ) AL

BUS SECTION TESTED		RESISTANCE IN ☑ MICRO-OHMS ☐ MILLI-OHMS					BUS SECTION TESTED		RESISTANCE IN ☐ MICRO-OHMS ☐ MILLI-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
MAIN 4A	TIE	95	112	126		95							
TIE	MAIN 4B	59.9	71.4	72.9		412.9							

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: DLRO #1572

Tested By: D. FLEMING Tested By: E. KOEPFGEN

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER DIELECTRIC ABSORPTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 208
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/20/2020 — TEMPERATURE 70 °F — HUMIDITY 50 % — EQPT. LOCATION TERTIARY BLD 2ND FLR ELEC RM
SUBSTATION 4 — POSITION TRANSFORMER 1

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-020-01-1
SPECIFICATION NO. --- — KVA 750 / / — TYPE VPI — CLASS AA
PHASE 3 — TEMPERATURE RISE 115 °C °C — IMPEDANCE 5.82 % — B.I.L. RATING 95 kV PRI. 10 kV SEC.
COOLANT AIR — CAPACITY --- GALLONS — TOTAL WEIGHT 7000
WINDING POLARITY SUBTRACTIVE — WINDING MATERIAL CU/CU — K FACTOR ---
PRIMARY VOLTAGE 13,200 — (●) DELTA ( ) WYE — RATED CURRENT 33 / / AMPERES
SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 902 / / AMPERES
TAP VOLTAGES 13,860 | 13,530 | 13,200 | 12,870 | 12,540
TAP CONNECTIONS E-F | D-F | E-G | D-G | C-G
TAP SETTING E-G 13,200 VOLTS — # FANS --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE ☑

TEST VOLTAGE:
PRIMARY TO SECONDARY 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 1 — K2=(TCF) (K1)
PRIMARY TO GROUND 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 1
SECONDARY TO GROUND 1 kVdc — TEST VOLTAGE MULTIPLIER, K1 1

CORE/COIL TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF — DRY 1.05 — LIQUID 1.080

MINUTES	PRIMARY TO SECONDARY GROUND GUARDED				PRIMARY TO GROUND SECONDARY GUARDED				SECONDARY TO GROUND PRIMARY GUARDED			
	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C
0.25	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
0.50	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
0.75	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
1.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
1.25	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
1.50	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
1.75	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
2.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
3.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
4.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
5.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
6.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
7.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
8.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
9.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
10.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
POLARIZATION INDEX	1.00				1.00				1.00			

POLARIZATON INDEX = 10 MINUTE RDG. / 1 MINUTE RDG.

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979

Tested By: D. FLEMING Tested By: E. KOEPFGEN

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER INSPECTION

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 209
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 2/20/2020 | TEMPERATURE 70 °F | HUMIDITY 50 % | EQPT. LOCATION 4
SUBSTATION 4 | POSITION TRANSFORMER 1

NAMEPLATE DATA

MANUFACTURER SQUARE D | SERIAL NO. 30951271-020-01-1
SPECIFICATION NO. --- | kVA 750 / / | TYPE VPI | CLASS AA
PHASE 3 | TEMPERATURE RISE 115 °C °C | IMPEDANCE 5.82 % | B.I.L. RATING 95 kV PRI. 10 kV SEC.
COOLANT AIR | CAPACITY --- GALLONS | TOTAL WEIGHT 7000
WINDING POLARITY SUBTRACTIVE | WINDING MATERIAL CU/CU | K FACTOR ---
PRIMARY VOLTAGE 13,200 | (●) DELTA ( ) WYE | RATED CURRENT 33 / / AMPERES
SECONDARY VOLTAGE 480 / 277 | ( ) DELTA (●) WYE | RATED CURRENT 902 / / AMPERES

TAP VOLTAGES	13,860	13,530	13,200	12,870	12,540			
TAP CONNECTIONS	E-F	D-F	E-G	D-G	C-G			

TAP SETTING E-G 13,200 VOLTS | # FANS --- | TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL | DRY TYPE [x]

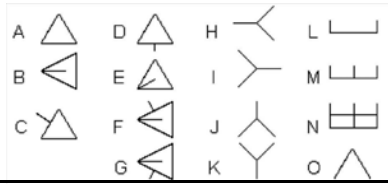
GAUGES:

COOLANT TEMPERATURE --- °C | MAXIMUM TEMPERATURE --- °C | RESET TEMPERATURE GAUGE [ ]
COOLANT LEVEL --- | PRESSURE VACUUM --- # | LCR COUNTER ---
OTHER GAUGES ---

VISUAL INSPECTION:

BUSHINGS ACCEPTABLE | SUPPORT INSULATORS ACCEPTABLE | CONNECTIONS ACCEPTABLE
PAINT ACCEPTABLE | RADIATORS --- | FANS ---
NO-LOAD TAP CHANGER --- | LEAKS ---
MAIN TANK DIELECTRIC SAMPLE SYRINGE # | BOTTLE #
LTC DIELECTRIC SAMPLE SYRINGE # | BOTTLE #
GROUND CONDUCTOR SIZE 4/0 AWG/kcm | NO. OF GROUND CONDUCTORS 1 | GROUND CONDUCTOR CONDITION ACC
ADDITIONAL EQUIPMENT

VECTOR DIAGRAM



PRI. VECTOR: E
SEC. VECTOR: H

POST TEST VOLTAGES

NO LOAD SECONDARY VOLTAGE			
X1 - X2	V	X0 - G	V
X1 - X3	V	X0 - X1	V
X2 - X3	V	X0 - X2	V
		X0 - X3	V

COMMENTS:
DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: D. FLEMING Tested By: E. KOEPFGEN

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER TURNS RATIO TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 210
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/20/2020 — TEMPERATURE 70 °F — HUMIDITY 50 % — EQPT. LOCATION TERTIARY BLD 2ND FLR ELEC RM
SUBSTATION 4 — POSITION TRANSFORMER 1

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-020-01-1
SPECIFICATION NO. --- — KVA 750 / / — TYPE VPI — CLASS AA
PHASE 3 — TEMPERATURE RISE 115 °C °C — IMPEDANCE 5.82 % — B.I.L. RATING 95 kV PRI. 10 kV SEC.
COOLANT AIR — CAPACITY --- GALLONS — TOTAL WEIGHT 7000
WINDING POLARITY SUBTRACTIVE — WINDING MATERIAL CU/CU — K FACTOR ---
PRIMARY VOLTAGE 13,200 — (●) DELTA ( ) WYE — RATED CURRENT 33 / / AMPERES
SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 902 / / AMPERES

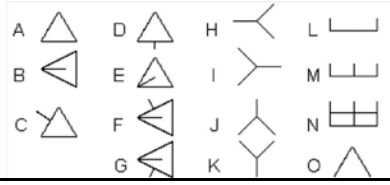
TAP VOLTAGES	13,860	13,530	13,200	12,870	12,540		
TAP CONNECTIONS	E-F	D-F	E-G	D-G	C-G		

TAP SETTING E-G 13,200 VOLTS — # FANS --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE [☑]

TRANSFORMER TURNS RATIO TESTS

TAP NUMBER		WINDING VOLTAGES	CALCULATED RATIO	MEASURED RATIO		
				H_3H_1/X_0X_1	H_1H_2/X_0X_2	H_2H_3/X_0X_3
1	E-F	13,860 / 277	50.0361			
2	D-F	13,530 / 277	48.8448			
3	E-G	13,200 / 277	47.6534	47.7390	47.7480	47.7580
4	D-G	12,870 / 277	46.4621			
5	C-G	12,540 / 277	45.2708			
6		/				
7		/				
8		/				

VECTOR DIAGRAM



PRI. VECTOR: A
SEC. VECTOR: H

CORRECTION FACTOR FOR UNACCESSIBLE NEUTRAL

PHASE TESTED	BLACK	RED	BLACK	RED	JUMPER	READING MULTIPLIER	TEST SHEET DESIGNATION
DELTA-WYE							
A	H1	H3	X1	X2	H2H3	1.547	H1-H3 X1-X2
B	H2	H1	X2	X3	H1H3	1.547	H2-H3 X2-X3
C	H3	H2	X3	X1	H1H2	1.547	H3-H2 X3-X1
WYE-DELTA							
A	H1	H3	X1	X2	X2X3	1.5000	H1-H3 X1-X2
B	H2	H1	X2	X3	X1X3	1.5000	H2-H1 X2-X3
C	H3	H2	X3	X1	X1X2	1.5000	H3-H2 X3-X1

COMMENTS:

DEFICIENCIES:

[☑] ACCEPTABLE [☐] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: TTR20 #184970

Tested By: E. KOEPFGEN Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOADBREAK DISCONNECT TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 211
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 2/28/2020 | TEMPERATURE 50 °F | HUMIDITY 30 % | EQPT. LOCATION SOLIDS BLDG ELEC RM
SUBSTATION 5 | POSITION 52-4 BUS A

FUSE DATA

MANUFACTURER EATON | TYPE 15RBA4-INH | HOLDER RBA-400 | MAX. AMPS 400
REFILL ELEMENT TYPE --- | SIZE 400 | CAT. NO. 5981C53G02 | TCC NO. --- | VOLTAGE 13.2 kV

NAMEPLATE DATA

MANUFACTURER EATON | SERIAL NO. ---
VOLTAGE 15KV | TYPE MVS 2 | AMPERES 1200 | INTERRUPTING RATING 61 kA
TYPE OPERATING MECHANISM MANUAL | AGE 10/09 | B.I.L. RATING 95 kV
MOMENTARY FAULT CLOSING AMPS 61 kA | OTHER NAMEPLATE DATA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Dirty	NA
INSULATING MEMBERS	☑	Dirty	NA
MECHANICAL CONNECTION	☑	Dirty	NA
STRUCTURAL MEMBERS	☑	Dirty	NA
CUBICLE	☑	Dirty	NA
AUXILIARY DEVICES	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
MAIN CONTACTS	☑	Dirty	NA
HEATERS	☐	N/A	NA
BEARINGS	☑	Acceptable	NA
CONTACT SEQUENCE	☑	Acceptable	NA
GROUND CONNECTION	☑	Acceptable	NA

INSULATION TEST VOLTAGE 5 kVdc | TEST VOLTAGE MULTIPLIER, K1 = 1 | K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

INSULATION TESTS

	RANGE MULTIPLIER	K2	POLE 1 (P1-P2) MΩ READING	POLE 1 (P1-P2) MΩ 20°C	POLE 2 (P2-P3) MΩ READING	POLE 2 (P2-P3) MΩ 20°C	POLE 3 (P1-P3) MΩ READING	POLE 3 (P1-P3) MΩ 20°C
POLE TO POLE	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
POLE TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LINE TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LOAD TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LINE TO LOAD	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0

Contacts

		POLE 1	POLE 2	POLE 3
CONTACT RESISTANCE SWITCH & FUSE ☑ MICRO-OHMS ☐ MILLI-OHMS		667.8	673.9	795.9
SWITCH CONTACT		0.010	0.009	0.017
FUSE		611	634	721
HI POT (MICRO AMPS)	37KV	11	0.12	3.8

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979, DLRO #UIS1570, HIPOT #191469

Tested By: E. TAPPAN Tested By: E. KOEPFGEN

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LIGHTNING ARRESTER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 212
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/28/2020 — TEMPERATURE 70 °F — HUMIDITY 70 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION 52-4 BUS A

NAMEPLATE DATA

MANUFACTURER ABB — TYPE --- — MODEL ---
CATALOG NO. D012SA010ADAA0 — SERIAL NO. 11215288 — RELIEF ---
RATED RMS VOLTAGE 12.5 kV — RATED MCOV 10.2 kV — RMS CURRENT RATING kA — RATED CREST kA
SYSTEM VOLTAGE 13.2 kV — ARRESTER TYPE STATION ○ INTERMEDIATE ○ DISTRIBUTION ◉ — MATERIAL TYPE PORCELAIN ○ POLYMER ◉

INSULATION TEST VOLTAGE 5.00 kV DC — TEST VOLTAGE MULTIPLIER 1
RANGE MULTIPLIER 1.0 — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION TEST

POSITION	TOTAL CORRECTION MULTIPLIER	A PHASE TO GROUND		B PHASE TO GROUND		C PHASE TO GROUND	
		ACTUAL MEGOHMS	CORRECTED MEGOHMS	ACTUAL MEGOHMS	CORRECTED MEGOHMS	ACTUAL MEGOHMS	CORRECTED MEGOHMS
52-4 BUS A	1.05	100,000	105,000.0	100,000	105,000.0	100,000	105,000.0

WATT LOSS TEST

TEST kV SWITCH SETTING
OUTPUT TEST VOLTAGE
READING CORRECTION FACTOR

○ GROUNDED SPECIMEN TEST
○ UNGROUNDED SPECIMEN TEST

MILLI-WATT LOSS

POSITION	A PHASE	B PHASE	C PHASE

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979

Tested By: E. KOEPFGEN Tested By: E. TAPPAN

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER DIELECTRIC ABSORPTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 213

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/28/2020 — TEMPERATURE 70 °F — HUMIDITY 70 % — EQPT. LOCATION SOLIDS BUILDING

SUBSTATION 5 — POSITION 52-4 BUS A TRANSFORMER

NAMEPLATE DATA

MANUFACTURER CUTLER HAMMER — SERIAL NO. D584963001

SPECIFICATION NO. MDT03545 — KVA 2,000 / 2,200 / 2,933 — TYPE CAST — CLASS AA/AA/FA

PHASE 3 — TEMPERATURE RISE °C °C — IMPEDANCE 5.83 % — B.I.L. RATING 60X95 kV PRI. 30 kV SEC.

COOLANT AIR/FAN — CAPACITY --- --- — TOTAL WEIGHT 11700

WINDING POLARITY --- — WINDING MATERIAL CU — K FACTOR ---

PRIMARY VOLTAGE — (●) DELTA ( ) WYE — RATED CURRENT 87 / 96 / 128 AMPERES

SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 2,406 / 2,646 / 3,528 AMPERES

TAP VOLTAGES	13,860	13,530	13,200	12,870	12,540			
TAP CONNECTIONS	C-D&G-L&M-N	C-D&F-K&M-N	C-D&F-L&M-N	C-D&F-L&M-N	C-D&E-L&M-N			

TAP SETTING C-D&G-L&M-N 13,200 VOLTS — # FANS 12 — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE [x]

TEST VOLTAGE:

PRIMARY TO SECONDARY	5 kVdc	TEST VOLTAGE MULTIPLIER, K1	1	K2=(TCF) (K1)
PRIMARY TO GROUND	5 kVdc	TEST VOLTAGE MULTIPLIER, K1	1	
SECONDARY TO GROUND	1 kVdc	TEST VOLTAGE MULTIPLIER, K1	1	

CORE/COIL TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF — DRY 1.05 — LIQUID 1.080

MINUTES	PRIMARY TO SECONDARY GROUND GUARDED				PRIMARY TO GROUND SECONDARY GUARDED				SECONDARY TO GROUND PRIMARY GUARDED			
	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C
0.25	66,100.00	1	1.05	69,405.0	100,000.0	1	1.05	105,000.0	51,100.00	1	1.05	53,655.0
0.50	68,400.00	1	1.05	71,820.0	100,000.0	1	1.05	105,000.0	72,700.00	1	1.05	76,335.0
0.75	70,000.00	1	1.05	73,500.0	100,000.0	1	1.05	105,000.0	51,300.00	1	1.05	53,865.0
1.00	73,800.00	1	1.05	77,490.0	100,000.0	1	1.05	105,000.0	93,300.00	1	1.05	97,965.0
1.25	74,100.00	1	1.05	77,805.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
1.50	79,900.00	1	1.05	83,895.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
1.75	78,400.00	1	1.05	82,320.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
2.00	78,900.00	1	1.05	82,845.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
3.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
4.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
5.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
6.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
7.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
8.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
9.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
10.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
POLARIZATION INDEX	1.36				1.00				1.07			

POLARIZATON INDEX = 10 MINUTE RDG. / 1 MINUTE RDG.

COMMENTS:

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979

Tested By: E. TAPPAN Tested By: E. KOEPFGEN

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER INSPECTION

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 214

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/28/2020 — TEMPERATURE 70 °F — HUMIDITY 70 % — EQPT. LOCATION SOLIDS BUILDING

SUBSTATION 5 — POSITION 52-4 BUS A TRANSFORMER

NAMEPLATE DATA

MANUFACTURER CUTLER HAMMER — SERIAL NO. D5849630011

SPECIFICATION NO. MDT03545 — kVA 2,000 / 2,200 / 2,933 — TYPE CAST — CLASS AA/AA/FA

PHASE 3 — TEMPERATURE RISE 80 °C 100 °C — IMPEDANCE 5.83 % — B.I.L. RATING 60X95 kV PRI. 30 kV SEC.

COOLANT AIR/FAN — CAPACITY --- --- — TOTAL WEIGHT 11700

WINDING POLARITY --- — WINDING MATERIAL CU — K FACTOR ---

PRIMARY VOLTAGE 13,200 — (●) DELTA ( ) WYE — RATED CURRENT 87 / 96 / 128 AMPERES

SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 2,406 / 2,646 / 3,528 AMPERES

TAP VOLTAGES	13,860	13,530	13,200	12,870	12,540			
TAP CONNECTIONS	C-D&G-L&M-N	C-D&F-K&M-N	C-D&F-L&M-N	C-D&F-L&M-N	C-D&E-L&M-N			

TAP SETTING C-D&G-L&M-N 13,200 VOLTS — # FANS 12 — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE [x]

GAUGES:

COOLANT TEMPERATURE --- °C — MAXIMUM TEMPERATURE --- °C — RESET TEMPERATURE GAUGE [ ]

COOLANT LEVEL --- — PRESSURE VACUUM --- # — LCR COUNTER ---

OTHER GAUGES ---

VISUAL INSPECTION:

BUSHINGS CLEANED — SUPPORT INSULATORS CLEANED — CONNECTIONS ACCEPTABLE

PAINT ACCEPTABLE — RADIATORS --- — FANS SEE BELOW

NO-LOAD TAP CHANGER --- — LEAKS ---

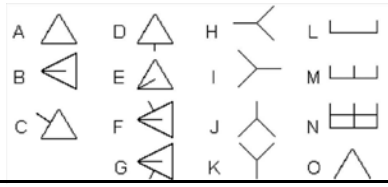
MAIN TANK DIELECTRIC SAMPLE SYRINGE # — BOTTLE #

LTC DIELECTRIC SAMPLE SYRINGE # — BOTTLE #

GROUND CONDUCTOR SIZE 4/0 AWG/kcm — NO. OF GROUND CONDUCTORS 1 — GROUND CONDUCTOR CONDITION ACC

ADDITIONAL EQUIPMENT

VECTOR DIAGRAM



PRI. VECTOR: E

SEC. VECTOR: H

POST TEST VOLTAGES

NO LOAD SECONDARY VOLTAGE			
X1 - X2	V	X0 - G	V
X1 - X3	V	X0 - X1	V
X2 - X3	V	X0 - X2	V
		X0 - X3	V

COMMENTS: DIRTY - RECOMMEND FULL P/M CLEANING
BACK OF GEAR LEFT TO RIGHT FAN #5 NOT WORKING.

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: E. KOEPFGEN Tested By: E. TAPPAN

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER TURNS RATIO TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 215

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/28/2020 — TEMPERATURE 52 °F — HUMIDITY 30 % — EQPT. LOCATION SOLIDS BUILDING

SUBSTATION 5 — POSITION 52-4 BUS A TRANSFORMER

NAMEPLATE DATA

MANUFACTURER CUTLER HAMMER — SERIAL NO. D584963001

SPECIFICATION NO. MDT03545 — KVA 2000 / 2200 / 2933 — TYPE CAST — CLASS AA/AA/FA

PHASE 3 — TEMPERATURE RISE 80 °C 100 °C — IMPEDANCE 5.83 % — B.I.L. RATING 60X95 kV PRI. 30 kV SEC.

COOLANT AIR/FAN — CAPACITY --- --- — TOTAL WEIGHT 11700

WINDING POLARITY --- — WINDING MATERIAL CU — K FACTOR ---

PRIMARY VOLTAGE 13200 — (●) DELTA ( ) WYE — RATED CURRENT / / AMPERES

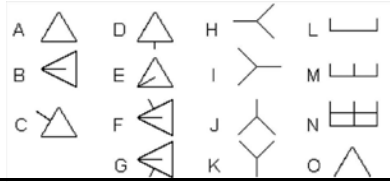
SECONDARY VOLTAGE 480 — ( ) DELTA (●) WYE — RATED CURRENT / / AMPERES

TAP VOLTAGES	13860	13530	13200	12870	12540		
TAP CONNECTIONS	C-D&G-L&M-N	C-D&F-K&M-N	C-D&F-L&M-N	C-D&F-L&M-N	C-D&E-L&M-N		
TAP SETTING	C-D&G-L&M-N	13200 VOLTS	# FANS 12	TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL		DRY TYPE ☑	

TRANSFORMER TURNS RATIO TESTS

TAP NUMBER		WINDING VOLTAGES	CALCULATED RATIO	MEASURED RATIO $H_1 H_2 / X_1 X_0$	MEASURED RATIO $H_2 H_1 / X_2 X_0$	MEASURED RATIO $H_3 H_2 / X_3 X_0$
1		/				
2		/				
3	C-D&G-L&M-N	13,200 / 277	47.653	47.8360	47.8350	47.8380
4		/				
5		/				
6		/				
7		/				
8		/				

VECTOR DIAGRAM



PRI. VECTOR: E

SEC. VECTOR: H

CORRECTION FACTOR FOR UNACCESSIBLE NEUTRAL

PHASE TESTED	BLACK	RED	BLACK	RED	JUMPER	READING MULTIPLIER	TEST SHEET DESIGNATION
DELTA-WYE							
A	H1	H3	X1	X2	H2H3	1.547	H1-H3 X1-X2
B	H2	H1	X2	X3	H1H3	1.547	H2-H3 X2-X3
C	H3	H2	X3	X1	H1H2	1.547	H3-H2 X3-X1
WYE-DELTA							
A	H1	H3	X1	X2	X2X3	1.5000	H1-H3 X1-X2
B	H2	H1	X2	X3	X1X3	1.5000	H2-H1 X2-X3
C	H3	H2	X3	X1	X1X2	1.5000	H3-H2 X3-X1

COMMENTS: ONE FAN NOT WORKING ON BACK SIDE OF GEAR (2ND CLOSEST TO PRIMARY CABLES). MACMILLAN P/N MTRF024001. CLASS "B." MODEL K4125-519/4. 1/20 HP SINGLE PHASE.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: TTR 25 #184970

Tested By: E. TAPPAN Tested By: E. KOEPFGEN

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOADBREAK DISCONNECT TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 216
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/6/2020 — TEMPERATURE 70 °F — HUMIDITY 70 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION 52-7 BUS B

FUSE DATA

MANUFACTURER EATON — TYPE --- — HOLDER RBA-400 — MAX. AMPS 400
REFILL ELEMENT TYPE 15KV — SIZE 400 — CAT. NO. 5981C53G02 — TCC NO. --- — VOLTAGE 13.2 kV

NAMEPLATE DATA

MANUFACTURER EATON — SERIAL NO. ---
VOLTAGE 15KV — TYPE MV52 — AMPERES 1200 — INTERRUPTING RATING 61 kA
TYPE OPERATING MECHANISM MANUAL — AGE --- — B.I.L. RATING 95 kV
MOMENTARY FAULT CLOSING AMPS 61 kA — OTHER NAMEPLATE DATA ---

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Dirty	NA
INSULATING MEMBERS	☑	Dirty	NA
MECHANICAL CONNECTION	☑	Dirty	NA
STRUCTURAL MEMBERS	☑	Dirty	NA
CUBICLE	☑	Dirty	NA
AUXILIARY DEVICES	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
MAIN CONTACTS	☑	Dirty	NA
HEATERS	☐	N/A	NA
BEARINGS	☑	Acceptable	NA
CONTACT SEQUENCE	☑	Acceptable	NA
GROUND CONNECTION	☑	Acceptable	NA

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

INSULATION TESTS

	RANGE MULTIPLIER	K2	POLE 1 (P1-P2) MΩ READING	POLE 1 (P1-P2) MΩ 20°C	POLE 2 (P2-P3) MΩ READING	POLE 2 (P2-P3) MΩ 20°C	POLE 3 (P1-P3) MΩ READING	POLE 3 (P1-P3) MΩ 20°C
POLE TO POLE	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
POLE TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LINE TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LOAD TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LINE TO LOAD	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0

Contacts

		POLE 1	POLE 2	POLE 3
CONTACT RESISTANCE SWITCH & FUSE ☐ MICRO-OHMS ☑ MILLI-OHMS		0.740	0.746	0.824
SWITCH CONTACT		0.032	0.081	0.050
FUSE		0.739	0.668	0.773
HI POT (MICRO AMPS)	37KV	8.7	5.4	10.1

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206124, DLRO #156856, HIPOT #156393

Tested By: E. KOEPFGEN Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LIGHTNING ARRESTER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 217
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/6/2020 — TEMPERATURE 70 °F — HUMIDITY 70 % — EQPT. LOCATION SOLIDS
SUBSTATION 5 — POSITION 52-7 BUS-B

NAMEPLATE DATA

MANUFACTURER ABB — TYPE --- — MODEL ---
CATALOG NO. DO125A010ADAA0 — SERIAL NO. --- — RELIEF ---
RATED RMS VOLTAGE 12.5 kV — RATED MCOV 10.2 kV — RMS CURRENT RATING kA — RATED CREST kA
SYSTEM VOLTAGE 13.2 kV — ARRESTER TYPE STATION ○ INTERMEDIATE ○ DISTRIBUTION ◉ — MATERIAL TYPE PORCELAIN ○ POLYMER ◉

INSULATION TEST VOLTAGE 5.00 kV DC — TEST VOLTAGE MULTIPLIER 1
RANGE MULTIPLIER 1.0 — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION TEST

POSITION	TOTAL CORRECTION MULTIPLIER	A PHASE TO GROUND		B PHASE TO GROUND		C PHASE TO GROUND	
		ACTUAL MEGOHMS	CORRECTED MEGOHMS	ACTUAL MEGOHMS	CORRECTED MEGOHMS	ACTUAL MEGOHMS	CORRECTED MEGOHMS
52-7 BUS B	1.05	100,000	105,000.0	100,000	105,000.0	100,000	105,000.0

WATT LOSS TEST

TEST kV SWITCH SETTING
OUTPUT TEST VOLTAGE
READING CORRECTION FACTOR

○ GROUNDED SPECIMEN TEST
○ UNGROUNDED SPECIMEN TEST

MILLI-WATT LOSS

POSITION	A PHASE	B PHASE	C PHASE

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206124

Tested By: E. KOEPFGEN Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER DIELECTRIC ABSORPTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 218
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/6/2020 — TEMPERATURE 70 °F — HUMIDITY 70 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION 52-7B TRANSFORMER

NAMEPLATE DATA

MANUFACTURER CUTLER HAMMER — SERIAL NO. D584964001
SPECIFICATION NO. MDT03545 — KVA 2,000 / 2,200 / 2,933 — TYPE CAST — CLASS AA/AA/FA
PHASE 3 — TEMPERATURE RISE 80 °C 100 °C — IMPEDANCE 5.78 % — B.I.L. RATING 90 kV PRI. 30 kV SEC.
COOLANT AIR — CAPACITY --- GALLONS — TOTAL WEIGHT ---
WINDING POLARITY SUBTRACTIVE — WINDING MATERIAL CU — K FACTOR ---
PRIMARY VOLTAGE 13,200 — (●) DELTA ( ) WYE — RATED CURRENT 87 / 96 / 128 AMPERES
SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 2,406 / 2,646 / 3,528 AMPERES
TAP VOLTAGES 13,860 | 13,530 | 13,200 | 12,870 | 12,540
TAP CONNECTIONS C-D&G-K&M-N | C-D&F-K&M-N | C-D&F-L&M-N | C-D&E-L&M-N
TAP SETTING C-D&G-L&M-N 13,200 VOLTS — # FANS 12 — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE ☐

TEST VOLTAGE:
PRIMARY TO SECONDARY 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 1 — K2=(TCF) (K1)
PRIMARY TO GROUND 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 1
SECONDARY TO GROUND 1 kVdc — TEST VOLTAGE MULTIPLIER, K1 1

CORE/COIL TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF — DRY 1.05 — LIQUID 1.080

MINUTES	PRIMARY TO SECONDARY GROUND GUARDED				PRIMARY TO GROUND SECONDARY GUARDED				SECONDARY TO GROUND PRIMARY GUARDED			
	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C
0.25	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0
0.50	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0
0.75	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0
1.00	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0
1.25	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0
1.50	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0
1.75	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0
2.00	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0
3.00	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0
4.00	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0
5.00	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0
6.00	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0
7.00	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0
8.00	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0
9.00	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0
10.00	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0	100,000.0	1	1.08	108,000.0
POLARIZATION INDEX	1.00				1.00				1.00			

POLARIZATON INDEX = 10 MINUTE RDG. / 1 MINUTE RDG.

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206124

Tested By: E. KOEPFGEN Tested By: _____

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER INSPECTION

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 219

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/6/2020 — TEMPERATURE 65 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING

SUBSTATION 5 — POSITION 52-7B TRANSFORMER

NAMEPLATE DATA

MANUFACTURER CUTLER HAMMER — SERIAL NO. D584964001

SPECIFICATION NO. MDT03545 — kVA 2,000 / 2,200 / 2,933 — TYPE CAST — CLASS AA/AA/FA

PHASE 3 — TEMPERATURE RISE 80 °C 100 °C — IMPEDANCE 5.78 % — B.I.L. RATING 90 kV PRI. 30 kV SEC.

COOLANT AIR — CAPACITY --- GALLONS — TOTAL WEIGHT ---

WINDING POLARITY SUBTRACTIVE — WINDING MATERIAL CU — K FACTOR ---

PRIMARY VOLTAGE 13,200 — (●) DELTA ( ) WYE — RATED CURRENT 87 / 96 / 128 AMPERES

SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 2,406 / 2,646 / 3,528 AMPERES

TAP VOLTAGES	13,860	13,530	13,200	12,870	12,540			
TAP CONNECTIONS	C-D&G-K&M-N	C-D&F-K&M-N	C-D&F-L&M-N	C-D&E-L&M-N				
TAP SETTING	C-D&G-L&M-N	13,200 VOLTS	# FANS 12	TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL	DRY TYPE ☐			

GAUGES:

COOLANT TEMPERATURE --- °C — MAXIMUM TEMPERATURE 77 °C — RESET TEMPERATURE GAUGE ☐

COOLANT LEVEL --- — PRESSURE VACUUM --- # — LCR COUNTER ---

OTHER GAUGES ---

VISUAL INSPECTION:

BUSHINGS DIRTY — SUPPORT INSULATORS DIRTY — CONNECTIONS ACCEPTABLE

PAINT ACCEPTABLE — RADIATORS --- — FANS SEE BELOW

NO-LOAD TAP CHANGER --- — LEAKS ---

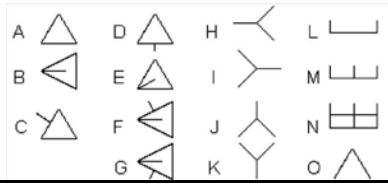
MAIN TANK DIELECTRIC SAMPLE SYRINGE # — BOTTLE #

LTC DIELECTRIC SAMPLE SYRINGE # — BOTTLE #

GROUND CONDUCTOR SIZE 4/0 AWG/kcm — NO. OF GROUND CONDUCTORS 1 — GROUND CONDUCTOR CONDITION ACC

ADDITIONAL EQUIPMENT

VECTOR DIAGRAM



PRI. VECTOR: E

SEC. VECTOR: H

POST TEST VOLTAGES

NO LOAD SECONDARY VOLTAGE			
X1 - X2	V	X0 - G	V
X1 - X3	V	X0 - X1	V
X2 - X3	V	X0 - X2	V
		X0 - X3	V

COMMENTS:

DEFICIENCIES: (LEFT TO RIGHT) FRONTSIDE FAN #4 NOT WORKING & ON BACK SIDE FAR LEFT FAN NOT WORKING.

☐ ACCEPTABLE ☑ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: E. KOEPFGEN — Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER TURNS RATIO TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 220

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/6/2020 — TEMPERATURE 70 °F — HUMIDITY 70 % — EQPT. LOCATION SOLIDS BUILDING

SUBSTATION 5 — POSITION 52-7B TRANSFORMER

NAMEPLATE DATA

MANUFACTURER CUTLER HAMMER — SERIAL NO. D584964001

SPECIFICATION NO. MDT03545 — KVA 2000 / 2200 / 2933 — TYPE CAST — CLASS AA/AA/FA

PHASE 3 — TEMPERATURE RISE 80 °C 100 °C — IMPEDANCE 5.78 % — B.I.L. RATING 90 kV PRI. 30 kV SEC.

COOLANT AIR — CAPACITY --- GALLONS — TOTAL WEIGHT ---

WINDING POLARITY SUBTRACTIVE — WINDING MATERIAL CU — K FACTOR ---

PRIMARY VOLTAGE 13200 — (●) DELTA ( ) WYE — RATED CURRENT / / AMPERES

SECONDARY VOLTAGE 4801 — ( ) DELTA (●) WYE — RATED CURRENT / / AMPERES

TAP VOLTAGES 13860 | 13530 | 13200 | 12870 | 12540

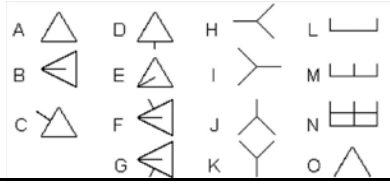
TAP CONNECTIONS C-D&G-K&M-N | C-D&F-K&M-N | C-D&F-L&M-N | C-D&E-L&M-N | C-D&E-L&M-N

TAP SETTING C-D&G-L&M-N 13200 VOLTS — # FANS 12 — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE ☐

TRANSFORMER TURNS RATIO TESTS

TAP NUMBER		WINDING VOLTAGES	CALCULATED RATIO	MEASURED RATIO $H_1 H_3 / X_1 X_0$	MEASURED RATIO $H_2 H_1 / X_2 X_0$	MEASURED RATIO $H_3 H_2 / X_3 X_0$
1		/				
2		/				
3	C-D & G-L & M-N	13,200 / 277	47.653	47.8140	47.7930	47.8340
4		/				
5		/				
6		/				
7		/				
8		/				

VECTOR DIAGRAM



PRI. VECTOR: E

SEC. VECTOR: H

CORRECTION FACTOR FOR UNACCESSIBLE NEUTRAL

PHASE TESTED	BLACK	RED	BLACK	RED	JUMPER	READING MULTIPLIER	TEST SHEET DESIGNATION
DELTA-WYE							
A	H1	H3	X1	X2	H2H3	1.547	H1-H3 X1-X2
B	H2	H1	X2	X3	H1H3	1.547	H2-H3 X2-X3
C	H3	H2	X3	X1	H1H2	1.547	H3-H2 X3-X1
WYE-DELTA							
A	H1	H3	X1	X2	X2X3	1.5000	H1-H3 X1-X2
B	H2	H1	X2	X3	X1X3	1.5000	H2-H1 X2-X3
C	H3	H2	X3	X1	X1X2	1.5000	H3-H2 X3-X1

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: TTR25 #184970

Tested By: E. KOEPFGEN Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 221
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/27/2020 — TEMPERATURE 45 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION F2H 800A SPARE

MANUFACTURER	EATON	SN / SO NO.	4135809057008	FRAME SIZE(F)	800
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	800	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	DIGITRIP 520	CATALOG NO.	MDSC083WEA	ZONE INTLK ☑	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Very Poor	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	N/A
GROUND CONNECTION	☑	Acceptable	N/A
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND											
RATING PLUG(R)	800	LONG TIME PU	1.0	x	800	A =	800	A	DELAY	4	
SENSOR TAP	800	SHORT TIME PU	4	=	3200	A			DELAY	0.2	I²T ○ IN ● OUT ○ N/A
GRD. FLT. ○ 3W ○ 4W		INST. PU	10	=	8000	A	● ON ○ OFF				
		GRD. FLT. PU	0.35	=	420	A	● ON ○ OFF		DELAY	0.2	I²T ○ IN ● OUT ○ N/A

SETTINGS AS LEFT											
RATING PLUG(R)	800	LONG TIME PU	1.0	x	800	A =	800	A	DELAY	1	
SENSOR TAP	800	SHORT TIME PU	1	=	3200	A			DELAY	0.2	I²T ○ IN ● OUT ○ N/A
GRD. FLT. ○ 3W ○ 4W		INST. PU	10	=	8000	A	● ON ○ OFF				
		GRD. FLT. PU	0.35	=	420	A	● ON ○ OFF		DELAY	0.2	I²T ○ IN ● OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	30	1.5X	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	30	1.5X	---	---	---	---	---	---	---	---
	STPU									
LONG TIME	30	6X	---	---	---	---	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	3	2X	---	---	---	---	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 7 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.552

INSULATION RESISTANCE	POLE 1 MΩ (P1-P2) READING	POLE 1 20°C	POLE 2 MΩ (P2-P3) READING	POLE 2 20°C	POLE 3 MΩ (P3-P1) READING	POLE 3 20°C
POLE TO POLE	2,000	1,104.00	2,000	1,104.00	2,000	1,104.00
POLE TO FRAME	2,000	1,104.00	2,000	1,104.00	2,000	1,104.00
LINE TO LOAD	2,000	1,104.00	2,000	1,104.00	2,000	1,104.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.015	0.011	0.017

COMMENTS: INST TRIP TESTED AT 4.

DEFICIENCIES: BREAKER FAILS TO PASS MORE THAN 0.5 AMPS ON SI TEST. REPLACE TRIP UNIT.

☐ ACCEPTABLE ☑ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #156386, DLRO #193764, SI #UIS224

Tested By: J. RYSENGA Tested By: E. TAPPAN

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 222
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/28/2020 — TEMPERATURE 52 °F — HUMIDITY 30 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION F3D MCC-53

MANUFACTURER	EATON	SN / SO NO.	4135809059004	FRAME SIZE(F)	800
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	600	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	3D	THERMAL MEMORY	◉ ON ○ OFF
TRIP UNIT TYPE	DIGITRIP 520	CATALOG NO.	MDSC083WEA	ZONE INTLK ☑	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Dirty	C
CONTACT FINGERS	☑	Dirty	C
LOADING AND ARCING CONTACTS	☑	Dirty	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Dirty	C
AUXILIARY DEVICES	☐	N/A	N/A
GROUND CONNECTION	☑	Dirty	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND												
RATING PLUG(R)	600	LONG TIME PU	1	x	600	A =	600	A	DELAY	15		
SENSOR TAP	600	SHORT TIME PU	6	=	3600	A			DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	10	=	6000	A	◉ ON ○ OFF					
		GRD. FLT. PU	0.35	=	210	A	◉ ON ○ OFF		DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A

SETTINGS AS LEFT												
RATING PLUG(R)	600	LONG TIME PU	1	x	600	A =	600	A	DELAY	15		
SENSOR TAP	600	SHORT TIME PU	6	=	3600	A			DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	10	=	6000	A	◉ ON ○ OFF					
		GRD. FLT. PU	0.35	=	210	A	◉ ON ○ OFF		DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	30	2X	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	IPU									
SHORT TIME	30	2X	---	---	0.2	0.2	0.2	0.2	0.2	0.2
	STPU									
LONG TIME	30	6X	---	---	12.4	12.4	12.1	12.1	12.2	12.2
	LTPU				5.6	5.6	5.6	5.6	5.6	5.6
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	4	2X	---	---	0.2	0.2	0.2	0.2	0.2	0.2
	GFPU				1.9	1.9	1.9	1.9	1.9	1.9

EQUIPMENT TEMPERATURE 11 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.666

INSULATION RESISTANCE	POLE 1 MΩ (P1-P2) READING	POLE 1 20°C	POLE 2 MΩ (P2-P3) READING	POLE 2 20°C	POLE 3 MΩ (P3-P1) READING	POLE 3 20°C
POLE TO POLE	2,000	1,332.00	2,000	1,332.00	2,000	1,332.00
POLE TO FRAME	2,000	1,332.00	2,000	1,332.00	2,000	1,332.00
LINE TO LOAD	2,000	1,332.00	2,000	1,332.00	2,000	1,332.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.015	0.013	0.013

COMMENTS: INST & ST TESTED AT 3.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979, DLRO #UIS1570, SI #013214

Tested By: E. TAPPAN Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 223
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/28/2020 — TEMPERATURE 52 °F — HUMIDITY 30 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION F3D MCC-53

MANUFACTURER	EATON	SN / SO NO.	4135809059001	FRAME SIZE(F)	4000
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	4000	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	2D	THERMAL MEMORY	◉ ON ○ OFF
TRIP UNIT TYPE	DIGITRIP 520	CATALOG NO.	MDSC403WEA	ZONE INTLK ☑	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Dirty	C
CONTACT FINGERS	☑	Dirty	C
LOADING AND ARCING CONTACTS	☑	Dirty	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Dirty	C
AUXILIARY DEVICES	☐	N/A	N/A
GROUND CONNECTION	☑	Dirty	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	4000	LONG TIME PU	0.8	x	4000	A =	3200	A	DELAY	4	
SENSOR TAP	4,000	SHORT TIME PU	2.5	=	8000	A			DELAY	0.3	I²T ○ IN ◉ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	---	=	---	A	○ ON ◉ OFF				
		GRD. FLT. PU	0.3	=	360	A	◉ ON ○ OFF		DELAY	0.4	I²T ○ IN ◉ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	4000	LONG TIME PU	0.8	x	4000	A =	3200	A	DELAY	4	
SENSOR TAP	4,000	SHORT TIME PU	2.5	=	8000	A			DELAY	0.3	I²T ○ IN ◉ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	---	=	---	A	○ ON ◉ OFF				
		GRD. FLT. PU	0.3	=	360	A	◉ ON ○ OFF		DELAY	0.4	I²T ○ IN ◉ OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	20	2X	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	IPU									
SHORT TIME	25	2X	---	---	0.2	0.2	0.2	0.2	0.2	0.2
	STPU									
LONG TIME	24	6X	---	---	3.1	3.1	3.1	3.1	3.2	3.2
	LTPU				4.2	4.2	4.2	4.2	4.2	4.2
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	6.5	2X	---	---	0.4	0.4	0.4	0.4	0.4	0.4
	GFPU				3.2	3.2	3.2	3.2	3.2	3.2

EQUIPMENT TEMPERATURE 11 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.666

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,332.00	2,000	1,332.00	2,000	1,332.00
POLE TO FRAME	2,000	1,332.00	2,000	1,332.00	2,000	1,332.00
LINE TO LOAD	2,000	1,332.00	2,000	1,332.00	2,000	1,332.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☑ MICRO-OHMS ☐ MILLI-OHMS

POLE 1	POLE 2	POLE 3
12	13	16

COMMENTS: POLE 1 = 12, POLE 2 = 18, POLE 3 = 14 - RIGHT SIDE DLRO.
DLRO ABOVE IS LEFT/RIGHT. INST VERIFIED AT 2.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979, DLRO #UIS1570, SI #013214

Tested By: E. KOEPFGEN Tested By: E. TAPPAN

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 224
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/5/2020 — TEMPERATURE 65 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING (2F)
SUBSTATION 5 — POSITION F4A MCC-54 BUS A

MANUFACTURER	EATON	SN / SO NO.	4135809057-001-009	FRAME SIZE(F)	800
BREAKER TYPE	MAGNUM DS MDSC08	SENSOR TAPS	800	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	CWD	THERMAL MEMORY	● ON ○ OFF
TRIP UNIT TYPE	DIGITRIP 520	CATALOG NO.	MDSC083WEA	ZONE INTLK ☑	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	800	LONG TIME PU	1.0	x	800	A =	800	A	DELAY	15		
SENSOR TAP	800	SHORT TIME PU	6	=	4800	A			DELAY	0.2	I²T ○ IN	● OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	10	=	8000	A	● ON ○ OFF					
		GRD. FLT. PU	0.35	=	280	A	● ON ○ OFF		DELAY	0.2	I²T ○ IN	● OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	800	LONG TIME PU	1.0	x	800	A =	800	A	DELAY	15		
SENSOR TAP	800	SHORT TIME PU	6	=	4800	A			DELAY	0.2	I²T ○ IN	● OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	10	=	8000	A	● ON ○ OFF					
		GRD. FLT. PU	0.35	=	280	A	● ON ○ OFF		DELAY	0.2	I²T ○ IN	● OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	30	2X	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	IPU									
SHORT TIME	30	2X	---	---	0.1	0.1	0.1	0.1	0.2	0.2
	STPU									
LONG TIME	30	6X	---	---	12.1	12.1	12.0	12.0	12.1	12.1
	LTPU				5.7	5.7	5.7	5.7	5.7	5.7
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	10.5	6X	---	---	0.3	0.3	0.3	0.3	0.4	0.4
	GFPU									

EQUIPMENT TEMPERATURE 18 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.924

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00
POLE TO FRAME	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00
LINE TO LOAD	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.023	0.029	0.023

COMMENTS: SHORT TIME & INST TESTED AT 3.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480, DLRO #157082, SI #013214

Tested By: D. FLEMING Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 225
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/5/2020 — TEMPERATURE 65 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING (2F)
SUBSTATION 5 — POSITION F4B MCC-55 BUS A

MANUFACTURER	EATON	SN / SO NO.	4135809059-001-007	FRAME SIZE(F)	800
BREAKER TYPE	MAGNUM DS MDSC08	SENSOR TAPS	600	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	DTS	THERMAL MEMORY	◉ ON ○ OFF
TRIP UNIT TYPE	DIGITRIP 520	CATALOG NO.	MDSC083WEA065GN	ZONE INTLK ☑	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C/L
AUXILIARY DEVICES	☐	N/A	N/A
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	600	LONG TIME PU	1.0	x	600	A =	600	A	DELAY	15		
SENSOR TAP	600	SHORT TIME PU	6	=	3600	A			DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A
GRD. FLT. ◉ 3W ○ 4W		INST. PU	10	=	6000	A	◉ ON ○ OFF					
		GRD. FLT. PU	0.35	=	210	A	◉ ON ○ OFF		DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	600	LONG TIME PU	1.0	x	600	A =	600	A	DELAY	15		
SENSOR TAP	600	SHORT TIME PU	6	=	3600	A			DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A
GRD. FLT. ◉ 3W ○ 4W		INST. PU	10	=	6000	A	◉ ON ○ OFF					
		GRD. FLT. PU	0.35	=	210	A	◉ ON ○ OFF		DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	30	2X	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	IPU									
SHORT TIME	30	2X	---	---	0.1	0.1	0.1	0.1	0.2	0.2
	STPU									
LONG TIME	30	6X	---	---	12.2	12.2	12.1	12.1	12.2	12.2
	LTPU				5.7	5.7	5.7	5.7	5.7	5.7
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	10.5	6X	---	---	0.3	0.3	0.3	0.3	0.3	0.3
	GFPU									

EQUIPMENT TEMPERATURE 18 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.924

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00
POLE TO FRAME	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00
LINE TO LOAD	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.029	0.027	0.028

COMMENTS: SHORT TIME & INST TESTED AT 3.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480, DLRO #157082, SI #013214

Tested By: D. FLEMING Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 226
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/5/2020 — TEMPERATURE 65 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING (2F)
SUBSTATION 5 — POSITION F4D MCC-56 BUS A

MANUFACTURER	EATON	SN / SO NO.	4135809059-001-005	FRAME SIZE(F)	800
BREAKER TYPE	MAGNUM DS MDSC08	SENSOR TAPS	600	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	DTS	THERMAL MEMORY	◉ ON ○ OFF
TRIP UNIT TYPE	DIGITRIP 520	CATALOG NO.	MDSC083WEA065GN	ZONE INTLK ☑	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	600	LONG TIME PU	1.0	x	600	A =	600	A	DELAY	15		
SENSOR TAP	600	SHORT TIME PU	6	=	3600	A			DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A
GRD. FLT. ◉ 3W ○ 4W		INST. PU	10	=	6000	A	◉ ON ○ OFF					
		GRD. FLT. PU	0.35	=	210	A	◉ ON ○ OFF		DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	600	LONG TIME PU	1.0	x	600	A =	600	A	DELAY	15		
SENSOR TAP	600	SHORT TIME PU	6	=	3600	A			DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A
GRD. FLT. ◉ 3W ○ 4W		INST. PU	10	=	6000	A	◉ ON ○ OFF					
		GRD. FLT. PU	0.35	=	210	A	◉ ON ○ OFF		DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	30	2X	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	IPU									
SHORT TIME	30	2X	---	---	0.1	0.1	0.1	0.1	0.2	0.2
	STPU									
LONG TIME	30	6X	---	---	11.7	11.7	11.5	11.5	11.7	11.7
	LTPU				5.7	5.7	5.7	5.7	5.7	5.7
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	10.5	6X	---	---	0.3	0.3	0.3	0.3	0.3	0.3
	GFPU									

EQUIPMENT TEMPERATURE 18 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.924

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00
POLE TO FRAME	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00
LINE TO LOAD	2,000	1,848.00	2,000	1,848.00	2,000	1,848.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.028	0.032	0.032

COMMENTS: SHORT TIME & INST TESTED AT 3.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480, DLRO #157082, SI #013214

Tested By: D. FLEMING Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
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(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 227
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/27/2020 — TEMPERATURE 45 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION F5A 800A SPARE

MANUFACTURER	EATON	SN / SO NO.	4135809057003	FRAME SIZE(F)	800
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	800	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	● ON ○ OFF
TRIP UNIT TYPE	DIGITRIP 520	CATALOG NO.	MDSC083WEA	ZONE INTLK ☑	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	N/A
GROUND CONNECTION	☑	Acceptable	N/A
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND		LONG TIME PU	1.0	x	800	A =	800	A	DELAY	4	
RATING PLUG(R)	800	SHORT TIME PU	6	=	4800	A			DELAY	0.2	I²T ○ IN ● OUT ○ N/A
SENSOR TAP	800	INST. PU	10	=	8000	A	● ON	○ OFF			
GRD. FLT. ○ 3W ○ 4W		GRD. FLT. PU	0.35	=	420	A	● ON	○ OFF	DELAY	0.2	I²T ○ IN ● OUT ○ N/A
SETTINGS AS LEFT		LONG TIME PU	1.0	x	800	A =	800	A	DELAY	4	
RATING PLUG(R)	800	SHORT TIME PU	6	=	4800	A			DELAY	0.2	I²T ○ IN ● OUT ○ N/A
SENSOR TAP	800	INST. PU	10	=	8000	A	● ON	○ OFF			
GRD. FLT. ○ 3W ○ 4W		GRD. FLT. PU	0.35	=	420	A	● ON	○ OFF	DELAY	0.2	I²T ○ IN ● OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	30	3X	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	IPU									
SHORT TIME	30	3X	---	---	0.1	0.1	0.1	0.1	0.1	0.1
	STPU									
LONG TIME	30	6X	---	---	5.4	5.4	5.6	5.6	5.7	5.7
	LTPU				4.6	4.6	4.6	4.6	4.6	4.6
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	3	2X	---	---	0.4	0.4	0.4	0.4	0.4	0.4
	GFPU									

EQUIPMENT TEMPERATURE 7 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.552

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2) READING	POLE 1 20°C	POLE 2 MΩ (P2-P3) READING	POLE 2 20°C	POLE 3 MΩ (P3-P1) READING	POLE 3 20°C
POLE TO POLE	2,000	1,104.00	2,000	1,104.00	2,000	1,104.00
POLE TO FRAME	2,000	1,104.00	2,000	1,104.00	2,000	1,104.00
LINE TO LOAD	2,000	1,104.00	2,000	1,104.00	2,000	1,104.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.026	0.031	0.037

COMMENTS: INST & STPU TESTED AT 2.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #156386, DLRO #193764, SI #UIS224

Tested By: J. RYSENGA Tested By: E. KOEPFGEN

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 228
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/27/2020 — TEMPERATURE 45 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION F5H 800A SPARE

MANUFACTURER	EATON	SN / SO NO.	4135809057005	FRAME SIZE(F)	800
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	800	MOUNTING	(•) B.I. ( ) D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	(•) ON ( ) OFF
TRIP UNIT TYPE	DIGITRIP 520	CATALOG NO.	MDSC083WEA	ZONE INTLK	[x] TARGETS [ ]

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	[x]	Acceptable	C
CONTACT FINGERS	[x]	Acceptable	C/L
LOADING AND ARCING CONTACTS	[x]	Acceptable	C
OVERCURRENT DEV. BATTERY	[x]	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	[x]	Acceptable	C
AUXILIARY DEVICES	[ ]	N/A	N/A
GROUND CONNECTION	[x]	Acceptable	N/A
LOAD CONDUCTOR NO. 0	Size		CU ( ) AL ( )

SETTINGS AS FOUND

RATING PLUG(R) 800 — SENSOR TAP 800 — GRD. FLT. ( ) 3W ( ) 4W

LONG TIME PU	1.0	x	800	A =	800	A	DELAY	12	
SHORT TIME PU	6	=	4800	A			DELAY	0.2	I²T ( ) IN (•) OUT ( ) N/A
INST. PU	10	=	8000	A	(•) ON	( ) OFF			
GRD. FLT. PU	0.35	=	420	A	(•) ON	( ) OFF	DELAY	0.2	I²T ( ) IN (•) OUT ( ) N/A

SETTINGS AS LEFT

RATING PLUG(R) 800 — SENSOR TAP 800 — GRD. FLT. ( ) 3W ( ) 4W

LONG TIME PU	1.0	x	800	A =	800	A	DELAY	12	
SHORT TIME PU	6	=	4800	A			DELAY	0.2	I²T ( ) IN (•) OUT ( ) N/A
INST. PU	10	=	8000	A	(•) ON	( ) OFF			
GRD. FLT. PU	0.35	=	420	A	(•) ON	( ) OFF	DELAY	0.2	I²T ( ) IN (•) OUT ( ) N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	30	3X	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	IPU									
SHORT TIME	30	3X	---	---	0.1	0.1	0.1	0.1	0.1	0.1
	STPU									
LONG TIME	30	6X	---	---	16.7	16.7	16.4	16.4	16.8	16.8
	LTPU				5	5	5	5	5	5
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	3	2X	---	---	0.3	0.3	0.3	0.3	0.3	0.3
	GFPU									

EQUIPMENT TEMPERATURE 7 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.552

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,104.00	2,000	1,104.00	2,000	1,104.00
POLE TO FRAME	2,000	1,104.00	2,000	1,104.00	2,000	1,104.00
LINE TO LOAD	2,000	1,104.00	2,000	1,104.00	2,000	1,104.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

[ ] MICRO-OHMS [x] MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.02	0.019	0.018

COMMENTS: INST & STPU TESTED AT 2.

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #156386, DLRO #193764, SI #UIS792

Tested By: J. RYSENGA — Tested By: E. TAPPAN

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
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(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 229
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/13/2020 — TEMPERATURE 70 °F — HUMIDITY 40 % — EQPT. LOCATION SOLIDS BUIDLING (2F)
SUBSTATION 5 — POSITION F6A MCC-54 BUS B

MANUFACTURER	EATON	SN / SO NO.	4135809057-001-010	FRAME SIZE(F)	800
BREAKER TYPE	MAGNUM DS MDSC08	SENSOR TAPS	600	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	CWD	THERMAL MEMORY	◉ ON ○ OFF
TRIP UNIT TYPE	DIGITRIP 520	CATALOG NO.	SEE COMMENTS	ZONE INTLK ☑	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	600	LONG TIME PU	1.0	x	600	A =	600	A	DELAY	15		
SENSOR TAP	600	SHORT TIME PU	6	=	2600	A			DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A
GRD. FLT. ◉ 3W ○ 4W		INST. PU	10	=	6000	A	◉ ON ○ OFF					
		GRD. FLT. PU	0.35	=	210	A	◉ ON ○ OFF		DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	600	LONG TIME PU	1.0	x	600	A =	600	A	DELAY	15		
SENSOR TAP	600	SHORT TIME PU	6	=	2600	A			DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A
GRD. FLT. ◉ 3W ○ 4W		INST. PU	10	=	6000	A	◉ ON ○ OFF					
		GRD. FLT. PU	0.35	=	210	A	◉ ON ○ OFF		DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	30	2X	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	IPU									
SHORT TIME	30	2X	---	---	0.4	0.4	0.4	0.4	0.4	0.4
	STPU									
LONG TIME	30	6X	---	---	11.4	11.4	11.8	11.8	11.8	11.8
	LTPU				5.7	5.7	5.7	5.7	5.7	5.7
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	10.5	6X	---	---	0.4	0.4	0.4	0.4	0.4	0.4
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☑ MICRO-OHMS ☐ MILLI-OHMS

POLE 1	POLE 2	POLE 3
38	39	36

COMMENTS: CAT # MDSC083WEA-065GN-MNNNN-NNNAX.
SHORT TIME & INST TESTED AT 3.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480, DLRO #157082, SI #199302

Tested By: D. FLEMING Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
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Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 230
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/13/2020 — TEMPERATURE 70 °F — HUMIDITY 40 % — EQPT. LOCATION SOLIDS BUIDLING (2F)
SUBSTATION 5 — POSITION F6B MCC-55 BUS B

MANUFACTURER	EATON	SN / SO NO.	4135809059-001-001	FRAME SIZE(F)	800
BREAKER TYPE	MAGNUM DS MDSC08	SENSOR TAPS	600	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	DTS	THERMAL MEMORY	◉ ON ○ OFF
TRIP UNIT TYPE	DIGITRIP 520	CATALOG NO.	SEE COMMENTS	ZONE INTLK ☐	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	600	LONG TIME PU	1.0	x	600	A =	600	A	DELAY	15		
SENSOR TAP	600	SHORT TIME PU	6	=	2600	A			DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A
GRD. FLT. ◉ 3W ○ 4W		INST. PU	10	=	6000	A	◉ ON ○ OFF					
		GRD. FLT. PU	0.35	=	210	A	◉ ON ○ OFF		DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	600	LONG TIME PU	1.0	x	600	A =	600	A	DELAY	15		
SENSOR TAP	600	SHORT TIME PU	6	=	2600	A			DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A
GRD. FLT. ◉ 3W ○ 4W		INST. PU	10	=	6000	A	◉ ON ○ OFF					
		GRD. FLT. PU	0.35	=	210	A	◉ ON ○ OFF		DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	30	2X	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	IPU									
SHORT TIME	30	2X	---	---	0.4	0.4	0.4	0.4	0.4	0.4
	STPU									
LONG TIME	30	6X	---	---	11.2	11.2	11.1	11.1	11.2	11.2
	LTPU				5.7	5.7	5.7	5.7	5.7	5.7
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	10.5	6X	---	---	0.4	0.4	0.3	0.3	0.4	0.4
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☑ MICRO-OHMS ☐ MILLI-OHMS

POLE 1	POLE 2	POLE 3
37	36	38

COMMENTS: CAT # MDSC083WEA-065GN-MNNNN-NNNAX.
SHORT TIME & INST TESTED AT 3.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480, DLRO #157082, SI #199302

Tested By: D. FLEMING Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan (734) 424-1200
Centerville, Ohio (937) 439-9660

LOW VOLTAGE POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 231
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/6/2020 — TEMPERATURE 60 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING (2F)
SUBSTATION 5 — POSITION F6C CFG-2

MANUFACTURER	EATON	SN / SO NO.	---	FRAME SIZE(F)	800
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	600	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	DTS	THERMAL MEMORY	● ON ○ OFF
TRIP UNIT TYPE	DIGITRIP 520	CATALOG NO.	MDSC083WEA	ZONE INTLK ☑	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Dirty	C
CONTACT FINGERS	☑	Dirty	C/L
LOADING AND ARCING CONTACTS	☑	Dirty	C
OVERCURRENT DEV. BATTERY	☑	Very Poor	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Dirty	C
AUXILIARY DEVICES	☐	N/A	N/A
GROUND CONNECTION	☑	Dirty	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND		LONG TIME PU	1	x	600	A =	600	A	DELAY	4	
RATING PLUG(R)	600	SHORT TIME PU	6	=	3600	A			DELAY	0.2	I²T ○ IN ● OUT ○ N/A
SENSOR TAP	800	INST. PU	8	=	4800	A	● ON	○ OFF			
GRD. FLT. ○ 3W ○ 4W		GRD. FLT. PU	0.85	=	280	A	● ON	○ OFF	DELAY	0.2	I²T ○ IN ● OUT ○ N/A
SETTINGS AS LEFT		LONG TIME PU	1	x	600	A =	600	A	DELAY	4	
RATING PLUG(R)	600	SHORT TIME PU	6	=	3600	A			DELAY	0.2	I²T ○ IN ● OUT ○ N/A
SENSOR TAP	800	INST. PU	8	=	4800	A	● ON	○ OFF			
GRD. FLT. ○ 3W ○ 4W		GRD. FLT. PU	0.85	=	280	A	● ON	○ OFF	DELAY	0.2	I²T ○ IN ● OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	30	2X	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	IPU									
SHORT TIME	30	2X	---	---	0.4	0.4	0.4	0.4	0.4	0.4
	STPU									
LONG TIME	30	6X	---	---	3.6	3.6	3.7	3.7	3.7	3.7
	LTPU				5.8	5.8	5.8	5.8	5.8	5.8
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	10.5	6X	---	---	0.4	0.4	0.4	0.4	0.4	0.4
	GFPU									

EQUIPMENT TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.848

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
POLE TO FRAME	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
LINE TO LOAD	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.016	0.016	0.015

COMMENTS: TRIP UNIT BATTERY DEAD.
SHORT & INST TESTED AT 3.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761, AMPTECTOR SI #013214

Tested By: AS / NH / DF — Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
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LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 232
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/13/2020 — TEMPERATURE 70 °F — HUMIDITY 40 % — EQPT. LOCATION SOLIDS BUIDLING (2F)
SUBSTATION 5 — POSITION F6D MCC-56 BUS B

MANUFACTURER	EATON	SN / SO NO.	4135809059-001-006	FRAME SIZE(F)	800
BREAKER TYPE	MAGNUM DS MDSC08	SENSOR TAPS	600	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	DTS	THERMAL MEMORY	◉ ON ○ OFF
TRIP UNIT TYPE	DIGITRIP 520	CATALOG NO.	SEE COMMENTS	ZONE INTLK ☑	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	600	LONG TIME PU	1.0	x	600	A =	600	A	DELAY	15		
SENSOR TAP	600	SHORT TIME PU	6	=	3600	A			DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A
GRD. FLT. ◉ 3W ○ 4W		INST. PU	10	=	6000	A	◉ ON ○ OFF					
		GRD. FLT. PU	0.35	=	210	A	◉ ON ○ OFF		DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	600	LONG TIME PU	1.0	x	600	A =	600	A	DELAY	15		
SENSOR TAP	600	SHORT TIME PU	6	=	3600	A			DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A
GRD. FLT. ◉ 3W ○ 4W		INST. PU	10	=	6000	A	◉ ON ○ OFF					
		GRD. FLT. PU	0.35	=	210	A	◉ ON ○ OFF		DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	30	2X	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	IPU									
SHORT TIME	30	2X	---	---	0.4	0.4	0.4	0.4	0.4	0.4
	STPU									
LONG TIME	30	6X	---	---	11.5	11.5	11.6	11.6	11.6	11.6
	LTPU				6.0	6.0	6.0	6.0	6.0	6.0
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	10.5	6X	---	---	0.4	0.4	0.4	0.4	0.4	0.4
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☑ MICRO-OHMS ☐ MILLI-OHMS

POLE 1	POLE 2	POLE 3
34	28	29

COMMENTS: CAT # MDSC083WEA-065GN-MNNNN-NNNAX.
SHORT TIME & INST TESTED AT 3.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480, DLRO #157082, SI #199302

Tested By: D. FLEMING Tested By:

Utilities Instrumentation Service, Inc.

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LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 233
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/6/2020 — TEMPERATURE 60 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUIDLING (2F)
SUBSTATION 5 — POSITION F7A MCC-51 BUS B

MANUFACTURER	EATON	SN / SO NO.	---	FRAME SIZE(F)	800
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	800	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	DTS	THERMAL MEMORY	● ON ○ OFF
TRIP UNIT TYPE	DIGITRIP 520	CATALOG NO.	MDSC083WEA	ZONE INTLK ☑	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Dirty	C
CONTACT FINGERS	☑	Dirty	C/L
LOADING AND ARCING CONTACTS	☑	Dirty	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Dirty	C
AUXILIARY DEVICES	☐	N/A	N/A
GROUND CONNECTION	☑	Dirty	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	800	LONG TIME PU	1.0	x	800	A =	800	A	DELAY	15		
SENSOR TAP	800	SHORT TIME PU	6	=	4800	A			DELAY	0.2	I²T ○ IN	● OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	10	=	8000	A	● ON ○ OFF					
		GRD. FLT. PU	0.35	=	280	A	● ON ○ OFF		DELAY	0.2	I²T ○ IN	● OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	800	LONG TIME PU	1.0	x	800	A =	800	A	DELAY	15		
SENSOR TAP	800	SHORT TIME PU	6	=	4800	A			DELAY	0.2	I²T ○ IN	● OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	10	=	8000	A	● ON ○ OFF					
		GRD. FLT. PU	0.35	=	280	A	● ON ○ OFF		DELAY	0.2	I²T ○ IN	● OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	30	2X	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	IPU									
SHORT TIME	30	2X	---	---	0.4	0.4	0.4	0.4	0.4	0.4
	STPU									
LONG TIME	30	6X	---	---	12.3	12.3	12.1	12.1	12.0	12.0
	LTPU				5.7	5.7	5.7	5.7	5.7	5.7
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	10.5	6X	---	---	0.4	0.4	0.4	0.4	0.4	0.4
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.016	0.015	0.017

COMMENTS: TESTED SHORT & INST AT 3.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761, AMPTECTOR SI #013214

Tested By: AS / NH / DF — Tested By:

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LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 234
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/6/2020 — TEMPERATURE 60 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING (2F)
SUBSTATION 5 — POSITION F7B MCC-52 BUS B

MANUFACTURER	EATON	SN / SO NO.	---	FRAME SIZE(F)	800
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	800	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	● ON ○ OFF
TRIP UNIT TYPE	DIGITRIP 520	CATALOG NO.	MDSC083WEA	ZONE INTLK ☑	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Dirty	C
CONTACT FINGERS	☑	Dirty	C/L
LOADING AND ARCING CONTACTS	☑	Dirty	C
OVERCURRENT DEV. BATTERY	☑	Very Poor	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Dirty	C
AUXILIARY DEVICES	☐	N/A	N/A
GROUND CONNECTION	☑	Dirty	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND		LONG TIME PU	1	x	800	A =	800	A	DELAY	15	
RATING PLUG(R)	800	SHORT TIME PU	6	=	4800	A			DELAY	0.2	I²T ○ IN ● OUT ○ N/A
SENSOR TAP	800	INST. PU	10	=	8000	A	● ON	○ OFF			
GRD. FLT. ○ 3W ○ 4W		GRD. FLT. PU	0.35	=	280	A	● ON	○ OFF	DELAY	0.2	I²T ○ IN ● OUT ○ N/A
SETTINGS AS LEFT		LONG TIME PU	1	x	800	A =	800	A	DELAY	15	
RATING PLUG(R)	800	SHORT TIME PU	6	=	4800	A			DELAY	0.2	I²T ○ IN ● OUT ○ N/A
SENSOR TAP	800	INST. PU	10	=	8000	A	● ON	○ OFF			
GRD. FLT. ○ 3W ○ 4W		GRD. FLT. PU	0.35	=	280	A	● ON	○ OFF	DELAY	0.2	I²T ○ IN ● OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	30	2X	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	IPU									
SHORT TIME	30	2X	---	---	0.2	0.2	0.2	0.2	0.1	0.1
	STPU									
LONG TIME	30	6X	---	---	12.2	12.2	12.6	12.6	12.6	12.6
	LTPU				5.6	5.6	5.6	5.6	5.6	5.6
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	10.5	6X	---	---	0.3	0.3	0.3	0.3	0.3	0.3
	GFPU									

EQUIPMENT TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.848

INSULATION RESISTANCE	POLE 1 MΩ (P1-P2) READING	POLE 1 20°C	POLE 2 MΩ (P2-P3) READING	POLE 2 20°C	POLE 3 MΩ (P3-P1) READING	POLE 3 20°C
POLE TO POLE	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
POLE TO FRAME	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
LINE TO LOAD	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.015	0.014	0.015

COMMENTS: SHORT & INST TESTED AT 3.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761, AMPTECTOR SI #013214

Tested By: AS / NH / DF — Tested By:

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LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 235
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/6/2020 — TEMPERATURE 60 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING (2F)
SUBSTATION 5 — POSITION F7C CFG-3

MANUFACTURER	EATON	SN / SO NO.	---	FRAME SIZE(F)	800
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	800	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	DTS	THERMAL MEMORY	● ON ○ OFF
TRIP UNIT TYPE	DIGITRIP 520	CATALOG NO.	MDSC083WEA	ZONE INTLK ☑	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Dirty	C
CONTACT FINGERS	☑	Dirty	C/L
LOADING AND ARCING CONTACTS	☑	Dirty	C
OVERCURRENT DEV. BATTERY	☑	Very Poor	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Dirty	C
AUXILIARY DEVICES	☐	N/A	N/A
GROUND CONNECTION	☑	Dirty	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND		LONG TIME PU	1	x	600	A =	600	A	DELAY	4	
RATING PLUG(R)	600	SHORT TIME PU	6	=	3600	A			DELAY	0.2	I²T ○ IN ● OUT ○ N/A
SENSOR TAP	800	INST. PU	8	=	4800	A	● ON	○ OFF			
GRD. FLT.	○ 3W ○ 4W	GRD. FLT. PU	0.35	=	280	A	● ON	○ OFF	DELAY	0.2	I²T ○ IN ● OUT ○ N/A
SETTINGS AS LEFT		LONG TIME PU	1	x	600	A =	600	A	DELAY	4	
RATING PLUG(R)	600	SHORT TIME PU	6	=	3600	A			DELAY	0.2	I²T ○ IN ● OUT ○ N/A
SENSOR TAP	800	INST. PU	8	=	4800	A	● ON	○ OFF			
GRD. FLT.	○ 3W ○ 4W	GRD. FLT. PU	0.35	=	280	A	● ON	○ OFF	DELAY	0.2	I²T ○ IN ● OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	30	2X	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	IPU									
SHORT TIME	30	2X	---	---	0.4	0.4	0.4	0.4	0.3	0.3
	STPU									
LONG TIME	30	6X	---	---	3.4	3.4	3.4	3.4	3.4	3.4
	LTPU				5.8	5.8	5.8	5.8	5.8	5.8
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	10.5	6X	---	---	0.4	0.4	0.4	0.4	0.4	0.4
	GFPU									

EQUIPMENT TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.848

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
POLE TO FRAME	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
LINE TO LOAD	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.016	0.017	0.016

COMMENTS: SHORT & INST TESTED AT 3.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761, AMPTECTOR SI #013214

Tested By: AS / NH / DF — Tested By:

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LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 236
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/6/2020 — TEMPERATURE 60 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING (2F)
SUBSTATION 5 — POSITION F7D MCC-53 BUS B

MANUFACTURER	EATON	SN / SO NO.	---	FRAME SIZE(F)	800
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	800	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	DTS	THERMAL MEMORY	● ON ○ OFF
TRIP UNIT TYPE	DIGITRIP 520	CATALOG NO.	MDSC083WEA	ZONE INTLK ☑	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Dirty	C
CONTACT FINGERS	☑	Dirty	C/L
LOADING AND ARCING CONTACTS	☑	Dirty	C
OVERCURRENT DEV. BATTERY	☑	Very Poor	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Dirty	C
AUXILIARY DEVICES	☐	N/A	N/A
GROUND CONNECTION	☑	Dirty	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	600	LONG TIME PU	1	x	600	A =	600	A	DELAY	15		
SENSOR TAP	800	SHORT TIME PU	6	=	3600	A			DELAY	0.2	I²T ○ IN	● OUT ○ N/A
GRD. FLT. ○ 3W ○ 4W		INST. PU	10	=	6000	A	● ON	○ OFF				
		GRD. FLT. PU	0.35	=	280	A	● ON	○ OFF	DELAY	0.2	I²T ○ IN	● OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	600	LONG TIME PU	1	x	600	A =	600	A	DELAY	15		
SENSOR TAP	800	SHORT TIME PU	6	=	3600	A			DELAY	0.2	I²T ○ IN	● OUT ○ N/A
GRD. FLT. ○ 3W ○ 4W		INST. PU	10	=	6000	A	● ON	○ OFF				
		GRD. FLT. PU	0.35	=	280	A	● ON	○ OFF	DELAY	0.2	I²T ○ IN	● OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	30	2X	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	IPU									
SHORT TIME	30	2X	---	---	0.4	0.4	0.4	0.4	0.3	0.3
	STPU									
LONG TIME	30	6X	---	---	12.2	12.2	11.9	11.9	12.1	12.1
	LTPU				6	6	6	6	6	6
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	10.5	6X	---	---	0.4	0.4	0.4	0.4	0.4	0.4
	GFPU									

EQUIPMENT TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.848

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
POLE TO FRAME	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
LINE TO LOAD	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.015	0.015	0.015

COMMENTS: SHORT & INST TESTED AT 3.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761, AMPTECTOR SI #013214

Tested By: AS / NH / DF — Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 237
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/27/2020 — TEMPERATURE 45 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION F8B 800A SPARE

MANUFACTURER	EATON	SN / SO NO.	4135809057004	FRAME SIZE(F)	800
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	800	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	● ON ○ OFF
TRIP UNIT TYPE	DIGITRIP 520	CATALOG NO.	MDSC083WEA	ZONE INTLK ☑	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	N/A
GROUND CONNECTION	☑	Acceptable	N/A
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND		LONG TIME PU	1.0	x	800	A =	800	A	DELAY 15	
RATING PLUG(R)	800	SHORT TIME PU	8	=	6400	A			DELAY 0.2	I²T ○ IN ● OUT ○ N/A
SENSOR TAP	800	INST. PU	10	=	8000	A	● ON	○ OFF		
GRD. FLT. ○ 3W ○ 4W		GRD. FLT. PU	0.35	=	420	A	● ON	○ OFF	DELAY 0.2	I²T ○ IN ● OUT ○ N/A
SETTINGS AS LEFT		LONG TIME PU	1.0	x	800	A =	800	A	DELAY 15	
RATING PLUG(R)	800	SHORT TIME PU	8	=	6400	A			DELAY 0.2	I²T ○ IN ● OUT ○ N/A
SENSOR TAP	800	INST. PU	10	=	8000	A	● ON	○ OFF		
GRD. FLT. ○ 3W ○ 4W		GRD. FLT. PU	0.35	=	420	A	● ON	○ OFF	DELAY 0.2	I²T ○ IN ● OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	30	3X	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	IPU									
SHORT TIME	30	3X	---	---	0.1	0.1	0.1	0.1	0.1	0.1
	STPU									
LONG TIME	30	6X	---	---	22.0	22.0	21.6	21.6	22.3	22.3
	LTPU				5	5	5	5	5	5
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	3	2X	---	---	0.4	0.4	0.5	0.5	0.4	0.4
	GFPU									

EQUIPMENT TEMPERATURE 7 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.552

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2) READING	POLE 1 20°C	POLE 2 MΩ (P2-P3) READING	POLE 2 20°C	POLE 3 MΩ (P3-P1) READING	POLE 3 20°C
POLE TO POLE	2,000	1,104.00	2,000	1,104.00	2,000	1,104.00
POLE TO FRAME	2,000	1,104.00	2,000	1,104.00	2,000	1,104.00
LINE TO LOAD	2,000	1,104.00	2,000	1,104.00	2,000	1,104.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.018	0.021	0.017

COMMENTS: INST & STPU TESTED AT 2.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #156386, DLRO #193764, SI #UIS224

Tested By: J. RYSENGA Tested By: E. TAPPAN

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 238

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/28/2020 — TEMPERATURE 52 °F — HUMIDITY 30 % — EQPT. LOCATION SOLIDS BUILDING

SUBSTATION 5 — POSITION FEEDER F3A

MANUFACTURER	CUTLER HAMMER	SN / SO NO.	4135809057007	FRAME SIZE(F)	800
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	800	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	3A	THERMAL MEMORY	◉ ON ○ OFF
TRIP UNIT TYPE	DIGITRIP 520	CATALOG NO.	MDSC083WEA	ZONE INTLK ☑	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Dirty	C
CONTACT FINGERS	☑	Dirty	C
LOADING AND ARCING CONTACTS	☑	Dirty	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Dirty	C
AUXILIARY DEVICES	☐	N/A	N/A
GROUND CONNECTION	☑	Dirty	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND		LONG TIME PU	1	x	800	A =	800	A	DELAY	15	
RATING PLUG(R)	800	SHORT TIME PU	6	=	4800	A			DELAY	0.2	I²T ○ IN ◉ OUT ○ N/A
SENSOR TAP	800	INST. PU	10	=	8000	A	◉ ON	○ OFF			
GRD. FLT.	◉ 3W ○ 4W	GRD. FLT. PU	0.35	=	280	A	◉ ON	○ OFF	DELAY	0.2	I²T ○ IN ◉ OUT ○ N/A
SETTINGS AS LEFT		LONG TIME PU	1	x	800	A =	800	A	DELAY	15	
RATING PLUG(R)	800	SHORT TIME PU	6	=	4800	A			DELAY	0.2	I²T ○ IN ◉ OUT ○ N/A
SENSOR TAP	800	INST. PU	10	=	8000	A	◉ ON	○ OFF			
GRD. FLT.	◉ 3W ○ 4W	GRD. FLT. PU	0.35	=	280	A	◉ ON	○ OFF	DELAY	0.2	I²T ○ IN ◉ OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	IPU									
SHORT TIME	30	2X	---	---	0.2	0.2	0.1	0.1	0.1	0.1
	STPU									
LONG TIME	30	6X	---	---	12.8	12.8	12.3	12.3	12.6	12.6
	LTPU				5.5	5.5	5.5	5.5	5.5	5.5
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	4	2X	---	---	0.3	0.3	0.2	0.2	0.3	0.3
	GFPU				1.9	1.9	1.9	1.9	1.9	1.9

EQUIPMENT TEMPERATURE 11 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.666

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,332.00	2,000	1,332.00	2,000	1,332.00
POLE TO FRAME	2,000	1,332.00	2,000	1,332.00	2,000	1,332.00
LINE TO LOAD	2,000	1,332.00	2,000	1,332.00	2,000	1,332.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.03	0.032	0.031

COMMENTS: ST TESTED AT 3, INST VERIFIED AT 3.

DEFICIENCIES: BATTERY NEEDS TO BE REPLACED.

☐ ACCEPTABLE ☑ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979, DLRO #UIS1570, SI #013214

Tested By: E. TAPPAN — Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 239
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/28/2020 — TEMPERATURE 52 °F — HUMIDITY 30 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION FEEDER F3B

MANUFACTURER	CUTLER HAMMER	SN / SO NO.	4135809057006	FRAME SIZE(F)	800
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	800	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	3B	THERMAL MEMORY	◉ ON ○ OFF
TRIP UNIT TYPE	DIGITRIP 520	CATALOG NO.	MDSC083WEA	ZONE INTLK ☑	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Dirty	C
CONTACT FINGERS	☑	Dirty	C
LOADING AND ARCING CONTACTS	☑	Dirty	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Dirty	C
AUXILIARY DEVICES	☐	N/A	N/A
GROUND CONNECTION	☑	Dirty	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND		LONG TIME PU	1	x	800	A =	800	A	DELAY	15	
RATING PLUG(R)	800	SHORT TIME PU	6	=	4800	A			DELAY	0.2	I²T ○ IN ◉ OUT ○ N/A
SENSOR TAP	800	INST. PU	10	=	8000	A	◉ ON	○ OFF			
GRD. FLT.	◉ 3W ○ 4W	GRD. FLT. PU	0.35	=	260	A	◉ ON	○ OFF	DELAY	0.2	I²T ○ IN ◉ OUT ○ N/A
SETTINGS AS LEFT		LONG TIME PU	1	x	800	A =	800	A	DELAY	15	
RATING PLUG(R)	800	SHORT TIME PU	6	=	4800	A			DELAY	0.2	I²T ○ IN ◉ OUT ○ N/A
SENSOR TAP	800	INST. PU	10	=	8000	A	◉ ON	○ OFF			
GRD. FLT.	◉ 3W ○ 4W	GRD. FLT. PU	0.35	=	260	A	◉ ON	○ OFF	DELAY	0.2	I²T ○ IN ◉ OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	30	2X	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	IPU									
SHORT TIME	30	2X	---	---	0.1	0.1	0.2	0.2	0.1	0.1
	STPU									
LONG TIME	30	6X	---	---	12.6	12.6	12.9	12.9	12.2	12.2
	LTPU				5.5	5.5	5.5	5.5	5.5	5.5
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	4	2X	---	---	0.2	0.2	0.2	0.2	0.2	0.2
	GFPU				1.9	1.9	1.9	1.9	1.9	1.9

EQUIPMENT TEMPERATURE 11 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.666

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,332.00	2,000	1,332.00	2,000	1,332.00
POLE TO FRAME	2,000	1,332.00	2,000	1,332.00	2,000	1,332.00
LINE TO LOAD	2,000	1,332.00	2,000	1,332.00	2,000	1,332.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.025	0.027	0.029

COMMENTS: INST & ST TESTED AT 3.

DEFICIENCIES: BATTERY NEEDS TO BE REPLACED.

☐ ACCEPTABLE ☑ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979, DLRO #UIS1570, SI #013214

Tested By: E. TAPPAN — Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 240
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/28/2020 — TEMPERATURE 52 °F — HUMIDITY 30 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION FEEDER F4C

MANUFACTURER	CUTLER HAMMER	SN / SO NO.	4135809059003	FRAME SIZE(F)	800
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	600	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	4C	THERMAL MEMORY	● ON ○ OFF
TRIP UNIT TYPE	DIGITRIP 520	CATALOG NO.	MDSC083WEA	ZONE INTLK ☑	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Dirty	C
CONTACT FINGERS	☑	Dirty	C
LOADING AND ARCING CONTACTS	☑	Dirty	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Dirty	C
AUXILIARY DEVICES	☐	N/A	N/A
GROUND CONNECTION	☑	Dirty	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND												
RATING PLUG(R)	600	LONG TIME PU	1	x	600	A =	600	A	DELAY	4		
SENSOR TAP	600	SHORT TIME PU	6	=	3600	A			DELAY	0.2	I²T ○ IN	● OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	8	=	4800	A	● ON ○ OFF					
		GRD. FLT. PU	0.35	=	210	A	● ON ○ OFF		DELAY	0.2	I²T ○ IN	● OUT ○ N/A

SETTINGS AS LEFT												
RATING PLUG(R)	600	LONG TIME PU	1	x	600	A =	600	A	DELAY	4		
SENSOR TAP	600	SHORT TIME PU	6	=	3600	A			DELAY	0.2	I²T ○ IN	● OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	8	=	4800	A	● ON ○ OFF					
		GRD. FLT. PU	0.35	=	210	A	● ON ○ OFF		DELAY	0.2	I²T ○ IN	● OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	30	2X	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	IPU									
SHORT TIME	30	2X	---	---	0.2	0.2	0.2	0.2	0.1	0.1
	STPU									
LONG TIME	30	6X	---	---	3.7	3.7	3.6	3.6	3.6	3.6
	LTPU				5.4	5.4	5.4	5.4	5.4	5.4
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	4	2X	---	---	0.2	0.2	0.2	0.2	0.2	0.2
	GFPU				1.9	1.9	1.9	1.9	1.9	1.9

EQUIPMENT TEMPERATURE 11 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.666

INSULATION RESISTANCE	POLE 1 MΩ (P1-P2) READING	POLE 1 20°C	POLE 2 MΩ (P2-P3) READING	POLE 2 20°C	POLE 3 MΩ (P3-P1) READING	POLE 3 20°C
POLE TO POLE	2,000	1,332.00	2,000	1,332.00	2,000	1,332.00
POLE TO FRAME	2,000	1,332.00	2,000	1,332.00	2,000	1,332.00
LINE TO LOAD	2,000	1,332.00	2,000	1,332.00	2,000	1,332.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.013	0.015	0.018

COMMENTS: ST & INST TESTED AT 3.

DEFICIENCIES: TRIP UNIT BATTERY NEEDS REPLACEMENT.

☐ ACCEPTABLE ☑ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979, DLRO #UIS1570, SI #013214

Tested By: E. TAPPAN — Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 241
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/6/2020 — TEMPERATURE 60 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING (2F)
SUBSTATION 5 — POSITION M8C BUS B MAIN

MANUFACTURER	EATON	SN / SO NO.	---	FRAME SIZE(F)	4000
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	4000	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	◉ ON ○ OFF
TRIP UNIT TYPE	DIGITRIP 520	CATALOG NO.	MDSC403WEA	ZONE INTLK ☑	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Dirty	C
CONTACT FINGERS	☑	Dirty	C/L
LOADING AND ARCING CONTACTS	☑	Dirty	C
OVERCURRENT DEV. BATTERY	☑	Very Poor	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Dirty	C
AUXILIARY DEVICES	☐	N/A	N/A
GROUND CONNECTION	☑	Dirty	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	4000	LONG TIME PU	0.8	x	4000	A =	3200	A	DELAY	4	
SENSOR TAP	4,000	SHORT TIME PU	2.5	=	8000	A			DELAY	0.3	I²T ○ IN ◉ OUT ○ N/A
GRD. FLT. ○ 3W ○ 4W		INST. PU	---	=	---	A	○ ON ◉ OFF				
		GRD. FLT. PU	0.30	=	1200	A	◉ ON ○ OFF		DELAY	0.4	I²T ○ IN ◉ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	4000	LONG TIME PU	0.8	x	4000	A =	3200	A	DELAY	4	
SENSOR TAP	4,000	SHORT TIME PU	2.5	=	8000	A			DELAY	0.3	I²T ○ IN ◉ OUT ○ N/A
GRD. FLT. ○ 3W ○ 4W		INST. PU	---	=	---	A	○ ON ◉ OFF				
		GRD. FLT. PU	0.30	=	1200	A	◉ ON ○ OFF		DELAY	0.4	I²T ○ IN ◉ OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	24	2.4	---	---	0.4	0.4	0.4	0.4	0.5	0.5
	STPU									
LONG TIME	24	6X	---	---	3.7	3.7	3.5	3.5	3.7	3.7
	LTPU				4.5	4.5	4.5	4.5	4.5	4.5
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	9	6X	---	---	0.6	0.6	0.6	0.6	0.6	0.6
	GFPU									

EQUIPMENT TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.848

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
POLE TO FRAME	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00
LINE TO LOAD	2,000	1,696.00	2,000	1,696.00	2,000	1,696.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.014	0.015	0.014

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761, AMPTECTOR SI #013214

Tested By: A. SHERWOOD Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 242
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/28/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING 2F
SUBSTATION 5 — POSITION MCC-51A

NAMEPLATE DATA

MANUFACTURER EATON — SERIAL NO. --- — TYPE 2100
CATALOG NO. MDT03545 IT.026-FVC — DRAWING NO. --- — VOLTAGE CLASS 600
MAIN BUS RATING 800 A — MAIN BUS NEUTRAL RATING --- A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING 65KA — NUMBER OF SECTIONS 6 — LISTING [✓] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER X — MLO --- — TYPE HMDL — AMPACITY 800 — MAIN DISCONNECT --- — FUSE TYPE --- — SIZE ---
TOTAL POSITIONS EQUIPPED 10 — NO. OF SPARE SPACES 2 — TOTAL POSITIONS USED 8

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
1 TO 6	RDG.	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
	20°C	2,120	2,120	2,120	2,120	2,120	2,120	2,120	2,120	2,120	2,120
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES:

[✓] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 243

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/28/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING 2F

SUBSTATION 5 — POSITION MCC-51A (01)

NAMEPLATE DATA

MANUFACTURER EATON — SIZE 800A — TYPE ---

CATALOG NO. MDT03545 IT0.24-FVC — SERIES FREEDOM SERIES 2100 — MAX. VOLTS 480

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06

INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
LB-1	BRKR	15A	2,307	4,701	1,627	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE SIZE 2	BRKR	7A	28,316	2,683	27,622	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE SIZE 3	BRKR	100A	1,276	1,287	1,546	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
TPTP-1	BRKR	15A	9,830	6,479	7,599	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
MRH-2	BRKR	30A	2,848	2,842	2,892	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
DPTP-1	BRKR	15A	7,700	9,815	6,827	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
STWP-1	BRKR	100A	943	873.6	872.8	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ATS-51A	BRKR	600A	746.3	549	342.1	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
MAIN 51A	BRKR	800A	218	251.9	247.5	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 244

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE

DATE 2/28/2020 TEMPERATURE 70 °F HUMIDITY 60 % EQPT. LOCATION SOLIDS BUILDING 2F

SUBSTATION 5 POSITION MCC-51A (02)

NAMEPLATE DATA

MANUFACTURER EATON SIZE 800A TYPE ---

CATALOG NO. MDT03545 IT0.24-FVC SERIES FREEDOM SERIES 2100 MAX. VOLTS 480

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C

TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1

K2 = (K1) (TCF) = 1.06

INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
SPD	BRKR	30A	3,184	3,041	3,242	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOLDED CASE WITH SOLID STATE TRIP UNIT CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 245

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/28/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING (2F)

SUBSTATION 5 — POSITION MCC-51A (MAIN)

MANUFACTURER	CUTLER HAMMER	SN / SO NO.	---	FRAME SIZE(F)	800
BREAKER TYPE	HMDL	SENSOR TAPS	800	MOUNTING	(●) B.I. ( ) D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	(●) ON ( ) OFF
TRIP UNIT TYPE	DIGITRIP RMS 310	CATALOG NO.	HMDL3800F	ZONE INTLK [ ]	TARGETS [ ]

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	NA
AUXILIARY DEVICES	☐	N/A	NA
GROUND CONNECTION	☑	Acceptable	NA
LOAD CONDUCTOR NO. 0	Size		Cu ( ) Al ( )

SETTINGS AS FOUND

RATING PLUG(R)	800	LONG TIME PU	---	x	800	A =	800	A	DELAY	---		
SENSOR TAP	800	SHORT TIME PU	2	=	1600	A			DELAY	---	I²T ( ) IN	( ) OUT (●) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	---	=	---	A	( ) ON	( ) OFF				
		GRD. FLT. PU	---	=	---	A	( ) ON	( ) OFF	DELAY	---	I²T ( ) IN	( ) OUT ( ) N/A

SETTINGS AS LEFT

RATING PLUG(R)	800	LONG TIME PU	---	x	800	A =	800	A	DELAY	---		
SENSOR TAP	800	SHORT TIME PU	2	=	1600	A			DELAY	---	I²T ( ) IN	( ) OUT (●) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	---	=	---	A	( ) ON	( ) OFF				
		GRD. FLT. PU	---	=	---	A	( ) ON	( ) OFF	DELAY	---	I²T ( ) IN	( ) OUT ( ) N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	D	---	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	STPU									
LONG TIME	D	---	28	56	40.6	40.6	40.6	40.6	40.6	40.6
	LTPU									
GROUND FAULT	---	---	---	---	---	---	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.056

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P4)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
POLE TO FRAME	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
LINE TO LOAD	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00

POLE RESISTANCE READING

[ ] MICRO-OHMS [☑] MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.218	0.2519	0.2475

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

COMMENTS: STYLE # 4203B99G06.
TRIP UNIT CAT # 8MES800T. TRIP UNIT TYPE: MES3800LS.

DEFICIENCIES:

[☑] ACCEPTABLE [ ] NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563, RAYTECH DLRO #UIS1572, CUTLER HAMMER SI #UIS1078

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 246
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/6/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION MCC-51B

NAMEPLATE DATA

MANUFACTURER EATON — SIZE --- — TYPE 2100
CATALOG NO. --- — SERIES --- — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
MAIN	HMDL BRKR	800	375.6	413	287.4	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
TVSS-51B	HFD BRKR	30	3,567	3,505	3,637	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ATS-51 SOURCE B	HLD BRKR	600	434.5	386	335.2	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
DPTP-2	HMCP BRKR	15	6,286	6,911	6,829	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
STWP-2	HMCP BRKR	100	1,511	893	947	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
TPIP-2	HMCP BRKR	15	6,549	6,721	9,769	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
EQUIPMENT SPARE FEEDER	HFD BRKR	150	986	2,210	1,908	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
EQUIPMENT SPARE SIZE 1	HMCP BRKR	7	28,328	29,848	27,378	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
EQUIPMENT SPARE SIZE 3	HMCP BRKR	100	3,171	16,517	1,164	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563, RAYTECH DLRO #UIS1572

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
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MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 247
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/6/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION MCC-51B

NAMEPLATE DATA

MANUFACTURER EATON — SERIAL NO. --- — TYPE 2100
CATALOG NO. --- — DRAWING NO. --- — VOLTAGE CLASS 600
MAIN BUS RATING 800 A — MAIN BUS NEUTRAL RATING --- A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING 65 — NUMBER OF SECTIONS 6 — LISTING [x] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER X — MLO --- — TYPE HMDL — AMPACITY 800 — MAIN DISCONNECT --- — FUSE TYPE --- — SIZE ---
TOTAL POSITIONS EQUIPPED 10 — NO. OF SPARE SPACES 17 — TOTAL POSITIONS USED 6

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTIONS	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
SECTION 1 THRU SECTION 6	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	2,120	2,120	2,120		2,120	2,120	2,120			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.

Dexter, Michigan
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(937) 439-9660

MOLDED CASE WITH SOLID STATE TRIP UNIT CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 248

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/6/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING

SUBSTATION 5 — POSITION MCC-51B (MAIN)

MANUFACTURER	CUTLER HAMMER	SN / SO NO.	---	FRAME SIZE(F)	800
BREAKER TYPE	HMDL65K	SENSOR TAPS	800	MOUNTING	(●) B.I. ( ) D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	(●) ON ( ) OFF
TRIP UNIT TYPE	DIGITRIP RMS 310	CATALOG NO.	HMDL3800F	ZONE INTLK [ ]	TARGETS [ ]

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Dirty	C
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	NA
AUXILIARY DEVICES	☐	N/A	NA
GROUND CONNECTION	☑	Acceptable	NA
LOAD CONDUCTOR NO. 0	Size		Cu ( ) Al ( )

SETTINGS AS FOUND

RATING PLUG(R)	800	LONG TIME PU	---	x	800	A =	800	A	DELAY	---	
SENSOR TAP	800	SHORT TIME PU	2	=	1600	A			DELAY	---	I²T ( ) IN ( ) OUT (●) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	---	=	---	A	( ) ON ( ) OFF				
		GRD. FLT. PU	---	=	---	A	( ) ON ( ) OFF		DELAY	---	I²T ( ) IN ( ) OUT ( ) N/A

SETTINGS AS LEFT

RATING PLUG(R)	800	LONG TIME PU	---	x	800	A =	800	A	DELAY	---	
SENSOR TAP	800	SHORT TIME PU	2	=	1600	A			DELAY	---	I²T ( ) IN ( ) OUT (●) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	---	=	---	A	( ) ON ( ) OFF				
		GRD. FLT. PU	---	=	---	A	( ) ON ( ) OFF		DELAY	---	I²T ( ) IN ( ) OUT ( ) N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	D	---	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	STPU									
LONG TIME	D	---	28	56	40.84	40.84	40.84	40.84	40.84	40.84
	LTPU									
GROUND FAULT	---	---	---	---	---	---	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.056

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P4)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
POLE TO FRAME	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
LINE TO LOAD	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00

POLE RESISTANCE READING — [ ] MICRO-OHMS [☑] MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.03756	0.0413	0.02874

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

COMMENTS: TRIP UNIT CAT # MES3800LS.

DEFICIENCIES:

[☑] ACCEPTABLE [ ] NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563, RAYTECH DLRO #UIS1572, CUTLER HAMMER SI #UIS1078

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 249
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/28/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING 2F
SUBSTATION 5 — POSITION MCC-52A

NAMEPLATE DATA

MANUFACTURER EATON — SERIAL NO. --- — TYPE 2100
CATALOG NO. MDT03545 IT.025FVC — DRAWING NO. --- — VOLTAGE CLASS 600
MAIN BUS RATING 800 A — MAIN BUS NEUTRAL RATING --- A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING 65KA — NUMBER OF SECTIONS 6 — LISTING [x] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER x — MLO --- — TYPE HMDL — AMPACITY 800 — MAIN DISCONNECT --- — FUSE TYPE --- — SIZE ---
TOTAL POSITIONS EQUIPPED 11 — NO. OF SPARE SPACES 3 — TOTAL POSITIONS USED 8

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
1 TO 6	RDG.	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
	20°C	2,120	2,120	2,120	2,120	2,120	2,120	2,120	2,120	2,120	2,120
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER UIS #1563

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 250

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/28/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING 2F

SUBSTATION 5 — POSITION MCC-52A (01)

NAMEPLATE DATA

MANUFACTURER EATON — SIZE 800 — TYPE 2100

CATALOG NO. MDT03545 IT.025TVC — SERIES FREEDOM SERIES 2100 — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06

INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
LB-2	BRKR	150A	22,346	5,377	1,939	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE SIZE 1	BRKR	30A	3,001	2,715	2,794	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE SIZE 1	BRKR	30A	3,046	10,438	7,111	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE SIZE 2	BRKR	70A	14,380	9,855	21,678	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
BTAB-1	BRKR	70A	1,995	4,970	1,702	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
BTAB-3	BRKR	70A	1,620	1,738	1,342	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
WTM-1	BRKR	15A	7,193	8,502	8,449	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
LDTM-2	BRKR	30A	3,073	3,707	3,515	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ATS-52	BRKR	600A	931	330.5	782	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 251

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE

DATE 2/28/2020 TEMPERATURE 70 °F HUMIDITY 60 % EQPT. LOCATION SOLIDS BUILDING 2F

SUBSTATION 5 POSITION MCC-52A (02)

NAMEPLATE DATA

MANUFACTURER EATON SIZE 800 TYPE 2100

CATALOG NO. MDT03545 IT.025TVC SERIES FREEDOM SERIES 2100 MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C

TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1

K2 = (K1) (TCF) = 1.06

INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
MAIN 52A	BRKR	800A	455.8	967	468.3	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
TVSS	BRKR	30A	2,983	3,146	3,406	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST 15600, REVISED 1/2/2020

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOLDED CASE WITH SOLID STATE TRIP UNIT CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 252

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/28/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING 2F

SUBSTATION 5 — POSITION MCC-52A (MAIN)

MANUFACTURER	CUTLER HAMMER	SN / SO NO.	---	FRAME SIZE(F)	800
BREAKER TYPE	HMDL	SENSOR TAPS	800	MOUNTING	(●) B.I. ( ) D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	(●) ON ( ) OFF
TRIP UNIT TYPE	DIGITRIP RMS 310	CATALOG NO.	HMDL3800F	ZONE INTLK [ ]	TARGETS [ ]

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	NA
AUXILIARY DEVICES	☐	N/A	NA
GROUND CONNECTION	☑	Acceptable	NA
LOAD CONDUCTOR NO. 0	Size		Cu ( ) Al ( )

SETTINGS AS FOUND

RATING PLUG(R)	800	LONG TIME PU	---	x	800	A =	800	A	DELAY	---		
SENSOR TAP	800	SHORT TIME PU	2	=	1600	A			DELAY	---	I²T ( ) IN	( ) OUT (●) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	---	=	---	A	( ) ON	( ) OFF				
		GRD. FLT. PU	---	=	---	A	( ) ON	( ) OFF	DELAY	---	I²T ( ) IN	( ) OUT ( ) N/A

SETTINGS AS LEFT

RATING PLUG(R)	800	LONG TIME PU	---	x	800	A =	800	A	DELAY	---		
SENSOR TAP	800	SHORT TIME PU	2	=	1600	A			DELAY	---	I²T ( ) IN	( ) OUT (●) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	---	=	---	A	( ) ON	( ) OFF				
		GRD. FLT. PU	---	=	---	A	( ) ON	( ) OFF	DELAY	---	I²T ( ) IN	( ) OUT ( ) N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	D	---	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	STPU									
LONG TIME	D	---	28	56	40.86	40.86	40.86	40.86	40.86	40.86
	LTPU									
GROUND FAULT	---	---	---	---	---	---	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.056

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P4)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
POLE TO FRAME	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
LINE TO LOAD	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00

POLE RESISTANCE READING — [ ] MICRO-OHMS [☑] MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.4558	0.967	0.4683

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

COMMENTS: STYLE # 4203B99G06. TRIP UNIT CAT # 8MES800T. TRIP UNIT TYPE: MES3800LS.

DEFICIENCIES:

[☑] ACCEPTABLE [ ] NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563, RAYTECH DLRO #UIS1572, CUTLER HAMMER SI #UIS1078

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 253
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/6/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION MCC-52B

NAMEPLATE DATA

MANUFACTURER EATON — SERIAL NO. --- — TYPE 2100
CATALOG NO. --- — DRAWING NO. --- — VOLTAGE CLASS 600
MAIN BUS RATING 800 A — MAIN BUS NEUTRAL RATING --- A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING 65K — NUMBER OF SECTIONS 6 — LISTING [x] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER X — MLO --- — TYPE HMDL — AMPACITY 800 — MAIN DISCONNECT --- — FUSE TYPE --- — SIZE ---
TOTAL POSITIONS EQUIPPED 12 — NO. OF SPARE SPACES 17 — TOTAL POSITIONS USED 17 6

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTIONS	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
SECTION 1 THRU SECTION 6	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	2,120	2,120	2,120		2,120	2,120	2,120			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
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FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 254
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/6/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION MCC-52B (01)

NAMEPLATE DATA

MANUFACTURER EATON — SIZE --- — TYPE 2100
CATALOG NO. --- — SERIES --- — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
MAIN	HMDL BRKR	800	287.8	294.6	462.8	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
TVSS-52B	HFD BRKR	30	2,981	3,126	3,626	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ATS-52 SOURCE B	HLD BRKR	600	405.8	286.2	391.8	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
WTM-2	HMCP BRKR	15	6,395	6,447	6,724	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
LDTM-1	HMCP BRKR	30	2,643	2,947	8,194	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
EQUIPMENT SPARE SIZE 2	HMCP BRKR	70	31,028	10,215	13,480	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
BTAB-2	HMCP BRKR	70	1,266	2,111	1,656	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
TEMP DEWATERED CAKE CONVEYOR	HMCP BRKR	15	8,935	15,133	6,736	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
EQUIPMENT SPARE SIZE 1	HMCP BRKR	30	2,977	3,939	24,062	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563, RAYTECH DLRO #UIS1572

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
Dexter, Michigan
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FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 255
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/6/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION MCC-52B (02)

NAMEPLATE DATA

MANUFACTURER EATON — SIZE --- — TYPE 2100
CATALOG NO. --- — SERIES --- — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
EQUIPMENT SPARE SIZE 1	HMCP BRKR	30	3,341	6,738	16,034	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
EQUIPMENT SPARE FDRB	HFD BRKR	125	5,323	1,616	1,370	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563, RAYTECH DLRO #UIS1572

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOLDED CASE WITH SOLID STATE TRIP UNIT CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 256

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/6/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING

SUBSTATION 5 — POSITION MCC-52B (MAIN)

MANUFACTURER	CUTLER HAMMER	SN / SO NO.	---	FRAME SIZE(F)	800
BREAKER TYPE	HMDL65K	SENSOR TAPS	800	MOUNTING	(●) B.I. ( ) D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	(●) ON ( ) OFF
TRIP UNIT TYPE	DIGITRIP RMS 310	CATALOG NO.	HMDL3800F	ZONE INTLK [ ]	TARGETS [ ]

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Dirty	C
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	NA
AUXILIARY DEVICES	☐	N/A	NA
GROUND CONNECTION	☑	Acceptable	NA
LOAD CONDUCTOR NO. 0	Size		Cu ( ) Al ( )

SETTINGS AS FOUND

RATING PLUG(R)	800	LONG TIME PU	---	x	800	A =	800	A	DELAY	---	
SENSOR TAP	800	SHORT TIME PU	2	=	1600	A			DELAY	---	I²T ( ) IN ( ) OUT (●) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	---	=	---	A	( ) ON ( ) OFF				
		GRD. FLT. PU	---	=	---	A	( ) ON ( ) OFF		DELAY	---	I²T ( ) IN ( ) OUT ( ) N/A

SETTINGS AS LEFT

RATING PLUG(R)	800	LONG TIME PU	---	x	800	A =	800	A	DELAY	---	
SENSOR TAP	800	SHORT TIME PU	2	=	1600	A			DELAY	---	I²T ( ) IN ( ) OUT (●) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	---	=	---	A	( ) ON ( ) OFF				
		GRD. FLT. PU	---	=	---	A	( ) ON ( ) OFF		DELAY	---	I²T ( ) IN ( ) OUT ( ) N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	D	---	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	STPU									
LONG TIME	D	---	28	56	41.15	41.15	41.15	41.15	41.15	41.15
	LTPU									
GROUND FAULT	---	---	---	---	---	---	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.056

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P4)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
POLE TO FRAME	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
LINE TO LOAD	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00

POLE RESISTANCE READING — [ ] MICRO-OHMS [☑] MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.02878	0.02946	0.04628

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

COMMENTS: TRIP UNIT CAT # MES3800LS.

DEFICIENCIES:

[☑] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563, RAYTECH DLRO #UIS1572, CUTLER HAMMER SI #UIS1078

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 257
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/28/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING 2F
SUBSTATION 5 — POSITION MCC-53A

NAMEPLATE DATA

MANUFACTURER EATON — SERIAL NO. --- — TYPE 2100
CATALOG NO. MDT03545 IT.026-FVC — DRAWING NO. --- — VOLTAGE CLASS 600
MAIN BUS RATING 600 A — MAIN BUS NEUTRAL RATING N/A A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING 65KA — NUMBER OF SECTIONS 6 — LISTING [x] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER X — MLO --- — TYPE HLD — AMPACITY 600 — MAIN DISCONNECT --- — FUSE TYPE --- — SIZE ---
TOTAL POSITIONS EQUIPPED 20 — NO. OF SPARE SPACES 3 — TOTAL POSITIONS USED 17

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
1 TO 6	RDG.	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
	20°C	2,120	2,120	2,120	2,120	2,120	2,120	2,120	2,120	2,120	2,120
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS: TIE IN SEPARATE SECTION NOT COUNTED ON THIS FORM.

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

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FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 258

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE

DATE 2/28/2020 TEMPERATURE 70 °F HUMIDITY 60 % EQPT. LOCATION SOLIDS BUILDING 2F

SUBSTATION 5 POSITION MCC-53A (01)

NAMEPLATE DATA

MANUFACTURER EATON SIZE 600A TYPE 2100

CATALOG NO. MDT03545 IT.026-FVC SERIES FREEDOM SERIES 2100 MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C

TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1

K2 = (K1) (TCF) = 1.06

INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
CF2-AHU-3	BRKR	100	1,101	1,487	1,202	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CF1-EAF-6	BRKR	15	8,313	6,779	7,119	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CF2-EAF-1	BRKR	3	156,310	156,360	158,360	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CF2-EAF-3	BRKR	7	27,176	27,162	27,332	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CF2-EAF-5	BRKR	7	30,550	27,696	36,298	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE SIZE 1	BRKR	3	186,350	186,490	171,240	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CF2-HSP-3	BRKR	15	6,409	8,076	7,794	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CF1-EAF-2	BRKR	7	41,946	27,324	44,920	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CF1-EAF-4	BRKR	7	28,904	27,726	36,582	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.

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(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 259

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/28/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING 2F

SUBSTATION 5 — POSITION MCC-53A (02)

NAMEPLATE DATA

MANUFACTURER EATON — SIZE 600A — TYPE 2100

CATALOG NO. MDT03545 IT.026-FVC — SERIES FREEDOM SERIES 2100 — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06

INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
SPARE SIZE 1	BRKR	15	13,508	6,562	10,967	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CF2-HSP-1	BRKR	7	27,990	47,980	35,920	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CF2-AHU-1	BRKR	50	1,864	25,016	10,500	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CF1-EAF-5	BRKR	50	1,807	1,652	2,244	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
NO NAME	BRKR	40	2,231	2,156	2,127	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE SIZE 2	BRKR	50	13,178	8,673	4,525	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CR1-HSP-1	BRKR	30	2,423	2,707	4,061	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CR1-HSP-5	BRKR	50	2,167	2,119	1,709	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CR1-HSP-7	BRKR	3	155,050	160,390	155,360	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: NO NAME RETERMINATED B-PHASE DUE TO STRANDS NOT UNDER LUG.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

Dexter, Michigan
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FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 260

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/28/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING 2F

SUBSTATION 5 — POSITION MCC-53A (03)

NAMEPLATE DATA

MANUFACTURER EATON — SIZE 600A — TYPE 2100

CATALOG NO. MDT03545 IT.026-FVC — SERIES FREEDOM SERIES 2100 — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06

INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
MAIN 53A	BRKR	600A	506.7	586.8	532	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
TVSS-53A	BRKR	30	4,414	3,039	4,567	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

Dexter, Michigan
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(937) 439-9660

MOLDED CASE WITH SOLID STATE TRIP UNIT CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 261

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 2/28/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING 2F

SUBSTATION 5 — POSITION MCC-53A (MAIN)

MANUFACTURER	CUTLER HAMMER	SN / SO NO.	---	FRAME SIZE(F)	600
BREAKER TYPE	HLD	SENSOR TAPS	600	MOUNTING	(●) B.I. ( ) D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	(●) ON ( ) OFF
TRIP UNIT TYPE	DIGITRIP RMS 310	CATALOG NO.	HLD3600F	ZONE INTLK [ ]	TARGETS [ ]

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	NA
AUXILIARY DEVICES	☐	N/A	NA
GROUND CONNECTION	☑	Acceptable	NA
LOAD CONDUCTOR NO. 0	Size		Cu ( ) Al ( )

SETTINGS AS FOUND

RATING PLUG(R)	600	LONG TIME PU	---	x	600	A =	600	A	DELAY	---	
SENSOR TAP	600	SHORT TIME PU	2	=	1200	A			DELAY	---	I²T ( ) IN ( ) OUT (●) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	---	=	---	A	( ) ON ( ) OFF				
		GRD. FLT. PU	---	=	---	A	( ) ON ( ) OFF		DELAY	---	I²T ( ) IN ( ) OUT ( ) N/A

SETTINGS AS LEFT

RATING PLUG(R)	600	LONG TIME PU	---	x	600	A =	600	A	DELAY	---	
SENSOR TAP	600	SHORT TIME PU	2	=	1200	A			DELAY	---	I²T ( ) IN ( ) OUT (●) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	---	=	---	A	( ) ON ( ) OFF				
		GRD. FLT. PU	---	=	---	A	( ) ON ( ) OFF		DELAY	---	I²T ( ) IN ( ) OUT ( ) N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	C	---	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	STPU									
LONG TIME	C	---	24	48	35.78	35.78	35.78	35.78	35.78	35.78
	LTPU									
GROUND FAULT	---	---	---	---	---	---	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.056

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P4)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
POLE TO FRAME	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
LINE TO LOAD	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00

POLE RESISTANCE READING

[ ] MICRO-OHMS [☑] MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.5067	0.5868	0.532

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

COMMENTS: STYLE # 6633C81G06. TRIP UNIT CAT # 6LES600T. TRIP UNIT TYPE: LES3600LS.

DEFICIENCIES:

[☑] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563, RAYTECH DLRO #UIS1572, CUTLER HAMMER SI #UIS1078

Tested By: N. HERRST Tested By: T. DODGE

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MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 262
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/6/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION MCC-53B

NAMEPLATE DATA

MANUFACTURER EATON — SERIAL NO. --- — TYPE 2100
CATALOG NO. --- — DRAWING NO. --- — VOLTAGE CLASS 600
MAIN BUS RATING 600 A — MAIN BUS NEUTRAL RATING --- A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING 65 — NUMBER OF SECTIONS 6 — LISTING [x] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER X — MLO --- — TYPE HLD — AMPACITY 600 — MAIN DISCONNECT --- — FUSE TYPE --- — SIZE ---
TOTAL POSITIONS EQUIPPED 19 — NO. OF SPARE SPACES 11 — TOTAL POSITIONS USED 17

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTIONS	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
SECTION 1 THRU SECTION 6	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	2,120	2,120	2,120		2,120	2,120	2,120			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 263
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/6/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING (01)
SUBSTATION 5 — POSITION MCC-53B (01)

NAMEPLATE DATA

MANUFACTURER EATON — SIZE --- — TYPE 2100
CATALOG NO. --- — SERIES --- — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
MAIN	HLD BRKR	600	554.9	449.3	481.9	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
TVSS-53B	HFD BRKR	30	3,157	3,158	3,168	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
EQUIPMENT SPARE SIZE 2	HMCP BRKR	70	16,641	22,894	22,328	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CR1-HSP-2	HMCP BRKR	30	2,638	2,685	2,873	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CR1-HSP-6	HMCP BRKR	50	20,178	1,973	2,172	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CF2-HSP-2	HMCP BRKR	7	27,638	28,024	30,482	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CF2-AHU-2	HMCP BRKR	50	2,397	1,496	2,958	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CF2-EAF-4	HMCP BRKR	7	27,384	27,694	27,380	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CF2-EAF-6	HMCP BRKR	7	26,824	27,046	27,358	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563, RAYTECH DLRO #UIS1572

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 264
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/6/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION MCC-53B (02)

NAMEPLATE DATA

MANUFACTURER EATON — SIZE --- — TYPE 2100
CATALOG NO. --- — SERIES --- — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
EQUIPMENT SPARE SIZE 1	HMCP BRKR	7	30,248	28,510	32,468	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CF2-EAF-7	HMCP BRKR	15	6,054	6,160	6,227	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CF2-EAF-8	HMCP BRKR	30	4,010	2,794	3,360	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
DL1-EAF-1	HMCP BRKR	7	29,094	27,394	27,584	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
EQUIPMENT SPARE SIZE 1	HMCP BRKR	30	9,186	26,736	17,155	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
DL1-EAF-2	HMCP BRKR	7	27,492	27,348	27,354	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
DL2-EAF-1	HMCP BRKR	7	27,446	28,410	28,128	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
DL2-EAF-2	HMCP BRKR	7	28,778	30,480	27,948	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
EQUIPMENT SPARE SIZE 3	HMCP BRKR	100	1,493	1,803	2,331	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563, RAYTECH DLRO #UIS1572

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOLDED CASE WITH SOLID STATE TRIP UNIT CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 265

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/6/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING

SUBSTATION 5 — POSITION MCC-53B (MAIN)

MANUFACTURER	CUTLER HAMMER	SN / SO NO.	---	FRAME SIZE(F)	600
BREAKER TYPE	HLD65K	SENSOR TAPS	600	MOUNTING	(●) B.I. ( ) D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	(●) ON ( ) OFF
TRIP UNIT TYPE	DIGITRIP RMS 310	CATALOG NO.	HLD3600F	ZONE INTLK [ ]	TARGETS [ ]

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Dirty	C
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	NA
AUXILIARY DEVICES	☐	N/A	NA
GROUND CONNECTION	☑	Acceptable	NA
LOAD CONDUCTOR NO. 0	Size		Cu ( ) Al ( )

SETTINGS AS FOUND

RATING PLUG(R) 600 — SENSOR TAP 600 — GRD. FLT. ( ) 3W ( ) 4W

LONG TIME PU	---	x	600	A =	600	A	DELAY	---	
SHORT TIME PU	2	=	1200	A			DELAY	---	I²T ( ) IN ( ) OUT (●) N/A
INST. PU	---	=	---	A	( ) ON	( ) OFF			
GRD. FLT. PU	---	=	---	A	( ) ON	( ) OFF	DELAY	---	I²T ( ) IN ( ) OUT ( ) N/A

SETTINGS AS LEFT

RATING PLUG(R) 600 — SENSOR TAP 600 — GRD. FLT. ( ) 3W ( ) 4W

LONG TIME PU	---	x	600	A =	600	A	DELAY	---	
SHORT TIME PU	2	=	1200	A			DELAY	---	I²T ( ) IN ( ) OUT (●) N/A
INST. PU	---	=	---	A	( ) ON	( ) OFF			
GRD. FLT. PU	---	=	---	A	( ) ON	( ) OFF	DELAY	---	I²T ( ) IN ( ) OUT ( ) N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	C	---	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	STPU									
LONG TIME	C	---	24	48	31.69	31.69	31.69	31.69	31.69	31.69
	LTPU									
GROUND FAULT	---	---	---	---	---	---	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.056

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P4)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
POLE TO FRAME	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
LINE TO LOAD	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00

POLE RESISTANCE READING — [ ] MICRO-OHMS [☑] MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.05549	0.04493	0.04819

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

COMMENTS:

DEFICIENCIES:

[☑] ACCEPTABLE [ ] NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563, RAYTECH DLRO #UIS1572, CUTLER HAMMER SI #UIS1078

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 266
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/5/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION MCC-54A

NAMEPLATE DATA

MANUFACTURER EATON — SERIAL NO. --- — TYPE 2100
CATALOG NO. --- — DRAWING NO. --- — VOLTAGE CLASS 600
MAIN BUS RATING 600 A — MAIN BUS NEUTRAL RATING --- A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING 65 — NUMBER OF SECTIONS 6 — LISTING [x] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER X — MLO --- — TYPE HMDL — AMPACITY 800 — MAIN DISCONNECT --- — FUSE TYPE --- — SIZE ---
TOTAL POSITIONS EQUIPPED 16 — NO. OF SPARE SPACES 12 — TOTAL POSITIONS USED 12

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTIONS	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
SECTION 1 THRU SECTION 6	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	2,120	2,120	2,120		2,120	2,120	2,120			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
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FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 267
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/5/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION MCC-54A (01)

NAMEPLATE DATA

MANUFACTURER EATON — SIZE 800 — TYPE 2100
CATALOG NO. --- — SERIES FREEDOM 2100 — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
SLC-6	HMCP BRKR	50A	2,413	1,401	2,053	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SLC-1	HMCP BRKR	15A	6,036	10,622	8,643	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SLC-4	HMCP BRKR	100A	863.8	980.3	1,056	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE	HMCP BRKR	50A	1,800	1,542	1,834	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SLC-3	HMCP BRKR	15A	6,733	6,283	6,248	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE	HMCP BRKR	15A	16,892	9,790	12,223	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ATS-54	HKD 65K	400A	360.9	371.4	355.2	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
MRH-1	HFD BRKR	80A	1,212	17,129	8,132	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ELEV-1	HFD BRKR	150A	603.7	714.1	735.8	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
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FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 268
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/5/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION MCC-54A (02)

NAMEPLATE DATA

MANUFACTURER EATON — SIZE 800 — TYPE 2100
CATALOG NO. --- — SERIES FREEDOM 2100 — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
SPARE FDRB	HFD BRKR	125A	1,589	741.5	1,683	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
WWBP-1	HMCP BRKR	15A	7,086	7,007	6,444	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SHTM-2	HMCP BRKR	50A	1,490	1,829	2,159	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SHTM-3	HMCP BRKR	50A	3,467	1,675	2,495	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
TVSS-A	HFD 65K	30A	3,031	1,334	3,051	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
MAIN 54A	HMDL 65KBRK	800A	351.1	285.7	331.1	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

Dexter, Michigan
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(937) 439-9660

MOLDED CASE WITH SOLID STATE TRIP UNIT CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 269

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/5/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING

SUBSTATION 5 — POSITION MCC-54A (MAIN)

MANUFACTURER	CUTLER HAMMER	SN / SO NO.	---	FRAME SIZE(F)	800
BREAKER TYPE	HMDL65K	SENSOR TAPS	800	MOUNTING	(●) B.I. ( ) D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	(●) ON ( ) OFF
TRIP UNIT TYPE	DIGITRIP RMS 310	CATALOG NO.	HMDL3800F	ZONE INTLK [ ]	TARGETS [ ]

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C
CONTACT FINGERS	☑	Acceptable	NA
LOADING AND ARCING CONTACTS	☑	Acceptable	NA
OVERCURRENT DEV. BATTERY	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	NA
AUXILIARY DEVICES	☐	N/A	NA
GROUND CONNECTION	☑	Acceptable	NA
LOAD CONDUCTOR NO. 0	Size		Cu ( ) Al ( )

SETTINGS AS FOUND

RATING PLUG(R)	800	LONG TIME PU	---	x	800	A =	800	A	DELAY	---		
SENSOR TAP	800	SHORT TIME PU	2	=	1600	A			DELAY	---	I²T	( ) IN ( ) OUT (●) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	---	=	---	A	( ) ON ( ) OFF					
		GRD. FLT. PU	---	=	---	A	( ) ON ( ) OFF		DELAY	---	I²T	( ) IN ( ) OUT ( ) N/A

SETTINGS AS LEFT

RATING PLUG(R)	800	LONG TIME PU	---	x	800	A =	800	A	DELAY	---		
SENSOR TAP	800	SHORT TIME PU	2	=	1600	A			DELAY	---	I²T	( ) IN ( ) OUT (●) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	---	=	---	A	( ) ON ( ) OFF					
		GRD. FLT. PU	---	=	---	A	( ) ON ( ) OFF		DELAY	---	I²T	( ) IN ( ) OUT ( ) N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	D	---	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	STPU									
LONG TIME	D	---	28	56	39.78	39.78	39.78	39.78	39.78	39.78
	LTPU									
GROUND FAULT	---	---	---	---	---	---	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.056

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P4)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
POLE TO FRAME	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
LINE TO LOAD	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00

POLE RESISTANCE READING — ☑ MICRO-OHMS ☐ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.3511	0.2857	0.331

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

COMMENTS: TRIP UNIT CAT # MES3800LS.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563, RAYTECH TTR #UIS1572, CUTLER HAMMER SI #UIS1078

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 270
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/13/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION MCC-54B

NAMEPLATE DATA

MANUFACTURER EATON — SERIAL NO. --- — TYPE 2100
CATALOG NO. --- — DRAWING NO. --- — VOLTAGE CLASS 600
MAIN BUS RATING 800 A — MAIN BUS NEUTRAL RATING 6 A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING 65 — NUMBER OF SECTIONS 6 — LISTING [x] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER X — MLO --- — TYPE HMDL — AMPACITY 800 — MAIN DISCONNECT --- — FUSE TYPE --- — SIZE ---
TOTAL POSITIONS EQUIPPED 13 — NO. OF SPARE SPACES 15 — TOTAL POSITIONS USED 12

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTIONS	☑	Acceptable	NA
AUXILIARY DEVICES	☑	Dirty	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
SECTION 1 THRU SECTION 6	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	2,120	2,120	2,120		2,120	2,120	2,120			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563

Tested By: N. HERRST Tested By: T. DODGE

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FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 271

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/12/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING

SUBSTATION 5 — POSITION MCC-54B (01)

NAMEPLATE DATA

MANUFACTURER EATON — SIZE 800A — TYPE FREEDOM SERIES 2100

CATALOG NO. --- — SERIES 2100 MCC — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06

INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
TVSS-54B	HFD	30A	2,834	2,819	2,994	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
MAIN	HDML	800A	361.8	181.9	239.1	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SHTM-2	HMCP	50A	1,341	1,458	2,072	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SHTM-4	HMCP	50A	1,394	1,476	1,873	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
WWBP-2	HMCP	15A	6,399	7,109	8,200	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE SIZE1	HMCP	30A	3,593	3,144	4,834	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ATS54	HKD	400A	367	328.1	377.4	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE SIZE 3	HMCP	100A	3,349	3,798	6,210	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE SIZE 1	HMCP	7A	27,866	28,982	29,440	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563, RAYTECH DLRO #UIS1572

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
Dexter, Michigan
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FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 272
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/12/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION MCC-54B (02)

NAMEPLATE DATA

MANUFACTURER EATON — SIZE 800A — TYPE FREEDOM SERIES 2100
CATALOG NO. --- — SERIES 2100 MCC — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
SLC-7	HMCP	50A	2,195	1,691	2,203	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SLC-2	HMCP	15A	6,431	6,649	6,478	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SLC-5	HMCP	100A	9,195	9,795	1,356	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563, RAYTECH DLRO #UIS1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOLDED CASE WITH SOLID STATE TRIP UNIT CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 273

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/13/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING

SUBSTATION 5 — POSITION MCC-54B (MAIN)

MANUFACTURER	CUTLER HAMMER	SN / SO NO.	---	FRAME SIZE(F)	800
BREAKER TYPE	HMDL	SENSOR TAPS	800	MOUNTING	(●) B.I. ( ) D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	(●) ON ( ) OFF
TRIP UNIT TYPE	DIGITRIP RMS 310	CATALOG NO.	HMDL3800F	ZONE INTLK [ ]	TARGETS [ ]

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Dirty	C
CONTACT FINGERS	☑	Acceptable	NA
LOADING AND ARCING CONTACTS	☑	Acceptable	NA
OVERCURRENT DEV. BATTERY	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	NA
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	NA
LOAD CONDUCTOR NO. 0	Size		Cu ( ) Al ( )

SETTINGS AS FOUND

RATING PLUG(R)	800	LONG TIME PU	---	x	---	A =	800	A	DELAY	---		
SENSOR TAP	800	SHORT TIME PU	2	=	1600	A			DELAY	---	I²T ( ) IN	( ) OUT (●) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	---	=	---	A	( ) ON	( ) OFF				
		GRD. FLT. PU	---	=	---	A	( ) ON	( ) OFF	DELAY	---	I²T ( ) IN	( ) OUT ( ) N/A

SETTINGS AS LEFT

RATING PLUG(R)	800	LONG TIME PU	---	x	---	A =	800	A	DELAY	---		
SENSOR TAP	800	SHORT TIME PU	2	=	1600	A			DELAY	---	I²T ( ) IN	( ) OUT (●) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	---	=	---	A	( ) ON	( ) OFF				
		GRD. FLT. PU	---	=	---	A	( ) ON	( ) OFF	DELAY	---	I²T ( ) IN	( ) OUT ( ) N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	D	---	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	STPU									
LONG TIME	D	---	28	56	40.73	40.73	40.73	40.73	40.73	40.73
	LTPU									
GROUND FAULT	---	---	---	---	---	---	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.056

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P4)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
POLE TO FRAME	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
LINE TO LOAD	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00

POLE RESISTANCE READING — [ ] MICRO-OHMS [☑] MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.3618	0.1819	0.2391

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

COMMENTS: TRIP UNIT CAT # MES3800LS

DEFICIENCIES:

[☑] ACCEPTABLE [ ] NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563, RAYTECH DLRO #UIS1572, SI #UIS1078

Tested By: N. HERRST Tested By: T. DODGE

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MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 274
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/5/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION MCC-55A

NAMEPLATE DATA

MANUFACTURER EATON — SERIAL NO. --- — TYPE 2100
CATALOG NO. --- — DRAWING NO. --- — VOLTAGE CLASS 600
MAIN BUS RATING 600 A — MAIN BUS NEUTRAL RATING --- A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING 65 — NUMBER OF SECTIONS 6 — LISTING [x] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER X — MLO --- — TYPE HLD — AMPACITY 600 — MAIN DISCONNECT --- — FUSE TYPE --- — SIZE ---
TOTAL POSITIONS EQUIPPED 18 — NO. OF SPARE SPACES 13 — TOTAL POSITIONS USED 15

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTIONS	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
SECTION 1 THRU SECTION 6	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	2,120	2,120	2,120		2,120	2,120	2,120			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563

Tested By: N. HERRST Tested By: T. DODGE

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FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 275
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/5/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION MCC-55A (01)

NAMEPLATE DATA

MANUFACTURER EATON — SIZE 600A — TYPE 2100
CATALOG NO. --- — SERIES FREEDOM 2100 — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
ATS-55	HLD	600A	600.8	635.3	465.3	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CF3-EAF-10	HMCP BRKR	15A	7,431	6,346	6,641	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CR4-EAF-1	HMCP BRKR	7A	28,716	28,756	30,034	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CR4-EAF-3	HMCP BRKR	7A	27,078	27,128	26,994	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
DL3-EAF-1	HMCP BRKR	7A	29,450	28,426	39,138	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CR3-ACU-1	HMCP BRKR	15A	8,005	6,487	8,893	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CF3-EAF-1	HMCP BRKR	7A	27,910	27,506	28,572	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CF3-EAF-6	MCP BRKR	7A	28,482	27,268	28,118	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CF3-EAF-8	HMCP BRKR	15A	16,225	6,158	6,630	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

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FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 276

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/5/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING

SUBSTATION 5 — POSITION MCC-55A (02)

NAMEPLATE DATA

MANUFACTURER EATON — SIZE 600A — TYPE 2100

CATALOG NO. --- — SERIES FREEDOM 2100 — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06

INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
SPARE SIZE 1	HMCP BRKR	3A	156,143	162,330	166,470	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CR3-ACU-2	HMCP BRKR	7A	29,734	28,690	31,998	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CR3-HSP-1	HMCP BRKR	7A	27,714	28,288	30,024	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE SIZE 1	HMCP BRKR	15A	6,308	14,108	18,201	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CR3-RAF-1	HMCP BRKR	7A	33,260	27,676	28,670	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CR3-RAF-2	HMCP BRKR	7A	28,034	28,066	27,968	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
TVSS-55A	HMCP BRKR	30A	2,889	3,094	3,033	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
MAIN 55A	HMCP BRKR	600A	261.1	517.3	369.2	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOLDED CASE WITH SOLID STATE TRIP UNIT CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 277

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/5/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING

SUBSTATION 5 — POSITION MCC-55A (MAIN)

MANUFACTURER	CUTLER HAMMER	SN / SO NO.	---	FRAME SIZE(F)	600
BREAKER TYPE	HLD65K	SENSOR TAPS	600	MOUNTING	(●) B.I. ( ) D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	(●) ON ( ) OFF
TRIP UNIT TYPE	DIGITRIP RMS 310	CATALOG NO.	HLD3600F	ZONE INTLK [ ]	TARGETS [ ]

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C
CONTACT FINGERS	☑	Acceptable	NA
LOADING AND ARCING CONTACTS	☑	Acceptable	NA
OVERCURRENT DEV. BATTERY	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	NA
AUXILIARY DEVICES	☐	N/A	NA
GROUND CONNECTION	☑	Acceptable	NA
LOAD CONDUCTOR NO. 0	Size		Cu ( ) Al ( )

SETTINGS AS FOUND

RATING PLUG(R)	600	LONG TIME PU	---	x	600	A =	600	A	DELAY	---	
SENSOR TAP	600	SHORT TIME PU	2	=	1200	A			DELAY	---	I²T ( ) IN ( ) OUT (●) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	---	=	---	A	( ) ON ( ) OFF				
		GRD. FLT. PU	---	=	---	A	( ) ON ( ) OFF		DELAY	---	I²T ( ) IN ( ) OUT ( ) N/A

SETTINGS AS LEFT

RATING PLUG(R)	600	LONG TIME PU	---	x	600	A =	600	A	DELAY	---	
SENSOR TAP	600	SHORT TIME PU	2	=	1200	A			DELAY	---	I²T ( ) IN ( ) OUT (●) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	---	=	---	A	( ) ON ( ) OFF				
		GRD. FLT. PU	---	=	---	A	( ) ON ( ) OFF		DELAY	---	I²T ( ) IN ( ) OUT ( ) N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	C	---	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	STPU									
LONG TIME	C	---	24	48	36.5	36.5	36.5	36.5	36.5	36.5
	LTPU									
GROUND FAULT	---	---	---	---	---	---	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.056

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P4)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
POLE TO FRAME	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
LINE TO LOAD	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00

POLE RESISTANCE READING — [ ] MICRO-OHMS [☑] MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.2611	0.5173	0.3692

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

COMMENTS: TRIP UNIT CAT # LES3600LS.

DEFICIENCIES:

[☑] ACCEPTABLE [ ] NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563, RAYTECH DLRO #UIS1572, CUTLER HAMMER SI #UIS1078

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 278
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/13/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION MCC-55B

NAMEPLATE DATA

MANUFACTURER EATON — SERIAL NO. --- — TYPE 2100
CATALOG NO. --- — DRAWING NO. --- — VOLTAGE CLASS 600
MAIN BUS RATING 600 A — MAIN BUS NEUTRAL RATING --- A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING 65 — NUMBER OF SECTIONS 6 — LISTING [x] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER X — MLO --- — TYPE HLD — AMPACITY 600 — MAIN DISCONNECT --- — FUSE TYPE --- — SIZE ---
TOTAL POSITIONS EQUIPPED 17 — NO. OF SPARE SPACES 14 — TOTAL POSITIONS USED 16

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTIONS	☑	Acceptable	NA
AUXILIARY DEVICES	☑	Dirty	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
SECTION 1 THRU SECTION 6	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	2,120	2,120	2,120		2,120	2,120	2,120			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563

Tested By: N. HERRST Tested By: T. DODGE

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FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 279
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/12/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION MCC-55B (01)

NAMEPLATE DATA

MANUFACTURER EATON — SIZE 600A — TYPE FREEDOM SERIES 2100
CATALOG NO. --- — SERIES 2100 MCC — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
TVSS-55B	HFD	30A	3,147	2,998	3,575	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
MAIN	HLD	600A	533	488	632	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CR3-AU-2	HMCP	50A	1,960	1,691	1,628	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CR3-AHU-3	HMCP	30A	3,235	2,768	5,575	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CR3-AHU-1	HMCP	50A	1,429	1,467	1,925	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE SIZE 1	HMCP	7A	31,724	48,262	39,240	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CR3-HSP-2	HMCP	7A	30,402	28,242	28,976	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CR3-HSP-3	HMCP	3A	179,340	158,640	165,610	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CR4-ACU-1	HMCP	7A	28,360	29,768	32,454	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

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FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 280
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/12/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION MCC-55B (02)

NAMEPLATE DATA

MANUFACTURER EATON — SIZE 600A — TYPE FREEDOM SERIES 2100
CATALOG NO. --- — SERIES 2100 MCC — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
CF3-EAF-7	HMCP	7A	27,830	29,498	29,168	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CF3-EAF-9	HMCP	15A	12,494	8,093	7,092	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CR3-EAF-1	HMCP	15A	7,676	8,473	7,065	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE SIZE 2	HMCP	50A	23,090	9,880	3,489	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CR4-EAF-2	HMCP	7A	27,296	29,612	27,912	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
DC3-EAF-2	HMCP	7A	27,995	29,068	29,336	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ATS-55B	HLD	400A	524	995	1,975	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

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LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 281
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/13/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION MCC-55B MAIN

MANUFACTURER	CUTLER HAMMER	SN / SO NO.	---	FRAME SIZE(F)	600
BREAKER TYPE	HLD	SENSOR TAPS	600	MOUNTING	(●) B.I. ( ) D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	(●) ON ( ) OFF
TRIP UNIT TYPE	DIGITRIP RMS 310	CATALOG NO.	HLD3600F	ZONE INTLK ☐	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Dirty	C
CONTACT FINGERS	☑	Acceptable	N/A
LOADING AND ARCING CONTACTS	☑	Acceptable	N/A
OVERCURRENT DEV. BATTERY	☐	N/A	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	N/A
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	N/A
LOAD CONDUCTOR NO. 0	Size		CU ( ) AL ( )

SETTINGS AS FOUND

RATING PLUG(R)	600	LONG TIME PU	---	x	---	A =	600	A	DELAY	---		
SENSOR TAP	600	SHORT TIME PU	2	=	1200	A			DELAY	---	I²T	( ) IN ( ) OUT (●) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	---	=	---	A	( ) ON ( ) OFF					
		GRD. FLT. PU	---	=	---	A	( ) ON ( ) OFF		DELAY	---	I²T	( ) IN ( ) OUT ( ) N/A

SETTINGS AS LEFT

RATING PLUG(R)	600	LONG TIME PU	---	x	---	A =	600	A	DELAY	---		
SENSOR TAP	600	SHORT TIME PU	2	=	1200	A			DELAY	---	I²T	( ) IN ( ) OUT (●) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	---	=	---	A	( ) ON ( ) OFF					
		GRD. FLT. PU	---	=	---	A	( ) ON ( ) OFF		DELAY	---	I²T	( ) IN ( ) OUT ( ) N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	C	---	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	STPU									
LONG TIME	C	---	24	48	35.41	35.41	35.41	35.41	35.41	35.41
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	---	---	---	---	---	---	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE	POLE 1 MΩ (P1-P2) READING	POLE 1 20°C	POLE 2 MΩ (P2-P3) READING	POLE 2 20°C	POLE 3 MΩ (P3-P1) READING	POLE 3 20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0	0	0

COMMENTS: TRIP UNIT CAT # LES3600LS.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563, RAYTECH DLRO #UIS1572, SI #UIS1078

Tested By: N. HERRST Tested By: T. DODGE

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FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 282
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/5/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION GRAVITY THICKENER BUILDING
SUBSTATION 5 — POSITION MCC-56A

NAMEPLATE DATA

MANUFACTURER EATON — SIZE --- — TYPE 2100
CATALOG NO. --- — SERIES --- — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
MAIN	HLD 65K BRKR	600	323.1	468.7	276.8	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
TVSS-56A	HFD	30	2,997	2,933	3,413	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
BT1-1M	HFD	175	703.5	525.5	697.2	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
OHD-1	HMCP	7	26,530	26,348	27,282	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SCMP-1	HMCP	30	2,674	2,558	6,201	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SCOL-1	HMCP	7	27,138	27,344	27,112	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SP-1	HMCP	30	3,419	2,773	3,010	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SCVR-1	HMCP	7	28,728	28,388	29,966	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
EQUIPMENT SPARE SIZE 1	HMCP	7	28,256	28,436	29,008	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563, RAYTECH DLRO #UIS1572

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 283
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/5/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION GRAVITY THICKENER BUILDING
SUBSTATION 5 — POSITION MCC-56A

NAMEPLATE DATA

MANUFACTURER EATON — SERIAL NO. --- — TYPE 2100
CATALOG NO. --- — DRAWING NO. --- — VOLTAGE CLASS 600
MAIN BUS RATING 600 A — MAIN BUS NEUTRAL RATING --- A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING 65 — NUMBER OF SECTIONS 3 — LISTING [x] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER X — MLO --- — TYPE HLD — AMPACITY 600 — MAIN DISCONNECT --- — FUSE TYPE --- — SIZE ---
TOTAL POSITIONS EQUIPPED 10 — NO. OF SPARE SPACES 3 — TOTAL POSITIONS USED 10

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTIONS	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
SECTION 1 THRU SECTION 3	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	2,120	2,120	2,120		2,120	2,120	2,120			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOLDED CASE WITH SOLID STATE TRIP UNIT CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 284

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/5/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION GRAVITY THICKENER BUILDING

SUBSTATION 5 — POSITION MCC-56A (MAIN)

MANUFACTURER	CUTLER HAMMER	SN / SO NO.	---	FRAME SIZE(F)	600
BREAKER TYPE	HLD	SENSOR TAPS	600	MOUNTING	(●) B.I. ( ) D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	(●) ON ( ) OFF
TRIP UNIT TYPE	DIGITRIP RMS 310	CATALOG NO.	HLD3600F	ZONE INTLK [ ]	TARGETS [ ]

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	[ ]	N/A	NA
CONTACT FINGERS	[ ]	N/A	NA
LOADING AND ARCING CONTACTS	[ ]	N/A	NA
OVERCURRENT DEV. BATTERY	[ ]	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	[ ]	N/A	NA
AUXILIARY DEVICES	[ ]	N/A	NA
GROUND CONNECTION	[ ]	N/A	NA
LOAD CONDUCTOR NO. 0	Size	Cu ( )	Al ( )

SETTINGS AS FOUND

RATING PLUG(R)	600	LONG TIME PU	---	x	600	A =	600	A	DELAY	---	
SENSOR TAP	600	SHORT TIME PU	2	=	1200	A			DELAY	---	I²T ( ) IN ( ) OUT (●) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	---	=	---	A	( ) ON ( ) OFF				
		GRD. FLT. PU	---	=	---	A	( ) ON ( ) OFF		DELAY	---	I²T ( ) IN ( ) OUT ( ) N/A

SETTINGS AS LEFT

RATING PLUG(R)	600	LONG TIME PU	---	x	600	A =	600	A	DELAY	---	
SENSOR TAP	600	SHORT TIME PU	2	=	1200	A			DELAY	---	I²T ( ) IN ( ) OUT (●) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	---	=	---	A	( ) ON ( ) OFF				
		GRD. FLT. PU	---	=	---	A	( ) ON ( ) OFF		DELAY	---	I²T ( ) IN ( ) OUT ( ) N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	C	---	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	STPU									
LONG TIME	C	---	24	48	36.59	36.59	36.59	36.59	36.59	36.59
	LTPU									
GROUND FAULT	---	---	---	---	---	---	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.056

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P4)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
POLE TO FRAME	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
LINE TO LOAD	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00

POLE RESISTANCE READING

[ ] MICRO-OHMS [✓] MILLI-OHMS

POLE 1	POLE 2	POLE 3
0	0	0

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

COMMENTS: TRIP UNIT CAT # LES3600LS.

DEFICIENCIES:

[✓] ACCEPTABLE [ ] NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563, RAYTECH DLRO #UIS1572, CUTLER HAMMER SI #UIS1078

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 285
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/13/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION GRAVITY THICKENER
SUBSTATION 5 — POSITION MCC-56B

NAMEPLATE DATA

MANUFACTURER EATON — SERIAL NO. --- — TYPE 2100
CATALOG NO. --- — DRAWING NO. --- — VOLTAGE CLASS 600
MAIN BUS RATING 600 A — MAIN BUS NEUTRAL RATING --- A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING 65 — NUMBER OF SECTIONS 3 — LISTING [x] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER X — MLO --- — TYPE HLD — AMPACITY 1600 — MAIN DISCONNECT --- — FUSE TYPE --- — SIZE ---
TOTAL POSITIONS EQUIPPED 11 — NO. OF SPARE SPACES 2 — TOTAL POSITIONS USED 10

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTIONS	☑	Acceptable	NA
AUXILIARY DEVICES	☑	Dirty	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
SECTION 1 THRU SECTION 3	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	2,120	2,120	2,120		2,120	2,120	2,120			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 286
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/13/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION GRAVITY THICKENER BUILDING
SUBSTATION 5 — POSITION MCC-56B (01)

NAMEPLATE DATA

MANUFACTURER EATON — SIZE 800A — TYPE FREEDOM SERIES 2100
CATALOG NO. --- — SERIES 2100 MCC — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
SCMP-2	HMCP	30A	2,553	2,852	2,905	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SC01-2	HMCP	7A	26,646	32,538	28,132	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SP-2	HMCP	30A	2,893	3,008	3,213	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SCVR-2	HMCP	7A	30,150	30,210	27,382	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
RF-26	HMCP	3A	156,650	164,010	159,390	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE SIZE 1	HMCP	30A	19,421	23,806	4,617	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
BT2-1M	HFD	175A	5,292	5,543	5,110	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
DP-56	HKD	400A	296.3	412.5	529.4	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
MAIN	HLD	600A	684.8	386.2	318.7	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563, DLRO #UIS1572

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.

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Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 287

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE

DATE 3/13/2020 TEMPERATURE 70 °F HUMIDITY 60 % EQPT. LOCATION GRAVITY THICKENER BUILDING

SUBSTATION 5 POSITION MCC-56B (02)

NAMEPLATE DATA

MANUFACTURER EATON SIZE 800A TYPE FREEDOM SERIES 2100

CATALOG NO. --- SERIES 2100 MCC MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C

TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1

K2 = (K1) (TCF) = 1.06

INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
SPD	HFD	30A	3,102	2,999	3,315	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563, DLRO #UIS1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOLDED CASE WITH SOLID STATE TRIP UNIT CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 288

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/13/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION GRAVITY THICKENER BUILDING

SUBSTATION 5 — POSITION MCC-56B (MAIN)

MANUFACTURER	CUTLER HAMMER	SN / SO NO.	---	FRAME SIZE(F)	600
BREAKER TYPE	HLD	SENSOR TAPS	600	MOUNTING	◉ B.I. ○ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	◉ ON ○ OFF
TRIP UNIT TYPE	DIGITRIP RMS 310	CATALOG NO.	---	ZONE INTLK ☐	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	NA
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	NA
LOAD CONDUCTOR NO. 0	Size		Cu ○ Al ○

SETTINGS AS FOUND

RATING PLUG(R)	600	LONG TIME PU	---	x	---	A =	600	A	DELAY	---	
SENSOR TAP	600	SHORT TIME PU	2	=	1200	A			DELAY	---	I²T ○ IN ○ OUT ◉ N/A
GRD. FLT. ○ 3W ○ 4W		INST. PU	---	=	---	A	○ ON ○ OFF				
		GRD. FLT. PU	---	=	---	A	○ ON ○ OFF		DELAY	---	I²T ○ IN ○ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	600	LONG TIME PU	---	x	---	A =	600	A	DELAY	---	
SENSOR TAP	600	SHORT TIME PU	2	=	1200	A			DELAY	---	I²T ○ IN ○ OUT ◉ N/A
GRD. FLT. ○ 3W ○ 4W		INST. PU	---	=	---	A	○ ON ○ OFF				
		GRD. FLT. PU	---	=	---	A	○ ON ○ OFF		DELAY	---	I²T ○ IN ○ OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	C	---	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	STPU									
LONG TIME	C	---	24	48	29.78	29.78	29.78	29.78	29.78	29.78
	LTPU									
GROUND FAULT	---	---	---	---	---	---	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.056

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P4)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
POLE TO FRAME	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
LINE TO LOAD	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00

POLE RESISTANCE READING — ☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.6848	0.3862	0.3187

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

COMMENTS: TRIP UNIT CAT # LES3600LS.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563, RAYTECH TTR #UIS1572, CUTLER HAMMER SI #UIS1078

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE SWITCHBOARD INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 289
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/28/2020 — TEMPERATURE 52 °F — HUMIDITY 30 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION SUB 5 BUS A

NAMEPLATE DATA

MANUFACTURER CUTLER HAMMER — SERIAL NO. --- — TYPE MAGNUM DS
CATALOG NO. --- — DRAWING NO. LFSC79295CC1 — VOLTAGE CLASS 480/277
PHASE AMPACITY 4000 A — WITHSTAND RATING 100 kA — CONDUCTOR ☑ Cu ☐ Al

INSTALLED DEVICES

DRAWOUT LVACB 22 — BOLT-IN LVACB --- — DRAWOUT MCCB --- — BOLT-IN MCCB ---
BOLTED PRESSURE SWITCHES --- — FUSED DISCONNECTS --- — PROTECTIVE RELAYS --- — PANEL METERS 2
kWh METERS --- — VT's --- — CT's 6 — CPT's 2
Other TVSS/SPD

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 11 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.55

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
2-5	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	1,100	1,100	1,100		1,100	1,100	1,100			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS: NEUTRAL BUS DOES NOT RUN THROUGHOUT THE SWITCHGEAR.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206979

Tested By: E. TAPPAN Tested By: E. KOEPFGEN

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

SWITCHBOARD BUS CONNECTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 290
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/28/2020 — TEMPERATURE 52 °F — HUMIDITY 30 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION SUB 5 BUS A

NAMEPLATE DATA

MANUFACTURER CUTLER HAMMER — SERIAL NO. VDT03545 — TYPE MAGNUM DS
CATALOG NO. --- — DRAWING NO. LFSC79295CC1 — VOLTAGE CLASS 480/277
PHASE AMPACITY 4000 A — WITHSTAND RATING 100 kA — CONDUCTOR (•) CU ( ) AL

BUS SECTION TESTED		RESISTANCE IN [x] MICRO-OHMS [ ] MILLI-OHMS					BUS SECTION TESTED		RESISTANCE IN [ ] MICRO-OHMS [ ] MILLI-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
2	5	44	69	52		419							

COMMENTS:

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: DLRO #UIS1570

Tested By: E. TAPPAN Tested By: E. KOEPFGEN

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE SWITCHBOARD INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 291
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/6/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING (2F)
SUBSTATION 5 — POSITION SUB 5 BUS B

NAMEPLATE DATA

MANUFACTURER CUTLER HAMMER — SERIAL NO. G-4577 — TYPE LV SWITCHBOARD
CATALOG NO. MDT03545 — DRAWING NO. LFS07929S001 — VOLTAGE CLASS 480/277
PHASE AMPACITY 4000 A — WITHSTAND RATING 100 kA — CONDUCTOR ☑ Cu ☐ Al

INSTALLED DEVICES

DRAWOUT LVACB 22 — BOLT-IN LVACB --- — DRAWOUT MCCB --- — BOLT-IN MCCB ---
BOLTED PRESSURE SWITCHES --- — FUSED DISCONNECTS --- — PROTECTIVE RELAYS --- — PANEL METERS 2
kWh METERS --- — VT's 6 — CT's 6 — CPT's ---
Other 2 SPDs

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☑	Dirty	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
6-12	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	2,120	2,120	2,120		2,120	2,120	2,120			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS: INSTALLED DEVICE COUNT IS FOR BOTH BUS A & B.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #206124

Tested By: D. FLEMING Tested By: E. KOEPFGEN

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Dexter, Michigan
(734) 424-1200
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(937) 439-9660

SWITCHBOARD BUS CONNECTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 292
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/6/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING (2F)
SUBSTATION 5 — POSITION SUB 5 BUS B

NAMEPLATE DATA

MANUFACTURER CUTLER HAMMER — SERIAL NO. G-4577 — TYPE LV SWITCHBOARD
CATALOG NO. MDT03545 — DRAWING NO. LFS07929S001 — VOLTAGE CLASS 480/277
PHASE AMPACITY 4000 A — WITHSTAND RATING 100 kA — CONDUCTOR (•) CU ( ) AL

BUS SECTION TESTED		RESISTANCE IN [x] MICRO-OHMS [ ] MILLI-OHMS					BUS SECTION TESTED		RESISTANCE IN [ ] MICRO-OHMS [ ] MILLI-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
SEC. 6	SEC. 11	51	52	55		427							

COMMENTS:

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: DLRO #156856

Tested By: D. FLEMING Tested By: E. KOEPFGEN

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 293
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 2/27/2020 — TEMPERATURE 45 °F — HUMIDITY 60 % — EQPT. LOCATION SOLIDS BUILDING
SUBSTATION 5 — POSITION TIE T5B

MANUFACTURER	EATON	SN / SO NO.	4135809060001	FRAME SIZE(F)	3200
BREAKER TYPE	MAGNUM DS	SENSOR TAPS	3200	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	DTS	THERMAL MEMORY	● ON ○ OFF
TRIP UNIT TYPE	DIGITRIP 520	CATALOG NO.	MDSC403WEA	ZONE INTLK ☑	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C/L
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C/L
AUXILIARY DEVICES	☐	N/A	N/A
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	3200	LONG TIME PU	0.9	x	3200	A =	2880	A	DELAY	4	
SENSOR TAP	3,200	SHORT TIME PU	2.5	=	7200	A			DELAY	0.3	I²T ○ IN ● OUT ○ N/A
GRD. FLT. ○ 3W ○ 4W		INST. PU	---	=	---	A	○ ON ● OFF				
		GRD. FLT. PU	0.3	=	360	A	● ON ○ OFF		DELAY	0.3	I²T ○ IN ● OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	3200	LONG TIME PU	0.9	x	3200	A =	2880	A	DELAY	4	
SENSOR TAP	3,200	SHORT TIME PU	2.5	=	7200	A			DELAY	0.3	I²T ○ IN ● OUT ○ N/A
GRD. FLT. ○ 3W ○ 4W		INST. PU	---	=	---	A	○ ON ● OFF				
		GRD. FLT. PU	0.3	=	360	A	● ON ○ OFF		DELAY	0.3	I²T ○ IN ● OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	20	2X	---	---	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
	IPU									
SHORT TIME	22.5	2X	---	---	0.2	0.2	0.2	0.2	0.2	0.2
	STPU									
LONG TIME	27	6X	---	---	3.2	3.2	3.2	3.2	3.3	3.3
	LTPU				5.3	5.3	5.3	5.3	5.3	5.3
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	3	2X	---	---	0.4	0.4	0.4	0.4	0.4	0.4
	GFPU									

EQUIPMENT TEMPERATURE 7 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.552

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	1,104.00	2,000	1,104.00	2,000	1,104.00
POLE TO FRAME	2,000	1,104.00	2,000	1,104.00	2,000	1,104.00
LINE TO LOAD	2,000	1,104.00	2,000	1,104.00	2,000	1,104.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING
☐ MICRO-OHMS ☐ MILLI-OHMS

POLE 1	POLE 2	POLE 3

COMMENTS: DLRO READINGS (IN MILLIOHMS). LEFT: A = 0.012, B = 0.023, C = 0.019 - INST TRIP. TESTED AT 2. RIGHT: A = 0.029, B = 0.030, C = 0.025.

DEFICIENCIES: CONTROL SWITCH DOES NOT OPERATE BREAKER. FURTHER INVESTIGATION IS REQUIRED.

☐ ACCEPTABLE ☑ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #156386, DLRO #193764, SI #UIS224

Tested By: J. RYSENGA Tested By: E. TAPPAN

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 294
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/9/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BLDG
SUBSTATION 6 — POSITION MAIN A

MANUFACTURER	SQUARE D	SN / SO NO.	085262997101	FRAME SIZE(F)	1600A
BREAKER TYPE	NW 16 H3	SENSOR TAPS	1600A	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0A	CATALOG NO.	WA6EER44A9CFFFWSEA	ZONE INTLK ☐	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	1600	LONG TIME PU	0.9	x	1600	A =	1440	A	DELAY	2		
SENSOR TAP	1,600	SHORT TIME PU	2.5	=	3.600	A			DELAY	0.3	I²T	○ IN ● OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	---	=	---	A	○ ON ● OFF					
		GRD. FLT. PU	B	=	640	A	● ON ○ OFF		DELAY	0.4	I²T	○ IN ● OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	1600	LONG TIME PU	0.9	x	1600	A =	1440	A	DELAY	2		
SENSOR TAP	1,600	SHORT TIME PU	2.5	=	3.600	A			DELAY	0.3	I²T	○ IN ● OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	---	=	---	A	○ ON ● OFF					
		GRD. FLT. PU	B	=	640	A	● ON ○ OFF		DELAY	0.4	I²T	○ IN ● OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	4500	200%	---	---	0.279	0.279	---	---	---	---
	STPU									
LONG TIME	2880	300%	---	---	19.370	19.370	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	1280	200%	---	---	0.404	0.404	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.01	0.009	0.011

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761, SI #1512

Tested By: S. LADD Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 295
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/10/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 6 — POSITION MAIN B

MANUFACTURER	SQUARE D	SN / SO NO.	085262997103	FRAME SIZE(F)	1600
BREAKER TYPE	NW 16 H3	SENSOR TAPS	1600	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0A	CATALOG NO.	WA6EER44A9CFFFWSEA	ZONE INTLK ☐	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	1600	LONG TIME PU	0.9	x	1600	A =	1440	A	DELAY	2		
SENSOR TAP	1,600	SHORT TIME PU	2.5	=	3.600	A			DELAY	0.3	I²T	○ IN ● OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	---	=	---	A	○ ON ● OFF					
		GRD. FLT. PU	B	=	640	A	● ON ○ OFF		DELAY	0.4	I²T	○ IN ● OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	1600	LONG TIME PU	0.9	x	1600	A =	1440	A	DELAY	2		
SENSOR TAP	1,600	SHORT TIME PU	2.5	=	3.600	A			DELAY	0.3	I²T	○ IN ● OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	---	=	---	A	○ ON ● OFF					
		GRD. FLT. PU	B	=	640	A	● ON ○ OFF		DELAY	0.4	I²T	○ IN ● OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	---	---	---	---	---	---	---	---	---	---
	IPU									
SHORT TIME	4500	---	---	---	0.278	0.278	---	---	---	---
	STPU									
LONG TIME	2880	---	---	---	19.520	19.520	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	1280	200%	---	---	0.402	0.402	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.011	0.01	0.01

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #1512

Tested By: S. LADD Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 296
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/9/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 6 — POSITION MCC-EBB-A

MANUFACTURER	SQUARE D	SN / SO NO.	085262997201	FRAME SIZE(F)	800
BREAKER TYPE	NW 08 H3	SENSOR TAPS	600	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0A	CATALOG NO.	WA6ATR44B9CXFXWXAA	ZONE INTLK ☐	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R) 600 — SENSOR TAP 600 — GRD. FLT. ● 3W ○ 4W

LONG TIME PU	1.0	x	600	A =	600	A	DELAY	8.0	
SHORT TIME PU	3	=	1800	A			DELAY	0.1	I²T ○ IN ● OUT ○ N/A
INST. PU	15	=	9000	A	● ON	○ OFF			
GRD. FLT. PU	C	=	240	A	● ON	○ OFF	DELAY	0.2	I²T ○ IN ● OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R) 600 — SENSOR TAP 600 — GRD. FLT. ● 3W ○ 4W

LONG TIME PU	1.0	x	600	A =	600	A	DELAY	8.0	
SHORT TIME PU	3	=	1800	A			DELAY	0.1	I²T ○ IN ● OUT ○ N/A
INST. PU	15	=	9000	A	● ON	○ OFF			
GRD. FLT. PU	C	=	240	A	● ON	○ OFF	DELAY	0.2	I²T ○ IN ● OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	11250	200%	---	---	0.037	0.037	---	---	---	---
	IPU									
SHORT TIME	5400	200%	---	---	0.096	0.096	---	---	---	---
	STPU									
LONG TIME	1400	300%	---	---	50.180	50.180	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	480	200%	---	---	0.152	0.152	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.01	0.01	0.01

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761, SI #1512

Tested By: S. LADD — Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 297
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/9/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION E. BLOWER BLDG.
SUBSTATION 6 — POSITION MCC-EBB-A

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. A1248058 — TYPE MODEL 6
CATALOG NO. --- — DRAWING NO. 30951271-141 — VOLTAGE CLASS 600
MAIN BUS RATING 600 A — MAIN BUS NEUTRAL RATING 0 A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING 65 — NUMBER OF SECTIONS 6 — LISTING [x] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER --- MLO X TYPE --- AMPACITY --- MAIN DISCONNECT --- FUSE TYPE --- SIZE ---
TOTAL POSITIONS EQUIPPED 26 — NO. OF SPARE SPACES 8 — TOTAL POSITIONS USED 22

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
SECTION 1 THRU SECTION 6	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	2,120	2,120	2,120		2,120	2,120	2,120			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 298
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/9/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 6 — POSITION MCC-EBB-A (01)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE 600A — TYPE MODEL 6
CATALOG NO. --- — SERIES 6 MCC — MAX. VOLTS 600V

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
SPD	NA	NA	490	538	592	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE	HJ 060	30A	15,030	12,059	16,484	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
EQUIP RECEP	HJ 060	30A	6,411	8,234	10,083	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE	HJ 060	30A	16,027	44,510	47,319	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
HOIST 1	HJ 060	20A	7,461	6,236	7,049	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE	HJ 060	30A	33,586	3,654	20,628	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SC-E1	HJ 030	30A	3,165	4,808	3,378	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SC-E3	HJ 030	30A	4,697	3,330	3,607	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
PUMP E1 RASP-E1	HJ 060	40A	3,504	2,689	4,241	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 299

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/9/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING

SUBSTATION 6 — POSITION MCC-EBB-A (02)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE 600A — TYPE MODEL 6

CATALOG NO. --- — SERIES 6 MCC — MAX. VOLTS 600V

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06

INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
PUMP-E3 PUMP-E3	HJ 060	40A	3,442	4,632	2,923	2,000 2,120	2,000 2,120	2,000 2,120	2,000 2,120	2,000 2,120	2,000 2,120
EBB-EF-6	HJ 030	30A	30,608	12,613	3,284	2,000 2,120	2,000 2,120	2,000 2,120	2,000 2,120	2,000 2,120	2,000 2,120
LP-U	HJ 060	60A	7,703	6,473	1,996	2,000 2,120	2,000 2,120	2,000 2,120	2,000 2,120	2,000 2,120	2,000 2,120
LP-O	HJ 060	60A	8,286	11,821	9,928	2,000 2,120	2,000 2,120	2,000 2,120	2,000 2,120	2,000 2,120	2,000 2,120
SSCP-E1	HJ 050	50A	8,057	15,696	11,343	2,000 2,120	2,000 2,120	2,000 2,120	2,000 2,120	2,000 2,120	2,000 2,120
ADP-E2	HJ 100	100A	2,366	6,806	2,079	2,000 2,120	2,000 2,120	2,000 2,120	2,000 2,120	2,000 2,120	2,000 2,120
PUMP-E7 RASP-E7	HJ 060	40A	3,943	3,095	4,255	2,000 2,120	2,000 2,120	2,000 2,120	2,000 2,120	2,000 2,120	2,000 2,120
WASP-E1	HJ 060	30A	16,536	11,424	22,495	2,000 2,120	2,000 2,120	2,000 2,120	2,000 2,120	2,000 2,120	2,000 2,120
SUMP PUMP 2	HJ 030	30A	6,063	7,409	7,647	2,000 2,120	2,000 2,120	2,000 2,120	2,000 2,120	2,000 2,120	2,000 2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 300
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 3/9/2020 | TEMPERATURE 70 °F | HUMIDITY 60 % | EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 6 | POSITION MCC-EBB-A (03)

NAMEPLATE DATA

MANUFACTURER SQUARE D | SIZE 600A | TYPE MODEL 6
CATALOG NO. --- | SERIES 6 MCC | MAX. VOLTS 600V

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C
TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1
K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
ATS-EBB	LJ 400	300A	728	855	1,050	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
HOIST 2	HJ 060	20A	7,677	6,861	8,879	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SUMP PUMP 4	HJ 030	30A	14,950	12,718	16,866	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
EBB-HV-1	HJ 060	20A	30,917	14,749	10,031	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
EBB-RF-4	HJ 030	30A	20,076	16,095	23,738	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
EBB-EF-10	HJ 030	30A	8,702	7,460	10,365	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 301
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/10/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 6 — POSITION MCC-EBB-B

MANUFACTURER	SQUARE D	SN / SO NO.	085262997202	FRAME SIZE(F)	800
BREAKER TYPE	NW 08 H3	SENSOR TAPS	600	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0A	CATALOG NO.	WA6ATR44B9CXFXWXAA	ZONE INTLK ☐	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	600	LONG TIME PU	1.0	x	600	A =	600	A	DELAY	8.0		
SENSOR TAP	600	SHORT TIME PU	3	=	1800	A			DELAY	0.1	I²T ○ IN	● OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	15	=	9000	A	● ON ○ OFF					
		GRD. FLT. PU	C	=	240	A	● ON ○ OFF		DELAY	0.2	I²T ○ IN	● OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	600	LONG TIME PU	1.0	x	600	A =	600	A	DELAY	8.0		
SENSOR TAP	600	SHORT TIME PU	3	=	1800	A			DELAY	0.1	I²T ○ IN	● OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	15	=	9000	A	● ON ○ OFF					
		GRD. FLT. PU	C	=	240	A	● ON ○ OFF		DELAY	0.2	I²T ○ IN	● OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	11250	---	---	---	0.037	0.037	---	---	---	---
	IPU									
SHORT TIME	5400	---	---	---	0.096	0.096	---	---	---	---
	STPU									
LONG TIME	1400	---	---	---	52.213	52.213	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	480	200%	---	---	0.153	0.153	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.009	0.01	0.01

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761, SI #1512

Tested By: S. LADD Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 302
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/10/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION E. BLOWER BLDG
SUBSTATION 6 — POSITION MCC-EBB-B

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. A0291304 — TYPE MODEL 6
CATALOG NO. --- — DRAWING NO. 30951271-142 — VOLTAGE CLASS 600
MAIN BUS RATING 600 A — MAIN BUS NEUTRAL RATING 0 A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING 65 — NUMBER OF SECTIONS 6 — LISTING [x] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER --- MLO X TYPE --- AMPACITY --- MAIN DISCONNECT --- FUSE TYPE --- SIZE ---
TOTAL POSITIONS EQUIPPED 25 — NO. OF SPARE SPACES 6 — TOTAL POSITIONS USED 22

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
SECTION 1 THRU SECTION 6	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	2,120	2,120	2,120		2,120	2,120	2,120			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.

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FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 303

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/10/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING

SUBSTATION 6 — POSITION MCC-EBB-B (01)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE 600A — TYPE MODEL 6

CATALOG NO. --- — SERIES 6 MCC — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06

INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
SC-E2	HJ 030	30A	4,649	2,958	6,174	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
EBB-EUH-1	HJ 060	20A	9,452	9,663	15,958	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
WASP-E2	HJ 060	30A	5,175	4,697	4,148	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
EBB-EF-5	HJ 030	30A	6,198	8,399	3,986	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
PP-EBB-A	LJ 400	300A	369.9	314.4	296.5	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SC-E4	HJ 030	30A	4,756	6,050	2,930	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
B-EBB-EF-7	HJ 030	30A	6,018	8,639	7,097	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
A-EBB-EF-9	HJ 030	30A	9,276	2,923	3,187	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SSCP-E2	HJ 060	30A	3,884	3,083	2,414	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 304
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/10/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 6 — POSITION MCC-EBB-B (02)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE 600A — TYPE MODEL 6
CATALOG NO. --- — SERIES 6 MCC — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
EBB-EDH-1	HJ 060	30A	4,383	4,069	3,948	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE	HJ 060	30A	16,497	17,646	9,823	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ADP-E1	HJ 100	100A	17,995	6,904	11,964	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
RASP-E2	HJ 060	50A	2,767	3,509	3,227	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
RASP-E4	HJ 060	50A	2,990	2,527	2,882	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SUMP PUMP 1	HJ 030	30A	3,037	2,422	2,503	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SUMP PUMP 3	HJ 030	30A	4,309	2,809	2,955	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
10HP SPARE	HJ 030	30A	11,421	26,566	11,333	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
RASP-E6	HJ 060	30A	7,306	2,810	2,375	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 305
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/10/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 6 — POSITION MCC-EBB-B (03)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE 600A — TYPE MODEL 6
CATALOG NO. --- — SERIES 6 MCC — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
SPARE	HJ 060	30A	6,492	6,004	4,634	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
RASP-E8	HJ 060	50A	3,370	2,932	3,202	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
LP-T	HJ 060	60A	4,801	3,461	3,631	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPD	NA	NA	111.1	847	803.3	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
EQUIP RECEP	HJ 060	30A	4,957	4,418	4,128	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
PP-EBB-B	HJ 060	60A	6,961	2,998	8,524	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
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LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 306
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/9/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 6 — POSITION MCC-EPB-A

MANUFACTURER	SQUARE D	SN / SO NO.	085262997301	FRAME SIZE(F)	800
BREAKER TYPE	NW 08 H3	SENSOR TAPS	250	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0A	CATALOG NO.	WA6PPR44A9CXFXWXAA	ZONE INTLK ☐	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R) 250 — SENSOR TAP 250 — GRD. FLT. ● 3W ○ 4W

LONG TIME PU	0.8	x	250	A =	200	A	DELAY	4	
SHORT TIME PU	10	=	2000	A			DELAY	0.1	I²T ○ IN ● OUT ○ N/A
INST. PU	15	=	3750	A	● ON	○ OFF			
GRD. FLT. PU	C	=	100	A	● ON	○ OFF	DELAY	0.1	I²T ○ IN ● OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R) 250 — SENSOR TAP 250 — GRD. FLT. ● 3W ○ 4W

LONG TIME PU	0.8	x	250	A =	200	A	DELAY	4	
SHORT TIME PU	10	=	2000	A			DELAY	0.1	I²T ○ IN ● OUT ○ N/A
INST. PU	15	=	3750	A	● ON	○ OFF			
GRD. FLT. PU	C	=	100	A	● ON	○ OFF	DELAY	0.1	I²T ○ IN ● OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	4688	200%	---	---	0.037	0.037	---	---	---	---
	IPU									
SHORT TIME	2875	200%	---	---	0.104	0.104	---	---	---	---
	STPU									
LONG TIME	1400	300%	---	---	2.596	2.596	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	200	200%	---	---	0.091	0.091	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.011	0.01	0.011

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761, SI #1512

Tested By: S. LADD — Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 307
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/9/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST PRIMARY BLDG
SUBSTATION 6 — POSITION MCC-EPB-A

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. A0292519 — TYPE MODEL 6
CATALOG NO. --- — DRAWING NO. 30951271-139 — VOLTAGE CLASS 600
MAIN BUS RATING 600 A — MAIN BUS NEUTRAL RATING --- A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING 65KA — NUMBER OF SECTIONS 7 — LISTING [x] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER 1 — MLO --- — TYPE LJ400 — AMPACITY 400 — MAIN DISCONNECT --- — FUSE TYPE --- — SIZE ---
TOTAL POSITIONS EQUIPPED 38 — NO. OF SPARE SPACES 5 — TOTAL POSITIONS USED 31

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
SECTION 1 THRU SECTION 7	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	2,120	2,120	2,120		2,120	2,120	2,120			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
Dexter, Michigan
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FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 308
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/9/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST PRIMARY BUILDING
SUBSTATION 6 — POSITION MCC-EPB-A (01)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE 600A — TYPE MODEL 6
CATALOG NO. --- — SERIES 6 MCC — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
SPARE	HJ 030	30A	16,185	10,420	11,274	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
PSCP-E1	HJ 030	3A	3,252	2,895	2,571	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPD	NA	NA	920	936	872.3	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
MAIN	LJ 400	200A	649.9	627.4	666.9	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
PC-E3	HJ 030	30A	5,877	5,735	5,422	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
PC-E1	HJ 030	30A	6,111	5,042	5,955	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
PDP-E1	HJ 050	50A	5,765	8,142	4,377	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
EPI-SAP-4	HJ 030	30A	6,610	3,311	4,625	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
EPE-SAP-5	HJ 030	30A	6,481	3,349	2,626	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

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FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 309
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/9/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST PRIMARY BUILDING
SUBSTATION 6 — POSITION MCC-EPB-A (02)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE 600A — TYPE MODEL 6
CATALOG NO. --- — SERIES 6 MCC — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
EPB-SUP-1	HJ 030	30A	2,720	3,289	2,278	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
10HP SPARE	HJ 030	30A	14,374	12,959	19,958	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
10HP SPARE	HJ 030	30A	14,895	8,656	15,355	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
AXMX-E1A	HJ 030	30A	2,867	2,739	2,393	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
AXMX-E1B	HJ 030	30A	3,204	3,086	4,124	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
AXMX-E1C	HJ 030	30A	4,121	3,763	3,277	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
AXMX-E3A	HJ 030	30A	4,306	34,162	3,085	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
PSLPM-E3	HJ 060	30A	4,313	6,624	5,065	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
PSLP-E3	HJ 060	30A	6,015	4,853	5,342	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

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FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 310
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/9/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST PRIMARY BUILDING
SUBSTATION 6 — POSITION MCC-EPB-A (03)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE 600A — TYPE MODEL 6
CATALOG NO. --- — SERIES 6 MCC — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
AXMX-E3B	HJ 030	30A	3,480	2,696	2,748	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
AXMX-E3C	HJ 030	30A	7,106	6,779	3,585	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
AXMX-E1A	HJ 030	30A	3,954	3,972	2,438	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ANMX-E1B	HJ 030	30A	3,471	5,585	2,973	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
PSLP-E1	HJ 060	30A	7,584	4,780	7,164	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE	HJ 060	30A	13,729	7,813	33,218	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ANMX-E1C	HJ 030	30A	4,410	5,684	9,606	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ANMX-E1D	HJ 030	30A	4,301	2,996	2,843	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SWMX-E1	HJ 030	30A	4,875	3,383	4,813	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 311
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/9/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST PRIMARY BUILDING
SUBSTATION 6 — POSITION MCC-EPB-A (04)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE 600A — TYPE MODEL 6
CATALOG NO. --- — SERIES 6 MCC — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
ANMX-E3A	HJ 030	30A	3,752	2,934	3,339	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SLIDE GATES: F-2-13, F-2-18, F-1-5, F-1-6, S-21-3	HJ 060	30A	11,388	14,796	16,051	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SLIDE GATES: F-2-6, F-2-1, F-1-1, F-1-2, S-21-1	HJ 060	30A	4,684	4,078	6,333	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ANMX-E3B	HJ 030	30A	10,560	6,761	7,453	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ANMX-E3C	HJ 030	30A	5,817	3,302	4,660	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ANMX-E3D	HJ 030	30A	3,041	6,928	3,388	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SWMX-E3	HJ 030	30A	34,808	2,853	3,044	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 312
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE
DATE 3/9/2020 TEMPERATURE 70 °F HUMIDITY 60 % EQPT. LOCATION EAST PRIMARY BUILDING
SUBSTATION 6 POSITION MCC-EPB-A (05)

NAMEPLATE DATA

MANUFACTURER SQUARE D SIZE 600A TYPE MODEL 6
CATALOG NO. --- SERIES 6 MCC MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C
TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1
K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
SPARE	HJ 060	30A	28,774	15,727	24,946	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
LP-V XFMR	HJ 150	100A	1,619	1,327	1,607	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOLDED CASE WITH SOLID STATE TRIP UNIT CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 313

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/09/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST PRIMARY BUILDING

SUBSTATION 6 — POSITION MCC-EPB-A MAIN

MANUFACTURER	SQUARE D	SN / SO NO.	7NKG0242706	FRAME SIZE(F)	400
BREAKER TYPE	LJ400	SENSOR TAPS	400	MOUNTING	(●) B.I. ( ) D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	( ) ON ( ) OFF
TRIP UNIT TYPE	MICROLOGIC 6.3A	CATALOG NO.	LJP36400U44XENLH2	ZONE INTLK ☐	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		Cu ( ) Al ( )

SETTINGS AS FOUND

RATING PLUG(R)	400	LONG TIME PU	200	x	---	A =	200	A	DELAY	2.0	
SENSOR TAP	400	SHORT TIME PU	6	=	1200	A			DELAY	0.1	I²T ( ) IN (●) OUT ( ) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	4.5	=	1800	A	(●) ON ( ) OFF				
		GRD. FLT. PU	0.2	=	80	A	(●) ON ( ) OFF		DELAY	0	I²T ( ) IN (●) OUT ( ) N/A

SETTINGS AS LEFT

RATING PLUG(R)	400	LONG TIME PU	200	x	---	A =	200	A	DELAY	2.0	
SENSOR TAP	400	SHORT TIME PU	6	=	1200	A			DELAY	0.1	I²T ( ) IN (●) OUT ( ) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	4.5	=	1800	A	(●) ON ( ) OFF				
		GRD. FLT. PU	0.2	=	80	A	(●) ON ( ) OFF		DELAY	0	I²T ( ) IN (●) OUT ( ) N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	2250	5.62	0.011	0.083	0.057	0.057	0.057	0.057	0.057	0.057
	IPU									
SHORT TIME	1427	7.13	0.08	0.166	0.131	0.131	0.131	0.131	0.131	0.131
	STPU									
LONG TIME	971	4.85	2.464	3.088	2.74	2.74	2.74	2.74	2.74	2.74
	LTPU									
GROUND FAULT	160	0.4	0.02	0.08	0.038	0.038	0.038	0.038	0.038	0.038
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.056

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P4)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
POLE TO FRAME	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
LINE TO LOAD	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00

POLE RESISTANCE READING — ☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.6499	0.6274	0.6669

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572, SI #1482

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 314
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/10/2020 — TEMPERATURE 70 °F — HUMIDITY 35 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 6 — POSITION MCC-EPB-B

MANUFACTURER	SQUARE D	SN / SO NO.	085262997302	FRAME SIZE(F)	800
BREAKER TYPE	NW 08 H3	SENSOR TAPS	250	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0A	CATALOG NO.	WA6PPR44A9CXFXWXAA	ZONE INTLK ☐	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	250	LONG TIME PU	0.8	x	250	A =	200	A	DELAY	4		
SENSOR TAP	250	SHORT TIME PU	10	=	2000	A			DELAY	0.1	I²T ○ IN	● OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	15	=	3750	A	● ON ○ OFF					
		GRD. FLT. PU	C	=	100	A	● ON ○ OFF		DELAY	0.1	I²T ○ IN	● OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	250	LONG TIME PU	0.8	x	250	A =	200	A	DELAY	4		
SENSOR TAP	250	SHORT TIME PU	10	=	2000	A			DELAY	0.1	I²T ○ IN	● OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	15	=	3750	A	● ON ○ OFF					
		GRD. FLT. PU	C	=	100	A	● ON ○ OFF		DELAY	0.1	I²T ○ IN	● OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	4688	---	---	---	0.036	0.036	---	---	---	---
	IPU									
SHORT TIME	2875	---	---	---	0.103	0.103	---	---	---	---
	STPU									
LONG TIME	1400	---	---	---	2.480	2.480	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	200	200%	---	---	0.093	0.093	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.011	0.01	0.009

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761, SI #1512

Tested By: S. LADD Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 315
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/10/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST PRIMARY BUILDING
SUBSTATION 6 — POSITION MCC-EPB-B

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. A0292528 — TYPE MODEL 6
CATALOG NO. --- — DRAWING NO. 30951271-140 — VOLTAGE CLASS 600
MAIN BUS RATING 600 A — MAIN BUS NEUTRAL RATING 600 A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING 65 — NUMBER OF SECTIONS 7 — LISTING [x] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER 1 — MLO --- — TYPE LJ400 — AMPACITY 400 — MAIN DISCONNECT --- — FUSE TYPE --- — SIZE ---
TOTAL POSITIONS EQUIPPED 39 — NO. OF SPARE SPACES 4 — TOTAL POSITIONS USED 31

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
SECTION 1 THRU SECTION 7	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	2,120	2,120	2,120		2,120	2,120	2,120			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 316

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/10/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST PRIMARY BUILDING

SUBSTATION 6 — POSITION MCC-EPB-B (01)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE 600A — TYPE MODEL 6

CATALOG NO. --- — SERIES 6 MCC — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06

INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
PSCP-E2	HJ 030	30A	2,612	2,884	3,034	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
A-PSCPM-E2	HJ 060	30A	29,548	4,439	6,572	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
C-PSLP-E2	HJ 060	30A	9,624	4,681	15,152	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPD	NA	NA	751.1	850.7	786	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
MAIN	LJ 400	200A	667.5	561.4	455.4	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
PL-E2	HJ 030	30A	7,328	3,286	4,706	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
2-HEATING UNIT 1	HJ 060	15A	7,188	13,863	9,929	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
HOIST	HJ 060	20A	8,557	7,048	9,784	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
PDP-E2	HJ 030	30A	6,031	5,403	6,539	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 317
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/10/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST PRIMARY BUILDING
SUBSTATION 6 — POSITION MCC-EPB-B (02)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE 600A — TYPE MODEL 6
CATALOG NO. --- — SERIES 6 MCC — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
PC-E4	HJ 030	30A	2,815	3,568	3,110	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPARE	HJ 060	30A	33,217	13,926	21,550	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
3-RF-1	HJ 030	30A	4,933	4,088	3,467	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
3-AXMX-E2A	HJ 030	30A	5,146	3,168	3,835	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
AXMX-E2B	HJ 030	30A	3,582	4,216	7,646	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SWMX-E2	HJ 060	30A	3,758	2,667	3,705	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
EQUIP RECEPS	HJ 060	30A	8,259	6,744	10,168	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
PSLPM-E1	HJ 060	30A	8,174	8,591	5,439	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
4-AXMX-E2C	HJ 030	30A	3,567	3,721	2,978	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 318
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/10/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST PRIMARY BUILDING
SUBSTATION 6 — POSITION MCC-EPB-B (03)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE 600A — TYPE MODEL 6
CATALOG NO. --- — SERIES 6 MCC — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
AXMX-E4A	HJ 030	30A	3,695	3,597	2,931	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
AXMX-E4B	HJ 030	30A	6,268	8,348	3,668	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
A-AXMX-E4C	HJ 030	30A	10,143	3,131	5,852	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SLIDE GATE F-2-7, F-2-12, F-1-3, F-1-4, S-21-2	HJ 060	30A	6,065	5,457	5,068	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SLIDE GATE F-2-19, F-2-24, F-1-7, F-1-8, S-21-4	HJ 030	30A	4,245	5,078	4,335	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
5-ANMX-E2A	HJ 030	30A	4,812	4,720	3,006	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
5-ANMX-E2B	HJ 030	30A	5,247	3,483	4,261	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 319
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/10/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST PRIMARY BUILDING
SUBSTATION 6 — POSITION MCC-EPB-B (04)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE 600A — TYPE MODEL 6
CATALOG NO. --- — SERIES 6 MCC — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
ANMX-E2C	HJ 030	30A	3,169	2,800	3,765	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ANMX-E2D	HJ 030	30A	2,877	3,179	3,153	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
EPB-EUH-1	HJ 060	30A	6,279	4,497	4,522	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
LP-W XFMR	HJ 060	60A	2,769	3,250	2,620	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ANMX-E4A	HJ 030	30A	3,880	4,263	4,154	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
6-ANMX-E4B	HJ 030	30A	5,334	2,986	3,591	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
AB-ANMX-E4C	HJ 030	30A	18,687	5,978	15,073	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ANMX-E4D	HJ 030	30A	3,247	3,328	4,288	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
EPB-SP-2	HJ 030	30A	4,222	4,646	4,377	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 320
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/10/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST PRIMARY BUILDING
SUBSTATION 6 — POSITION MCC-EPB-B (05)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE 600A — TYPE MODEL 6
CATALOG NO. --- — SERIES 6 MCC — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
AB-SWMX-E4	HJ 030	30A	7,158	5,475	2,980						
AC7-10HP SPARE	HJ 030	30A	36,152	14,127	24,070						
AC-SPARE 10HP	HJ 030	30A	21,546	9,823	19,302						
SPARE	HJ 060	30A	10,471	26,138	31,196						

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOLDED CASE WITH SOLID STATE TRIP UNIT CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 321

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/9/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION WEST PRIMARY BUILDING

SUBSTATION 6 — POSITION MCC-EPB-B MAIN

MANUFACTURER	SQUARE D	SN / SO NO.	7NKG0242706	FRAME SIZE(F)	400
BREAKER TYPE	LJ400	SENSOR TAPS	400	MOUNTING	(●) B.I. ( ) D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	( ) ON ( ) OFF
TRIP UNIT TYPE	MICROLOGIC 6.3A	CATALOG NO.	LJP36400U44XENL42	ZONE INTLK ☐	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		Cu ( ) Al ( )

SETTINGS AS FOUND

RATING PLUG(R)	400	LONG TIME PU	200	x	---	A =	---	A	DELAY	2.0	
SENSOR TAP	400	SHORT TIME PU	6.0	=	1200	A			DELAY	0.1	I²T ( ) IN (●) OUT ( ) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	4.5	=	1800	A	(●) ON ( ) OFF				
		GRD. FLT. PU	0.2	=	80	A	(●) ON ( ) OFF		DELAY	0	I²T ( ) IN (●) OUT ( ) N/A

SETTINGS AS LEFT

RATING PLUG(R)	400	LONG TIME PU	200	x	---	A =	---	A	DELAY	2.0	
SENSOR TAP	400	SHORT TIME PU	6.0	=	1200	A			DELAY	0.1	I²T ( ) IN (●) OUT ( ) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	4.5	=	1800	A	(●) ON ( ) OFF				
		GRD. FLT. PU	0.2	=	80	A	(●) ON ( ) OFF		DELAY	---	I²T ( ) IN (●) OUT ( ) N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	2250	5.62	0.011	0.083	0.057	0.057	0.057	0.057	0.057	0.057
	IPU									
SHORT TIME	1427	7.13	0.8	0.166	0.131	0.131	0.131	0.131	0.131	0.131
	STPU									
LONG TIME	971	4.85	2.464	3.088	2.74	2.74	2.74	2.74	2.74	2.74
	LTPU									
GROUND FAULT	160	0.4	0.02	0.08	0.038	0.038	0.038	0.038	0.038	0.038
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.056

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P4)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
POLE TO FRAME	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
LINE TO LOAD	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00

POLE RESISTANCE READING — ☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.6499	0.6274	0.6669

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572, SI #1482

Tested By: N. HERRST Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE SWITCHBOARD INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 322
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 3/9/2020 | TEMPERATURE 70 °F | HUMIDITY 60 % | EQPT. LOCATION EAST BLOWER BLDG
SUBSTATION 6 | POSITION SEC. 1-4

NAMEPLATE DATA

MANUFACTURER SQUARE D | SERIAL NO. G-726038 | TYPE POWER ZONE 4
CATALOG NO. --- | DRAWING NO. 30951271-024 | VOLTAGE CLASS 600
PHASE AMPACITY 1600 A | WITHSTAND RATING 100 kA | CONDUCTOR ☑ Cu ☐ Al

INSTALLED DEVICES

DRAWOUT LVACB --- | BOLT-IN LVACB --- | DRAWOUT MCCB 9 | BOLT-IN MCCB ---
BOLTED PRESSURE SWITCHES -- | FUSED DISCONNECTS --- | PROTECTIVE RELAYS --- | PANEL METERS 2
kWh METERS 2 | VT's 2 | CT's 6 | CPT's 6
Other ---

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	NEW
INSULATING MEMBERS	☑	Acceptable	NEW
CUBICLES	☑	Acceptable	NEW
GROUND CONNECTION	☑	Acceptable	NEW
AUXILIARY DEVICES	☑	Acceptable	NEW

TEST VOLTAGE 1 kVdc | EQUIPMENT TEMPERATURE 21 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
1-3	RDG.	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
	20°C	2,120	2,120	2,120	2,120	2,120	2,120	2,120	2,120	2,120	2,120
3-4	RDG.	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
	20°C	2,120	2,120	2,120	2,120	2,120	2,120	2,120	2,120	2,120	2,120
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539

Tested By: A. SHERWOOD Tested By: S. LADD

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

SWITCHBOARD BUS CONNECTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 323

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/9/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION E. BLOWER BLDG

SUBSTATION 6 — POSITION SEC. 1-4

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. G-726038 — TYPE POWER ZONE 4

CATALOG NO. --- — DRAWING NO. 30951271-024 — VOLTAGE CLASS 600

PHASE AMPACITY 1600 A — WITHSTAND RATING 100 kA — CONDUCTOR ○ CU ○ AL

BUS SECTION TESTED		RESISTANCE IN ☑ MICRO-OHMS ☐ MILLI-OHMS					BUS SECTION TESTED		RESISTANCE IN ☐ MICRO-OHMS ☐ MILLI-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
XFMR 1	MAIN A	27	31	43	---	---							
MAIN A	SPARE A	46	61	67	---	---							
MAIN A	MCC EBB A	39	52	57	---	---							
MAIN A	MCC EPB A	47	51	50	---	---							
MAIN A	TIE	86	89	87	---	---							
XFMR 2	MAIN B	25	28	25	---	---							
MAIN B	TIE	46	57	64	---	---							
MAIN B	MCC EBB B	38	52	58	---	---							
MAIN B	SPARE B	26	32	28	---	---							
MAIN B	MCC EPB	47	50	50	---	---							
XFMR 1	SEC 1	---	---	---	37	297							
SEC 1	SEC 2	---	---	---	---	79							
XFMR 2	SEC 4	---	---	---	43	43							
SEC 4	SEC 3	---	---	---	---	85							
SEC 1	SEC 3	---	---	---	---	98							

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: DLRO #193761

Tested By: A. SHERWOOD Tested By: S. LADD

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 324

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/9/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING

SUBSTATION 6 — POSITION SPARE A

MANUFACTURER	SQUARE D	SN / SO NO.	085262997401	FRAME SIZE(F)	800
BREAKER TYPE	NW 08 H3	SENSOR TAPS	400	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0A	CATALOG NO.	WA6AAR44A9CXFXWXAA	ZONE INTLK ☐	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	400	LONG TIME PU	0.5	x	400	A =	200	A	DELAY	0.5		
SENSOR TAP	400	SHORT TIME PU	1.5	=	300	A			DELAY	0.1	I²T	● IN ○ OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	2	=	800	A	● ON ○ OFF					
		GRD. FLT. PU	A	=	120	A	● ON ○ OFF		DELAY	0.1	I²T	● IN ○ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	400	LONG TIME PU	0.5	x	400	A =	200	A	DELAY	0.5		
SENSOR TAP	400	SHORT TIME PU	1.5	=	300	A			DELAY	0.1	I²T	● IN ○ OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	2	=	800	A	● ON ○ OFF					
		GRD. FLT. PU	A	=	120	A	● ON ○ OFF		DELAY	0.1	I²T	● IN ○ OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	1000	200%	---	---	0.037	0.037	---	---	---	---
	IPU									
SHORT TIME	550	200%	---	---	1.397	1.397	---	---	---	---
	STPU									
LONG TIME	267	300%	---	---	14.388	14.388	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	240	200%	---	---	0.262	0.262	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.013	0.014	0.011

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761, SI #1512

Tested By: S. LADD — Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 325
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/10/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 6 — POSITION SPARE B

MANUFACTURER	SQUARE D	SN / SO NO.	085262997402	FRAME SIZE(F)	800
BREAKER TYPE	NW 08 H3	SENSOR TAPS	400	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0A	CATALOG NO.	WA6AAR44A9CXFXWXAA	ZONE INTLK ☐	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	400	LONG TIME PU	0.5	x	400	A =	200	A	DELAY	0.5		
SENSOR TAP	400	SHORT TIME PU	1.5	=	300	A			DELAY	0.1	I²T	◉ IN ○ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	2	=	800	A	◉ ON ○ OFF					
		GRD. FLT. PU	A	=	120	A	◉ ON ○ OFF		DELAY	0.1	I²T	◉ IN ○ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	400	LONG TIME PU	0.5	x	400	A =	200	A	DELAY	0.5		
SENSOR TAP	400	SHORT TIME PU	1.5	=	300	A			DELAY	0.1	I²T	◉ IN ○ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	2	=	800	A	◉ ON ○ OFF					
		GRD. FLT. PU	A	=	120	A	◉ ON ○ OFF		DELAY	0.1	I²T	◉ IN ○ OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	1000	---	---	---	0.036	0.036	---	---	---	---
	IPU									
SHORT TIME	550	---	---	---	1.379	1.379	---	---	---	---
	STPU									
LONG TIME	267	---	---	---	14.047	14.047	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	240	---	---	---	0.263	0.263	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.01	0.01	0.011

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761, SI #1512

Tested By: S. LADD — Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER DIELECTRIC ABSORPTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 326
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/9/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 6 — POSITION SUB 6 TRANSFORMER 1

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-01
SPECIFICATION NO. TX11717001 — KVA 1,000 / / — TYPE VPI — CLASS AA
PHASE 3 — TEMPERATURE RISE 115 °C / °C — IMPEDANCE 5.6 % — B.I.L. RATING 30 kV PRI. / 10 kV SEC.
COOLANT AIR — CAPACITY --- / GALLONS — TOTAL WEIGHT 6900
WINDING POLARITY SUBTRACTIVE — WINDING MATERIAL CU — K FACTOR NA
PRIMARY VOLTAGE 4,160 — (●) DELTA ( ) WYE — RATED CURRENT 139 / / AMPERES
SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 1,203 / / AMPERES
TAP VOLTAGES 4,368 | 4,264 | 4,160 | 4,056 | 3,952
TAP CONNECTIONS E-F | D-F | E-G | D-G | C-G
TAP SETTING E-G 480 VOLTS — # FANS 0 — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE ☑

TEST VOLTAGE:
PRIMARY TO SECONDARY 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 1 — K2=(TCF) (K1)
PRIMARY TO GROUND 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 1
SECONDARY TO GROUND 1 kVdc — TEST VOLTAGE MULTIPLIER, K1 1

CORE/COIL TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF — DRY 1.05 — LIQUID 1.080

MINUTES	PRIMARY TO SECONDARY GROUND GUARDED				PRIMARY TO GROUND SECONDARY GUARDED				SECONDARY TO GROUND PRIMARY GUARDED			
	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C
0.25	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
0.50	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
0.75	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
1.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
1.25	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
1.50	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
1.75	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
2.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
3.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
4.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
5.00												
6.00												
7.00												
8.00												
9.00												
10.00												
POLARIZATION INDEX												

POLARIZATON INDEX = 10 MINUTE RDG. / 1 MINUTE RDG.

COMMENTS: LIGHTNING ARRESTOR MEGGER: A = 3180, B = 6720, C = 6100.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539

Tested By: A. SHERWOOD Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER INSPECTION

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 327
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/9/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 6 — POSITION SUB 6 TRANSFORMER 1

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-01
SPECIFICATION NO. TX11717001 — kVA 1,000 / / — TYPE VPI — CLASS AA
PHASE 3 — TEMPERATURE RISE 115 °C / °C — IMPEDANCE 5.6 % — B.I.L. RATING 30 kV PRI. / 10 kV SEC.
COOLANT AIR — CAPACITY --- / GALLONS — TOTAL WEIGHT 6900
WINDING POLARITY SUBTRACTIVE — WINDING MATERIAL CU — K FACTOR NA
PRIMARY VOLTAGE 4,160 — (●) DELTA ( ) WYE — RATED CURRENT 139 / / AMPERES
SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 1,203 / / AMPERES

TAP VOLTAGES	4,368	4,264	4,160	4,056	3,952			
TAP CONNECTIONS	E-F	D-F	E-G	D-G	C-G			

TAP SETTING E-G — 480 VOLTS — # FANS 0 — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE [x]

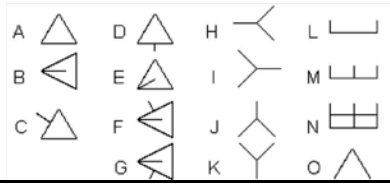
GAUGES:

COOLANT TEMPERATURE --- °C — MAXIMUM TEMPERATURE --- °C — RESET TEMPERATURE GAUGE [ ]
COOLANT LEVEL --- — PRESSURE VACUUM --- # — LCR COUNTER ---
OTHER GAUGES ---

VISUAL INSPECTION:

BUSHINGS ACCEPTABLE — SUPPORT INSULATORS ACCEPTABLE — CONNECTIONS ACCEPTABLE
PAINT ACCEPTABLE — RADIATORS --- — FANS ---
NO-LOAD TAP CHANGER --- — LEAKS ---
MAIN TANK DIELECTRIC SAMPLE SYRINGE # --- — BOTTLE # ---
LTC DIELECTRIC SAMPLE SYRINGE # --- — BOTTLE # ---
GROUND CONDUCTOR SIZE 4/0 AWG/kcm — NO. OF GROUND CONDUCTORS 1 — GROUND CONDUCTOR CONDITION ACC
ADDITIONAL EQUIPMENT ---

VECTOR DIAGRAM



PRI. VECTOR: E
SEC. VECTOR: H

POST TEST VOLTAGES

NO LOAD SECONDARY VOLTAGE			
X1 - X2	V	X0 - G	V
X1 - X3	V	X0 - X1	V
X2 - X3	V	X0 - X2	V
		X0 - X3	V

COMMENTS:
DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: A. SHERWOOD Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER TURNS RATIO TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 328
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/9/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 6 — POSITION SUB 6 TRANSFORMER 1

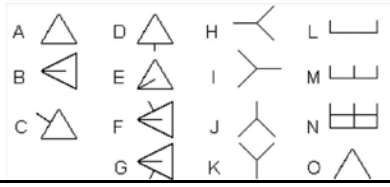
NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-01
SPECIFICATION NO. TX11717001 — KVA 1,000 / / — TYPE VPI — CLASS AA
PHASE 3 — TEMPERATURE RISE 115 °C / °C — IMPEDANCE 5.6 % — B.I.L. RATING 30 kV PRI. / 10 kV SEC.
COOLANT AIR — CAPACITY --- GALLONS — TOTAL WEIGHT 6900
WINDING POLARITY SUBTRACTIVE — WINDING MATERIAL CU — K FACTOR NA
PRIMARY VOLTAGE 4,160 — (●) DELTA ( ) WYE — RATED CURRENT 139 / / AMPERES
SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 1,203 / / AMPERES
TAP VOLTAGES 4,368 | 4,264 | 4,160 | 4,056 | 3,952
TAP CONNECTIONS E-F | D-F | E-G | D-G | C-G
TAP SETTING E-G — 480 VOLTS — # FANS 0 — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE ☑

TRANSFORMER TURNS RATIO TESTS

TAP NUMBER		WINDING VOLTAGES	CALCULATED RATIO	MEASURED RATIO H_1H_3/X_1X_0	MEASURED RATIO H_2H_1/X_2X_0	MEASURED RATIO H_3H_2/X_3X_0
1	E-F	4,368 / 277	15.7690			
2	D-F	4,264 / 277	15.3935			
3	E-G	4,160 / 277	15.0181	15.0000	15.0070	15.0020
4	D-G	4,056 / 277	14.6426			
5	C-G	3,952 / 277	14.2671			
6		/				
7		/				
8		/				

VECTOR DIAGRAM



PRI. VECTOR: A
SEC. VECTOR: H

CORRECTION FACTOR FOR UNACCESSIBLE NEUTRAL

PHASE TESTED	BLACK	RED	BLACK	RED	JUMPER	READING MULTIPLIER	TEST SHEET DESIGNATION
DELTA-WYE							
A	H1	H3	X1	X2	H2H3	1.547	H1-H3 X1-X2
B	H2	H1	X2	X3	H1H3	1.547	H2-H3 X2-X3
C	H3	H2	X3	X1	H1H2	1.547	H3-H2 X3-X1
WYE-DELTA							
A	H1	H3	X1	X2	X2X3	1.5000	H1-H3 X1-X2
B	H2	H1	X2	X3	X1X3	1.5000	H2-H1 X2-X3
C	H3	H2	X3	X1	X1X2	1.5000	H3-H2 X3-X1

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: TTR #164234

Tested By: A. SHERWOOD Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

CAPACITOR BANK TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 329
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 3/9/2020 | TEMPERATURE 70 °F | HUMIDITY 60 % | EQPT. LOCATION E. BLOWER BLDG
SUBSTATION 6 | POSITION SUB 6 TRANSFORMER 1 & 2

MANUFACTURER ABB | TYPE 2GUS031801A2 | FREQUENCY 50/60 HZ
CATALOG NO. SN #500894036-20-0007 | RATING 0.5 MICRO FARRADS
INST. MANUAL --- | VOLTAGE 7 | FUSE ---
CLASS DIST. | FLUID TYPE FARADOL 810 | STYLE ---
FLUID/GALLONS 4.6 L | RATING - kVAR ---
PHASE: 1PH 1 | CRTD 0.5 | CACT ---
DEV --- | S/P ---

POSITION	ALLOWABLE MIN/MAX	MFG DATE	SERIAL NUMBER	CAPACITANCE	INTERNAL RESISTOR	INSULATION RESISTANCE
SUB 6 XFMR 1, X PHASE	---	2014	0007	499	N/A	100000+
SUB 6 XFMR 1, Y PHASE	---	2014	0019	500	N/A	100000+
SUB 6 XFMR 1, Z PHASE	---	2014	0012	500	N/A	100000+
SUB 6 XFMR 2, X PHASE	---	2014	0002	505	N/A	83600
SUB 6 XFMR 2, Y PHASE	---	2014	0024	498	N/A	83600
SUB 6 XFMR 2, Z PHASE	---	2014	0022	498	N/A	83600

COMMENTS: * = CAPACITANCE MEASUREMENTS ARE IN NANO FARRADS
100KV BILL MEG AT 2500VD

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, FLUKE #206123

Tested By: A. SHERWOOD Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LIGHTNING ARRESTER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 330
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/9/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 6 — POSITION SUB 6 TRANSFORMER 1 & 2

NAMEPLATE DATA

MANUFACTURER COOPER — TYPE MCOV — MODEL ---
CATALOG NO. --- — SERIAL NO. --- — RELIEF ---
RATED RMS VOLTAGE 2.55 kV — RATED MCOV 3 kV — RMS CURRENT RATING 10 kA — RATED CREST 0 kA
SYSTEM VOLTAGE 4.161 kV — ARRESTER TYPE STATION ○ INTERMEDIATE ○ DISTRIBUTION ◉ — MATERIAL TYPE PORCELAIN ○ POLYMER ◉

INSULATION TEST VOLTAGE 2.50 kV DC — TEST VOLTAGE MULTIPLIER 1
RANGE MULTIPLIER 1.0 — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION TEST

POSITION	TOTAL CORRECTION MULTIPLIER	A PHASE TO GROUND		B PHASE TO GROUND		C PHASE TO GROUND	
		ACTUAL MEGOHMS	CORRECTED MEGOHMS	ACTUAL MEGOHMS	CORRECTED MEGOHMS	ACTUAL MEGOHMS	CORRECTED MEGOHMS
SUB 6 TRANSFORMER 1	1.05	3,180	3,339.000	620	651.000	6,100	6,405.000
SUB 6 TRANSFORMER 2	1.05	2,530	2,656.500	2,680	2,814.000	2,750	2,887.500

WATT LOSS TEST

TEST kV SWITCH SETTING
OUTPUT TEST VOLTAGE
READING CORRECTION FACTOR

◉ GROUNDED SPECIMEN TEST
○ UNGROUNDED SPECIMEN TEST

MILLI-WATT LOSS

POSITION	A PHASE	B PHASE	C PHASE

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539

Tested By: A. SHERWOOD Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER DIELECTRIC ABSORPTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 331

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/10/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING

SUBSTATION 6 — POSITION SUB 6 TRANSFORMER 2

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-025-01

SPECIFICATION NO. TX11717001 — kVA 1,000 / / — TYPE VPI — CLASS AA

PHASE 3 — TEMPERATURE RISE 115 °C / °C — IMPEDANCE 5.6 % — B.I.L. RATING 30 kV PRI. / 10 kV SEC.

COOLANT AIR — CAPACITY --- GALLONS — TOTAL WEIGHT 6900

WINDING POLARITY SUBTRACTIVE — WINDING MATERIAL CU — K FACTOR ---

PRIMARY VOLTAGE 4,160 — (●) DELTA ( ) WYE — RATED CURRENT 139 / / AMPERES

SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 1,203 / / AMPERES

TAP VOLTAGES	1,368	4,264	4,160	4,056	3,952			
TAP CONNECTIONS	E-F	D-F	E-G	D-G	C-G			

TAP SETTING E-G 480 VOLTS — # FANS 0 — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE [x]

TEST VOLTAGE:

PRIMARY TO SECONDARY	5 kVdc	TEST VOLTAGE MULTIPLIER, K1	1	K2=(TCF) (K1)
PRIMARY TO GROUND	5 kVdc	TEST VOLTAGE MULTIPLIER, K1	1	
SECONDARY TO GROUND	1 kVdc	TEST VOLTAGE MULTIPLIER, K1	1	

CORE/COIL TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF — DRY 1.05 — LIQUID 1.080

MINUTES	PRIMARY TO SECONDARY GROUND GUARDED				PRIMARY TO GROUND SECONDARY GUARDED				SECONDARY TO GROUND PRIMARY GUARDED			
	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C
0.25	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	59,000.00	1	1.05	61,950.0
0.50	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	65,200.00	1	1.05	68,460.0
0.75	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	67,500.00	1	1.05	70,875.0
1.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	68,400.00	1	1.05	71,820.0
1.25	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	69,200.00	1	1.05	72,660.0
1.50	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	69,600.00	1	1.05	73,080.0
1.75	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	70,000.00	1	1.05	73,500.0
2.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	70,200.00	1	1.05	73,710.0
3.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	70,500.00	1	1.05	74,025.0
4.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	70,100.00	1	1.05	73,605.0
5.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	70,500.00	1	1.05	74,025.0
6.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	70,800.00	1	1.05	74,340.0
7.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	71,100.00	1	1.05	74,655.0
8.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	71,300.00	1	1.05	74,865.0
9.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	71,600.00	1	1.05	75,180.0
10.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	71,800.00	1	1.05	75,390.0
POLARIZATION INDEX	1.00				1.00				1.05			

POLARIZATON INDEX = 10 MINUTE RDG. / 1 MINUTE RDG.

COMMENTS:

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539

Tested By: A. SHERWOOD Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER INSPECTION

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 332

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/10/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING

SUBSTATION 6 — POSITION SUB 6 TRANSFORMER 2

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-025-01

SPECIFICATION NO. TX11717001 — KVA 1,000 / / — TYPE VPI — CLASS AA

PHASE 3 — TEMPERATURE RISE 115 °C / °C — IMPEDANCE 5.6 % — B.I.L. RATING 30 kV PRI. / 10 kV SEC.

COOLANT AIR — CAPACITY --- GALLONS — TOTAL WEIGHT 6900

WINDING POLARITY SUBTRACTIVE — WINDING MATERIAL CU — K FACTOR ---

PRIMARY VOLTAGE 4,160 — (●) DELTA ( ) WYE — RATED CURRENT 139 / / AMPERES

SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 1,203 / / AMPERES

TAP VOLTAGES	1,368	4,264	4,160	4,056	3,952			
TAP CONNECTIONS	E-F	D-F	E-G	D-G	C-G			

TAP SETTING E-G 480 VOLTS — # FANS — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE [x]

GAUGES:

COOLANT TEMPERATURE --- °C — MAXIMUM TEMPERATURE --- °C — RESET TEMPERATURE GAUGE [ ]

COOLANT LEVEL --- — PRESSURE VACUUM --- # — LCR COUNTER ---

OTHER GAUGES ---

VISUAL INSPECTION:

BUSHINGS ACCEPTABLE — SUPPORT INSULATORS ACCEPTABLE — CONNECTIONS ACCEPTABLE

PAINT ACCEPTABLE — RADIATORS --- — FANS ---

NO-LOAD TAP CHANGER --- — LEAKS ---

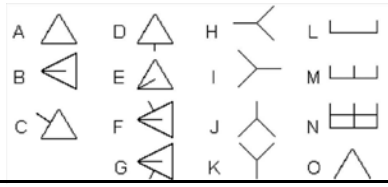
MAIN TANK DIELECTRIC SAMPLE SYRINGE # --- — BOTTLE # ---

LTC DIELECTRIC SAMPLE SYRINGE # --- — BOTTLE # ---

GROUND CONDUCTOR SIZE 4/0 AWG/kcm — NO. OF GROUND CONDUCTORS 1 — GROUND CONDUCTOR CONDITION ACC

ADDITIONAL EQUIPMENT ---

VECTOR DIAGRAM



PRI. VECTOR: E

SEC. VECTOR: H

POST TEST VOLTAGES

NO LOAD SECONDARY VOLTAGE			
X1 - X2	V	X0 - G	V
X1 - X3	V	X0 - X1	V
X2 - X3	V	X0 - X2	V
		X0 - X3	V

COMMENTS:

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: A. SHERWOOD Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER TURNS RATIO TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 333

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/10/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING

SUBSTATION 6 — POSITION SUB 6 TRANSFORMER 2

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-025-01

SPECIFICATION NO. TX11717001 — KVA 1,000 / / — TYPE VPI — CLASS AA

PHASE 3 — TEMPERATURE RISE 115 °C / °C — IMPEDANCE 5.6 % — B.I.L. RATING 30 kV PRI. / 10 kV SEC.

COOLANT AIR — CAPACITY --- GALLONS — TOTAL WEIGHT 6900

WINDING POLARITY SUBTRACTIVE — WINDING MATERIAL CU — K FACTOR ---

PRIMARY VOLTAGE 4,160 — (●) DELTA ( ) WYE — RATED CURRENT 139 / / AMPERES

SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 1,203 / / AMPERES

TAP VOLTAGES 1,368 | 4,264 | 4,160 | 4,056 | 3,952

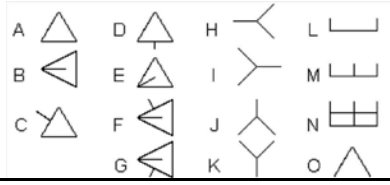
TAP CONNECTIONS E-F | D-F | E-G | D-G | C-G

TAP SETTING E-G 480 VOLTS — # FANS — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE ☑

TRANSFORMER TURNS RATIO TESTS

TAP NUMBER		WINDING VOLTAGES	CALCULATED RATIO	MEASURED RATIO		
				H_1H_3/X_1X_0	H_2H_1/X_2X_0	H_3H_2/X_3X_0
1	E-F	1,368 / 277	4.9386			
2	D-F	4,264 / 277	15.3935			
3	E-G	4,160 / 277	15.0181	15.0120	15.0050	15.0100
4	D-G	4,056 / 277	14.6426			
5	C-G	3,952 / 277	14.2671			
6		/				
7		/				
8		/				

VECTOR DIAGRAM



PRI. VECTOR: E

SEC. VECTOR: H

CORRECTION FACTOR FOR UNACCESSIBLE NEUTRAL

PHASE TESTED	BLACK	RED	BLACK	RED	JUMPER	READING MULTIPLIER	TEST SHEET DESIGNATION
DELTA-WYE							
A	H1	H3	X1	X2	H2H3	1.547	H1-H3 X1-X2
B	H2	H1	X2	X3	H1H3	1.547	H2-H3 X2-X3
C	H3	H2	X3	X1	H1H2	1.547	H3-H2 X3-X1
WYE-DELTA							
A	H1	H3	X1	X2	X2X3	1.5000	H1-H3 X1-X2
B	H2	H1	X2	X3	X1X3	1.5000	H2-H1 X2-X3
C	H3	H2	X3	X1	X1X2	1.5000	H3-H2 X3-X1

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: TTR #164324

Tested By: A. SHERWOOD Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 334
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/9/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 6 — POSITION TIE

MANUFACTURER	SQUARE D	SN / SO NO.	085262997102	FRAME SIZE(F)	1600
BREAKER TYPE	NW 16 H3	SENSOR TAPS	1600	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0A	CATALOG NO.	WA6EER44A9CFFFWSEA	ZONE INTLK ☐	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R) 1600 — SENSOR TAP 1,600 — GRD. FLT. ● 3W ○ 4W

LONG TIME PU	0.7	x	1600	A =	1120	A	DELAY	2	
SHORT TIME PU	2.5	=	2800	A			DELAY	0.2	I²T ○ IN ● OUT ○ N/A
INST. PU	8	=	12800	A	● ON	○ OFF			
GRD. FLT. PU	A	=	500	A	● ON	○ OFF	DELAY	0.3	I²T ○ IN ● OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R) 1600 — SENSOR TAP 1,600 — GRD. FLT. ● 3W ○ 4W

LONG TIME PU	0.7	x	1600	A =	1120	A	DELAY	2	
SHORT TIME PU	2.5	=	2800	A			DELAY	0.2	I²T ○ IN ● OUT ○ N/A
INST. PU	8	=	12800	A	● ON	○ OFF			
GRD. FLT. PU	A	=	500	A	● ON	○ OFF	DELAY	0.3	I²T ○ IN ● OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	16000	---	---	---	0.037	0.037	---	---	---	---
	IPU									
SHORT TIME	7800	---	---	---	0.157	0.157	---	---	---	---
	STPU									
LONG TIME	2240	---	---	---	17.787	17.787	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	1000	200%	---	---	0.260	0.260	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.014	0.015	0.015

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761, SI #1512

Tested By: S. LADD — Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 335
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/2/2020 — TEMPERATURE 70 °F — HUMIDITY 70 % — EQPT. LOCATION CEB
SUBSTATION 7 — POSITION ATS-ADM-1

MANUFACTURER	SQUARE D	SN / SO NO.	085255257301	FRAME SIZE(F)	800
BREAKER TYPE	MASTER PACT	SENSOR TAPS	800	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	2C1	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0 A	CATALOG NO.	WA6AAR44A9SXFXXXA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	800	LONG TIME PU	1	x	800	A =	800	A	DELAY	12		
SENSOR TAP	800	SHORT TIME PU	5	=	4000	A			DELAY	0.2	I²T ○ IN	● OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	15	=	12000	A	● ON ○ OFF					
		GRD. FLT. PU	C	=	320	A	● ON ○ OFF		DELAY	0.3	I²T ○ IN	● OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	800	LONG TIME PU	1	x	800	A =	800	A	DELAY	12		
SENSOR TAP	800	SHORT TIME PU	5	=	4000	A			DELAY	0.2	I²T ○ IN	● OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	15	=	12000	A	● ON ○ OFF					
		GRD. FLT. PU	C	=	320	A	● ON ○ OFF		DELAY	0.3	I²T ○ IN	● OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	15000	---	---	---	0.046	0.046	---	---	---	---
	IPU									
SHORT TIME	8000	---	---	---	0.161	0.161	---	---	---	---
	STPU									
LONG TIME	2933	---	---	---	29.364	29.364	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	640	---	---	---	0.264	0.264	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.01	0.009	0.01

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

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TOOLS USED: MEGGER #184539, DLRO #193761, SI #1512

Tested By: DF / AS Tested By: NH / TD

Utilities Instrumentation Service, Inc.

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LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

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OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/3/2020 — TEMPERATURE 70 °F — HUMIDITY 70 % — EQPT. LOCATION CEB
SUBSTATION 7 — POSITION ATS-ADM-1

MANUFACTURER	SQUARE D	SN / SO NO.	085255257302	FRAME SIZE(F)	800
BREAKER TYPE	MASTER PACT	SENSOR TAPS	600	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	5C1	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0 A	CATALOG NO.	WA6AAR44A9SXFXXXAA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R) 800 — SENSOR TAP 800 — GRD. FLT. ◉ 3W ○ 4W

LONG TIME PU	1	x	800	A =	800	A	DELAY 12		
SHORT TIME PU	5	=	4000	A			DELAY 0.2	I²T ○ IN	◉ OUT ○ N/A
INST. PU	15	=	12000	A	◉ ON	○ OFF			
GRD. FLT. PU	C	=	320	A	◉ ON	○ OFF	DELAY 0.3	I²T ○ IN	◉ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R) 800 — SENSOR TAP 800 — GRD. FLT. ◉ 3W ○ 4W

LONG TIME PU	1	x	800	A =	800	A	DELAY 12		
SHORT TIME PU	5	=	4000	A			DELAY 0.2	I²T ○ IN	◉ OUT ○ N/A
INST. PU	15	=	12000	A	◉ ON	○ OFF			
GRD. FLT. PU	C	=	320	A	◉ ON	○ OFF	DELAY 0.3	I²T ○ IN	◉ OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	15000	---	---	---	0.044	0.044	---	---	---	---
	IPU									
SHORT TIME	8000	---	---	---	0.165	0.165	---	---	---	---
	STPU									
LONG TIME	2933	---	---	---	28.612	28.612	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	640	---	---	---	0.264	0.264	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.011	0.011	0.012

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761, SI #1512

Tested By: AS / DF — Tested By: NH / EK

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 337
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/3/2020 — TEMPERATURE 70 °F — HUMIDITY 70 % — EQPT. LOCATION CEB
SUBSTATION 7 — POSITION ISOLATION TIE

MANUFACTURER	SQUARE D	SN / SO NO.	085255257101	FRAME SIZE(F)	3200
BREAKER TYPE	MASTER PACT	SENSOR TAPS	---	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0 A	CATALOG NO.	WA6JJR44A9CXFXWSAA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	3200	LONG TIME PU	0.6	x	3200	A =	1920	A	DELAY	4		
SENSOR TAP	3,200	SHORT TIME PU	4	=	7680	A			DELAY	0.3	I²T ○ IN	● OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	10	=	32000	A	● ON ○ OFF					
		GRD. FLT. PU	A	=	500	A	● ON ○ OFF		DELAY	0.3	I²T ○ IN	● OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	3200	LONG TIME PU	0.6	x	3200	A =	1920	A	DELAY	4		
SENSOR TAP	3,200	SHORT TIME PU	4	=	7680	A			DELAY	0.3	I²T ○ IN	● OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	10	=	32000	A	● ON ○ OFF					
		GRD. FLT. PU	A	=	500	A	● ON ○ OFF		DELAY	0.3	I²T ○ IN	● OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	40000	---	---	---	0.036	0.036	---	---	---	---
	IPU									
SHORT TIME	19840	---	---	---	0.263	0.263	---	---	---	---
	STPU									
LONG TIME	5760	---	---	---	14.922	14.922	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	1000	---	---	---	0.264	0.264	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2) READING	POLE 1 20°C	POLE 2 MΩ (P2-P3) READING	POLE 2 20°C	POLE 3 MΩ (P3-P1) READING	POLE 3 20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.01	0.01	0.01

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761, SI #1512

Tested By: DF / AS Tested By: NH / EK

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 338
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/2/2020 — TEMPERATURE 70 °F — HUMIDITY 70 % — EQPT. LOCATION CEB
SUBSTATION 7 — POSITION MAIN A

MANUFACTURER	SQUARE D	SN / SO NO.	085255257501	FRAME SIZE(F)	3200
BREAKER TYPE	MASTER PACT	SENSOR TAPS	3200	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	1 - B/C	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0 A	CATALOG NO.	WA6JJR44A9CFFFWSAA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	3200	LONG TIME PU	0.7	x	3200	A =	2240	A	DELAY	4	
SENSOR TAP	3,200	SHORT TIME PU	4	=	8960	A			DELAY	0.4	I²T ○ IN ● OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	10	=	32000	A	● ON ○ OFF				
		GRD. FLT. PU	C	=	720	A	● ON ○ OFF		DELAY	0.4	I²T ○ IN ● OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	3200	LONG TIME PU	0.7	x	3200	A =	2240	A	DELAY	4	
SENSOR TAP	3,200	SHORT TIME PU	4	=	8960	A			DELAY	0.4	I²T ○ IN ● OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	10	=	32000	A	● ON ○ OFF				
		GRD. FLT. PU	C	=	720	A	● ON ○ OFF		DELAY	0.4	I²T ○ IN ● OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	40000	---	---	---	0.037	0.037	---	---	---	---
	IPU									
SHORT TIME	20480	---	---	---	0.403	0.403	---	---	---	---
	STPU									
LONG TIME	6720	---	---	---	15.288	15.288	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	1440	---	---	---	0.404	0.404	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.012	0.012	0.011

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761, SI #1512

Tested By: DF / AS Tested By: NH / TD

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 339
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/3/2020 — TEMPERATURE 70 °F — HUMIDITY 70 % — EQPT. LOCATION CEB
SUBSTATION 7 — POSITION MAIN B

MANUFACTURER	SQUARE D	SN / SO NO.	085255257503	FRAME SIZE(F)	3200
BREAKER TYPE	MASTER PACT	SENSOR TAPS	3200	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	6 B/C	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0A	CATALOG NO.	WA6JJR44A9CFFFWSAA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND		LONG TIME PU	0.7	x	3200	A =	2240	A	DELAY	4	
RATING PLUG(R)	3200	SHORT TIME PU	4	=	8960	A			DELAY	0.4	I²T ○ IN ● OUT ○ N/A
SENSOR TAP	3,200	INST. PU	10	=	32000	A	● ON	○ OFF			
GRD. FLT.	● 3W ○ 4W	GRD. FLT. PU	C	=	320	A	● ON	○ OFF	DELAY	0.4	I²T ○ IN ● OUT ○ N/A
SETTINGS AS LEFT		LONG TIME PU	0.7	x	3200	A =	2240	A	DELAY	4	
RATING PLUG(R)	3200	SHORT TIME PU	4	=	8960	A			DELAY	0.4	I²T ○ IN ● OUT ○ N/A
SENSOR TAP	3,200	INST. PU	10	=	32000	A	● ON	○ OFF			
GRD. FLT.	● 3W ○ 4W	GRD. FLT. PU	C	=	320	A	● ON	○ OFF	DELAY	0.4	I²T ○ IN ● OUT ○ N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	40000	---	---	---	0.036	0.036	---	---	---	---
	IPU									
SHORT TIME	20480	---	---	---	0.403	0.403	---	---	---	---
	STPU									
LONG TIME	6720	---	---	---	15.204	15.204	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	1440	---	---	---	0.405	0.405	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE	POLE 1 MΩ (P1-P2) READING	POLE 1 20°C	POLE 2 MΩ (P2-P3) READING	POLE 2 20°C	POLE 3 MΩ (P3-P1) READING	POLE 3 20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.011	0.011	0.011

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761, SI #1512

Tested By: AS / DF Tested By: NH / EK

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 340
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/2/2020 — TEMPERATURE 70 °F — HUMIDITY 70 % — EQPT. LOCATION ADMIN ELECTRICAL ROOM
SUBSTATION 7 — POSITION MCC-ADM-1

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. --- — TYPE ---
CATALOG NO. --- — DRAWING NO. --- — VOLTAGE CLASS ---
MAIN BUS RATING 800 A — MAIN BUS NEUTRAL RATING --- A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING --- — NUMBER OF SECTIONS 7 — LISTING [x] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER 1 — MLO --- — TYPE --- — AMPACITY 800 — MAIN DISCONNECT --- — FUSE TYPE --- — SIZE ---
TOTAL POSITIONS EQUIPPED 23 — NO. OF SPARE SPACES 14 — TOTAL POSITIONS USED 23

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C/L
INSULATING MEMBERS	☑	Acceptable	C/L
CUBICLES	☑	Acceptable	C/L
GROUND CONNECTIONS	☑	Acceptable	C/L
AUXILIARY DEVICES	☑	Acceptable	C/L

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
SECTION (1-7)	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	2,120	2,120	2,120		2,120	2,120	2,120			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS: F. O. # 30951271 -147
3 PHASE 3 WIRE 60 HZ

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480

Tested By: D. FLEMING Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 341
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/2/2020 — TEMPERATURE 70 °F — HUMIDITY 70 % — EQPT. LOCATION ADMIN BLDG MAIN ELECTRICAL ROOM
SUBSTATION 7 — POSITION MCC-ADM-1 MAIN

MANUFACTURER	SQUARE D	SN / SO NO.	---	FRAME SIZE(F)	800
BREAKER TYPE	POWER PACT PL 800	SENSOR TAPS	800	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0 A	CATALOG NO.	AL800M23K	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	800	LONG TIME PU	0.8	x	800	A =	640	A	DELAY	12		
SENSOR TAP	800	SHORT TIME PU	5	=	3200	A			DELAY	0.1	I²T	○ IN ◉ OUT ○ N/A
GRD. FLT.	○ 3W ○ 4W	INST. PU	15	=	12000	A	◉ ON ○ OFF					
		GRD. FLT. PU	B	=	240	A	◉ ON ○ OFF		DELAY	0.2	I²T	○ IN ◉ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	800	LONG TIME PU	0.8	x	800	A =	640	A	DELAY	12		
SENSOR TAP	800	SHORT TIME PU	5	=	3200	A			DELAY	0.1	I²T	○ IN ◉ OUT ○ N/A
GRD. FLT.	○ 3W ○ 4W	INST. PU	15	=	12000	A	◉ ON ○ OFF					
		GRD. FLT. PU	B	=	240	A	◉ ON ○ OFF		DELAY	0.2	I²T	○ IN ◉ OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	15000	1.25	---	---	0.036	0.036	---	---	---	---
	IPU									
SHORT TIME	7600	2.375	---	---	0.095	0.095	---	---	---	---
	STPU									
LONG TIME	2347	3.667	---	---	28.459	28.459	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	480	2X	---	---	0.159	0.159	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2) READING	POLE 1 20°C	POLE 2 MΩ (P2-P3) READING	POLE 2 20°C	POLE 3 MΩ (P3-P1) READING	POLE 3 20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.032	0.034	0.032

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480, DLRO #1572, SI #1512

Tested By: D. FLEMING Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
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FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 342
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/2/2020 — TEMPERATURE 70 °F — HUMIDITY 70 % — EQPT. LOCATION ADMIN ELECTRICAL ROOM
SUBSTATION 7 — POSITION MCC-ADM-A (01)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE --- — TYPE MODEL 6
CATALOG NO. --- — SERIES --- — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
SPD	---	---	520	529	612	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
METER	MINI CB	0.25				2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ADM-P-3	MCCB HJ030	30	15,810	16,703	7,505	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ADM-EF-1	MDDB HJ030	30	6,459	15,642	4,618	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ADM-CH-1	MCCB HJ150	100	1,681	2,363	2,344	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ADM-P-4	MCCB HJ030	30	8,306	4,188	5,677	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ADM-EF-2	MCCB HJ030	30	9,151	5,722	4,911	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ADM-ACU-1	MCCB HJ060	45	5,733	7,432	10,439	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
STORM WATER PUMPS LCP	MCCB JJ250	250	713	764	800	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480, DLRO #1572

Tested By: D. FLEMING Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 343
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/2/2020 — TEMPERATURE 70 °F — HUMIDITY 70 % — EQPT. LOCATION ADMIN ELECTRICAL ROOM
SUBSTATION 7 — POSITION MCC-ADM-A (02)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE --- — TYPE MODEL 6
CATALOG NO. --- — SERIES --- — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
ADM-ACCU-1	MCCB HJ060	15	7,888	10,779	8,332	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
XFMR 75 KVA LP-ADM-1	MCCB JJ250	250	1,050	896	1,142	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ADM-P-1	MCCB HJ030	30	6,515	9,793	4,154	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
XFMR 150KVA PP-ADM-1	MCCB LJ400	300	1,024	603	532	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
XFMR 50KVA LP-ADM-2	MCCB LJ400	200	555	541	496	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ADM-EWH-1	MCCB HJ060	20	9,221	10,567	9,177	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ADM-EWH-2	MCCB HJ060	20	34,992	57,310	22,196	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
STORM WATER PUMP STATION OVERFLOW SLUICE GATE	MCCB HJ060	30	3,906	4,317	3,670	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
EWH-1	MCCB HJ060	50	2,689	3,769	2,698	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480, DLRO #1572

Tested By: D. FLEMING Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 344

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE

DATE 3/2/2020 TEMPERATURE 70 °F HUMIDITY 70 % EQPT. LOCATION ADMIN ELECTRICAL ROOM

SUBSTATION 7 POSITION MCC-ADM-A (03)

NAMEPLATE DATA

MANUFACTURER SQUARE D SIZE --- TYPE MODEL 6

CATALOG NO. --- SERIES --- MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C

TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1

K2 = (K1) (TCF) = 1.06

INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
ELEVATOR CONTROL PANEL	MCCB HJ060	30	4,640	4,643	6,022	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ADM-P-2	MCCB HJ030	30	10,661	3,795	4,734	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ADM-HVAC-1	MCCB HJ060	30	5,294	5,177	4,107	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ADM-HVAC-2	MCCB HJ060	20	8,693	9,388	8,199	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480, DLRO #1572

Tested By: D. FLEMING Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 345
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/2/2020 — TEMPERATURE 70 °F — HUMIDITY 70 % — EQPT. LOCATION CEB
SUBSTATION 7 — POSITION MCC-CEB-A

MANUFACTURER	SQUARE D	SN / SO NO.	085255257201	FRAME SIZE(F)	800
BREAKER TYPE	MASTER PACT	SENSOR TAPS	600	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	2 -D1	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0 A	CATALOG NO.	WA6ATR44A9SXFXXXAA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	600	LONG TIME PU	1	x	600	A =	600	A	DELAY	4		
SENSOR TAP	600	SHORT TIME PU	6	=	3600	A			DELAY	0.1	I²T ○ IN	● OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	15	=	9000	A	● ON ○ OFF					
		GRD. FLT. PU	C	=	240	A	● ON ○ OFF		DELAY	0.3	I²T ○ IN	● OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	600	LONG TIME PU	1	x	600	A =	600	A	DELAY	4		
SENSOR TAP	600	SHORT TIME PU	6	=	3600	A			DELAY	0.1	I²T ○ IN	● OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	15	=	9000	A	● ON ○ OFF					
		GRD. FLT. PU	C	=	240	A	● ON ○ OFF		DELAY	0.3	I²T ○ IN	● OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	11250	---	---	---	0.046	0.046	---	---	---	---
	IPU									
SHORT TIME	6300	---	---	---	0.098	0.098	---	---	---	---
	STPU									
LONG TIME	2600	---	---	---	6.752	6.752	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	480	---	---	---	0.265	0.265	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.011	0.011	0.01

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761, SI #1512

Tested By: DF / AS Tested By: NH / TD

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 346
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/2/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB
SUBSTATION 7 — POSITION MCC-CEB-A & B

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. F.O #30951271-148 — TYPE MODEL 6
CATALOG NO. --- — DRAWING NO. --- — VOLTAGE CLASS 600
MAIN BUS RATING 600 A — MAIN BUS NEUTRAL RATING 600 A — CONDUCTOR (•) Cu ( ) Al
CURRENT WITHSTAND RATING 65000 — NUMBER OF SECTIONS 3 — LISTING [x] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER --- — MLO X — TYPE --- — AMPACITY --- — MAIN DISCONNECT --- — FUSE TYPE --- — SIZE ---
TOTAL POSITIONS EQUIPPED 11 — NO. OF SPARE SPACES 5 — TOTAL POSITIONS USED 10

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C/L
INSULATING MEMBERS	☑	Acceptable	C/L
CUBICLES	☑	Acceptable	C/L
GROUND CONNECTIONS	☑	Acceptable	C/L
AUXILIARY DEVICES	☑	Acceptable	C/L

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
MCC-CEB-A & B	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	2,120	2,120	2,120		2,120	2,120	2,120			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS: * NO NEUTRAL PRESENT

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 347
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/2/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB
SUBSTATION 7 — POSITION MCC-CEB-A (01)

NAMEPLATE DATA

MANUFACTURER SQUARE D — SIZE --- — TYPE MODEL 6
CATALOG NO. --- — SERIES --- — MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1 — K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
CEB-ACCU-1	HJ 060	15	14,132	12,603	10,724	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CEB-ACU-1	HJ 060	45	7,066	3,323	3,363	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPD	---	---	444.3	522.4	496.1	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CEB-EF-1	HJ030	30	3,738	3,605	6,513	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CEB-FCP-1	HJ060	20	12,301	9,118	12,407	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ATS-CEB FOR XFMR 45KVA LP-CEB-A	HJ150	90	1,994	1,882	2,640	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
125VDC BATTERY CHARGER	HJ060	25	6,974	6,706	11,223	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
10HP SPARE	HJ030	30	5,167	5,147	9,002	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CEB-P-1	HJ030	30	5,032	4,930	4,810	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS: 125VDC BATTERY CHARGER C-PHASE NOT IN USE. A & B FEED THE CHARGER.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
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(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 348
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE
DATE 3/2/2020 TEMPERATURE 70 °F HUMIDITY 60 % EQPT. LOCATION CEB
SUBSTATION 7 POSITION MCC-CEB-A (02)

NAMEPLATE DATA

MANUFACTURER SQUARE D SIZE --- TYPE MODEL 6
CATALOG NO. --- SERIES --- MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C
TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1
K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
TIE BREAKER	LJ 600	600	382.8	398	334.8	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 349
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/3/2020 — TEMPERATURE 70 °F — HUMIDITY 70 % — EQPT. LOCATION CEB
SUBSTATION 7 — POSITION MCC-CEB-B

MANUFACTURER	SQUARE D	SN / SO NO.	085255257202	FRAME SIZE(F)	800
BREAKER TYPE	MASTER PACT	SENSOR TAPS	600	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	5- DI	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0 A	CATALOG NO.	WA6ATR44A9SXFXXXAA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	600	LONG TIME PU	1	x	600	A =	600	A	DELAY	4		
SENSOR TAP	600	SHORT TIME PU	6	=	3600	A			DELAY	0.1	I²T ○ IN	◉ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	15	=	9000	A	◉ ON ○ OFF					
		GRD. FLT. PU	C	=	240	A	◉ ON ○ OFF		DELAY	0.3	I²T ○ IN	◉ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	600	LONG TIME PU	1	x	600	A =	600	A	DELAY	4		
SENSOR TAP	600	SHORT TIME PU	6	=	3600	A			DELAY	0.1	I²T ○ IN	◉ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	15	=	9000	A	◉ ON ○ OFF					
		GRD. FLT. PU	C	=	240	A	◉ ON ○ OFF		DELAY	0.3	I²T ○ IN	◉ OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	11250	---	---	---	0.038	0.038	---	---	---	---
	IPU									
SHORT TIME	6300	---	---	---	0.099	0.099	---	---	---	---
	STPU									
LONG TIME	2600	---	---	---	7.036	7.036	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	480	---	---	---	0.263	0.263	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.0095	0.0097	0.0105

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761

Tested By: AS / DF Tested By: NH / EK

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

FUSED DISCONNECT INSPECTION & TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 350
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 3/3/2020 | TEMPERATURE 70 °F | HUMIDITY 60 % | EQPT. LOCATION CEB
SUBSTATION 7 | POSITION MCC-CEB-B

NAMEPLATE DATA

MANUFACTURER SQUARE D | SIZE --- | TYPE MODEL 6
CATALOG NO. --- | SERIES --- | MAX. VOLTS 600

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

EQUIPMENT TEMPERATURE 21 °C
TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
K1 = (VOLTAGE MULTIPLIER) (RANGE MULTIPLIER) = (1) (1) = 1
K2 = (K1) (TCF) = 1.06
INSULATION TEST VOLTAGE 1 kVdc

TEST RESULTS

POSITION	FUSE DATA		CONTACT RESISTANCE ☑ MICRO-OHMS ☐ MILLI-OHMS			INSULATION RESISTANCE - MEGOHMS					
	TYPE	SIZE	PHASE A	PHASE B	PHASE C	PHASE A-GROUND	PHASE B-GROUND	PHASE C-GROUND	PHASE A-PHASE B	PHASE A-PHASE C	PHASE B-PHASE C
CEB-EF-2	HJ 030	30	5,397	6,971	5,857	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ISO BREAKER	LJ 600	600	374.8	371.8	395.7	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CEB-P-2	HJ 030	30	9,501	7,741	6,134	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CEB-FCP-2	HJ 060	20	7,531	8,297	7,564	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
CEB-PPU-1	HJ 060	15	8,506	9,540	8,470	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
TO ATS-CEB FOR XFMR 45KVA LP-CEB-A	HJ 150	90	3,083	2,511	1,782	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
ATS-UV	HJ 060	60	3,151	3,855	4,070	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120
SPD	---	---	461.1	462.2	478.8	2,000	2,000	2,000	2,000	2,000	2,000
						2,120	2,120	2,120	2,120	2,120	2,120

SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, RAYTECH DLRO #1572

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOTOR CONTROL CENTER INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 351
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/3/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB
SUBSTATION 7 — POSITION MCC-CEB-B

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. --- — TYPE MODEL 6
CATALOG NO. --- — DRAWING NO. --- — VOLTAGE CLASS 600
MAIN BUS RATING 600 A — MAIN BUS NEUTRAL RATING 3 A — CONDUCTOR (●) Cu ( ) Al
CURRENT WITHSTAND RATING 65 — NUMBER OF SECTIONS 3 — LISTING [x] UL [ ] CSA [ ] Other

INSTALLED DEVICES

MAIN BREAKER --- MLO X TYPE --- AMPACITY --- MAIN DISCONNECT --- FUSE TYPE --- SIZE ---
TOTAL POSITIONS EQUIPPED 9 — NO. OF SPARE SPACES 6 — TOTAL POSITIONS USED 9

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		PHASE									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
SECTION 1 THRU SECTION 3	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	2,120	2,120	2,120		2,120	2,120	2,120			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOLDED CASE WITH SOLID STATE TRIP UNIT CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 352

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/3/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB

SUBSTATION 7 — POSITION MCC-CEB-B (ISO. BRKR)

MANUFACTURER	SQUARE D	SN / SO NO.	---	FRAME SIZE(F)	600
BREAKER TYPE	LJ600	SENSOR TAPS	600	MOUNTING	(●) B.I. ( ) D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	(●) ON ( ) OFF
TRIP UNIT TYPE	MICROLOGIC 6.3A	CATALOG NO.	LJP36600U44XENLH2	ZONE INTLK [ ]	TARGETS [ ]

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		Cu ( ) Al ( )

SETTINGS AS FOUND

RATING PLUG(R)	600	LONG TIME PU	---	x	---	A =	500	A	DELAY	2.0	
SENSOR TAP	600	SHORT TIME PU	6	=	3000	A			DELAY	---	I²T ( ) IN (●) OUT ( ) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	3	=	1800	A	(●) ON ( ) OFF				
		GRD. FLT. PU	0.2	=	120	A	(●) ON ( ) OFF		DELAY	---	I²T ( ) IN (●) OUT ( ) N/A

SETTINGS AS LEFT

RATING PLUG(R)	600	LONG TIME PU	---	x	---	A =	500	A	DELAY	2.0	
SENSOR TAP	600	SHORT TIME PU	6	=	3000	A			DELAY	---	I²T ( ) IN (●) OUT ( ) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	3	=	1800	A	(●) ON ( ) OFF				
		GRD. FLT. PU	0.2	=	120	A	(●) ON ( ) OFF		DELAY	---	I²T ( ) IN (●) OUT ( ) N/A

TCC NO.

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	2250	375%	0.011	0.083	0.059	0.059	0.059	0.059	0.059	0.059
	IPU									
SHORT TIME	4464	892%	0.020	0.080	0.046	0.046	0.046	0.046	0.046	0.046
	STPU									
LONG TIME	1403	280%	7.76	9.96	8.867	8.867	8.867	8.867	8.867	8.867
	LTPU									
GROUND FAULT	240	200%	0.02	0.08	0.038	0.038	0.038	0.038	0.038	0.038
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.056

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P4)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
POLE TO FRAME	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
LINE TO LOAD	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00

POLE RESISTANCE READING — [ ] MICRO-OHMS [☑] MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.3748	0.3718	0.3957

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

COMMENTS:

DEFICIENCIES:

[☑] ACCEPTABLE [ ] NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572, SI #1482

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 353
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/3/2020 — TEMPERATURE 70 °F — HUMIDITY 70 % — EQPT. LOCATION CEB
SUBSTATION 7 — POSITION PP-MTB

MANUFACTURER	SQUARE D	SN / SO NO.	085255257402	FRAME SIZE(F)	800
BREAKER TYPE	MASTER PACT	SENSOR TAPS	250	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	5A1	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0 A	CATALOG NO.	WA6PPR44A9SXFXXXAA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	250	LONG TIME PU	1	x	250	A =	250	A	DELAY	24		
SENSOR TAP	250	SHORT TIME PU	8	=	2000	A			DELAY	0.1	I²T ○ IN	◉ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	15	=	3750	A	◉ ON ○ OFF					
		GRD. FLT. PU	A	=	75	A	◉ ON ○ OFF		DELAY	0.1	I²T ○ IN	◉ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	250	LONG TIME PU	1	x	250	A =	250	A	DELAY	24		
SENSOR TAP	250	SHORT TIME PU	8	=	2000	A			DELAY	0.1	I²T ○ IN	◉ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	15	=	3750	A	◉ ON ○ OFF					
		GRD. FLT. PU	A	=	75	A	◉ ON ○ OFF		DELAY	0.1	I²T ○ IN	◉ OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	4688	---	---	---	0.036	0.036	---	---	---	---
	IPU									
SHORT TIME	2875	---	---	---	0.104	0.104	---	---	---	---
	STPU									
LONG TIME	1417	---	---	---	23.630	23.630	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	150	---	---	---	0.097	0.097	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.011	0.01	0.012

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761, SI #1512

Tested By: AS / DF Tested By: NH / EK

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER DIELECTRIC ABSORPTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 354
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/2/2020 — TEMPERATURE 49 °F — HUMIDITY 76 % — EQPT. LOCATION OUTDOORS (CEB)
SUBSTATION 7 — POSITION PT-UA-1A

NAMEPLATE DATA

MANUFACTURER HAMMOND MANUFACTURING — SERIAL NO. ---
SPECIFICATION NO. --- — KVA 150 / / — TYPE K — CLASS ANN
PHASE 3 — TEMPERATURE RISE 150 °C / °C — IMPEDANCE 5.1 % — B.I.L. RATING --- kV PRI. / --- kV SEC.
COOLANT AIR — CAPACITY --- / --- — TOTAL WEIGHT 1150
WINDING POLARITY --- — WINDING MATERIAL CU/AL — K FACTOR ---
PRIMARY VOLTAGE 480 — (●) DELTA ( ) WYE — RATED CURRENT 180 / / AMPERES
SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 180 / / AMPERES

TAP VOLTAGES	504	492	480	468	456			
TAP CONNECTIONS	1	2	3	4	5			

TAP SETTING 3 — 480 VOLTS — # FANS --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE ☑

TEST VOLTAGE:
PRIMARY TO SECONDARY 1 kVdc — TEST VOLTAGE MULTIPLIER, K1 1 — K2=(TCF) (K1)
PRIMARY TO GROUND 1 kVdc — TEST VOLTAGE MULTIPLIER, K1 1
SECONDARY TO GROUND 1 kVdc — TEST VOLTAGE MULTIPLIER, K1 1

CORE/COIL TEMPERATURE 9 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF — DRY 0.604 — LIQUID 0.472

MINUTES	PRIMARY TO SECONDARY GROUND GUARDED				PRIMARY TO GROUND SECONDARY GUARDED				SECONDARY TO GROUND PRIMARY GUARDED			
	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C
0.25	275.00	1	0.604	166.1	154.00	1	0.604	93.0	58.50	1	0.604	35.3
0.50	452.00	1	0.604	273.0	160.10	1	0.604	96.7	86.10	1	0.604	52.0
0.75	483.00	1	0.604	291.7	172.60	1	0.604	104.3	106.50	1	0.604	64.3
1.00	501.00	1	0.604	302.6	173.40	1	0.604	104.7	114.00	1	0.604	68.9
1.25	479.00	1	0.604	289.3	173.60	1	0.604	104.9	98.90	1	0.604	59.7
1.50	495.00	1	0.604	299.0	177.90	1	0.604	107.5	98.90	1	0.604	59.7
1.75	527.00	1	0.604	318.3	171.70	1	0.604	103.7	86.30	1	0.604	52.1
2.00	489.00	1	0.604	295.4	204.00	1	0.604	123.2	104.10	1	0.604	62.9
3.00	447.00	1	0.604	270.0	202.00	1	0.604	122.0	102.40	1	0.604	61.8
4.00	516.00	1	0.604	311.7	215.00	1	0.604	129.9	120.90	1	0.604	73.0
5.00	558.00	1	0.604	337.0	240.00	1	0.604	145.0	137.40	1	0.604	83.0
6.00	566.00	1	0.604	341.9	279.00	1	0.604	168.5	129.60	1	0.604	78.3
7.00	586.00	1	0.604	353.9	270.00	1	0.604	163.1	152.70	1	0.604	92.2
8.00	890.00	1	0.604	537.6	270.00	1	0.604	163.1	137.00	1	0.604	82.7
9.00	854.00	1	0.604	515.8	274.00	1	0.604	165.5	129.10	1	0.604	78.0
10.00	775.00	1	0.604	468.1	274.00	1	0.604	165.5	130.60	1	0.604	78.9
POLARIZATION INDEX	1.55				1.58				1.15			

POLARIZATON INDEX = 10 MINUTE RDG. / 1 MINUTE RDG.

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: N. HERRST Tested By: A. SHERWOOD

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER TURNS RATIO TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 355
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/2/2020 — TEMPERATURE 49 °F — HUMIDITY 76 % — EQPT. LOCATION OUTDOORS (CEB)
SUBSTATION 7 — POSITION PT-UA-1A

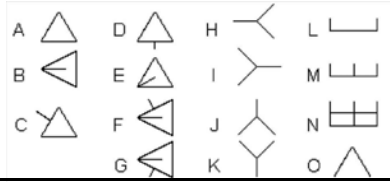
NAMEPLATE DATA

MANUFACTURER HAMMOND MANUFACTURING — SERIAL NO. ---
SPECIFICATION NO. --- — KVA 150 / / — TYPE K — CLASS ANN
PHASE 3 — TEMPERATURE RISE 150 °C °C — IMPEDANCE 5.1 % — B.I.L. RATING --- kV PRI. --- kV SEC.
COOLANT AIR — CAPACITY --- --- — TOTAL WEIGHT 1150
WINDING POLARITY --- — WINDING MATERIAL CU/AL — K FACTOR ---
PRIMARY VOLTAGE 480 — (●) DELTA ( ) WYE — RATED CURRENT 180 / / AMPERES
SECONDARY VOLTAGE 480 277 — ( ) DELTA (●) WYE — RATED CURRENT 180 / / AMPERES
TAP VOLTAGES 504 492 480 468 456
TAP CONNECTIONS 1 2 3 4 5
TAP SETTING 3 480 VOLTS — # FANS --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE ☑

TRANSFORMER TURNS RATIO TESTS

TAP NUMBER		WINDING VOLTAGES	CALCULATED RATIO	MEASURED RATIO $H_1 H_3 / X_1 X_0$	$H_2 H_1 / X_2 X_0$	$H_3 H_2 / X_3 X_0$
1	1	504 / 277	1.8195			
2	2	492 / 277	1.7762			
3	3	480 / 480	1.0000	1.0044	1.0038	1.0044
4	4	468 / 277	1.6895			
5	5	456 / 277	1.6462			
6		/				
7		/				
8		/				

VECTOR DIAGRAM



PRI. VECTOR: E
SEC. VECTOR: I(J)

CORRECTION FACTOR FOR UNACCESSIBLE NEUTRAL

PHASE TESTED	BLACK	RED	BLACK	RED	JUMPER	READING MULTIPLIER	TEST SHEET DESIGNATION
DELTA-WYE							
A	H1	H3	X1	X2	H2H3	1.547	H1-H3 X1-X2
B	H2	H1	X2	X3	H1H3	1.547	H2-H3 X2-X3
C	H3	H2	X3	X1	H1H2	1.547	H3-H2 X3-X1
WYE-DELTA							
A	H1	H3	X1	X2	X2X3	1.5000	H1-H3 X1-X2
B	H2	H1	X2	X3	X1X3	1.5000	H2-H1 X2-X3
C	H3	H2	X3	X1	X1X2	1.5000	H3-H2 X3-X1

COMMENTS: PART NO. 158684.
ZIG0ZAG WYE SECONDARY.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: RAYTECH TTR #177319

Tested By: N. HERRST Tested By: A. SHERWOOD 56325, REVISED 7/13/2016

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER DIELECTRIC ABSORPTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 356
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/3/2020 — TEMPERATURE 50 °F — HUMIDITY 40 % — EQPT. LOCATION OUTSIDE NEXT TO UV STATION
SUBSTATION 7 — POSITION PT-UV-1B

NAMEPLATE DATA

MANUFACTURER HAMMOND MFG TRANSFORMER GROUP — SERIAL NO. ---
SPECIFICATION NO. 158685 — KVA 150 / / — TYPE K — CLASS ---
PHASE 3 — TEMPERATURE RISE 150 °C 220 °C — IMPEDANCE 4.1 % — B.I.L. RATING --- kV PRI. --- kV SEC.
COOLANT --- — CAPACITY --- --- — TOTAL WEIGHT 1100
WINDING POLARITY --- — WINDING MATERIAL CU — K FACTOR ---
PRIMARY VOLTAGE 480 — (●) DELTA ( ) WYE — RATED CURRENT 180 / / AMPERES
SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 180 / / AMPERES
TAP VOLTAGES 504 | 492 | 480 | 468 | 456
TAP CONNECTIONS 1 | 2 | 3 | 4 | 5
TAP SETTING 3 — 480 VOLTS — # FANS --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE ☑

TEST VOLTAGE:
PRIMARY TO SECONDARY 1 kVdc — TEST VOLTAGE MULTIPLIER, K1 1 — K2=(TCF) (K1)
PRIMARY TO GROUND 1 kVdc — TEST VOLTAGE MULTIPLIER, K1 1
SECONDARY TO GROUND 1 kVdc — TEST VOLTAGE MULTIPLIER, K1 1

CORE/COIL TEMPERATURE 10 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF — DRY 0.63 — LIQUID 0.500

MINUTES	PRIMARY TO SECONDARY GROUND GUARDED				PRIMARY TO GROUND SECONDARY GUARDED				SECONDARY TO GROUND PRIMARY GUARDED			
	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C
0.25	2,000.00	1	0.63	1,260.0	2,000.00	1	0.63	1,260.0	2,000.00	1	0.63	1,260.0
0.50	2,000.00	1	0.63	1,260.0	2,000.00	1	0.63	1,260.0	2,000.00	1	0.63	1,260.0
0.75	2,000.00	1	0.63	1,260.0	2,000.00	1	0.63	1,260.0	2,000.00	1	0.63	1,260.0
1.00	2,000.00	1	0.63	1,260.0	2,000.00	1	0.63	1,260.0	2,000.00	1	0.63	1,260.0
1.25	2,000.00	1	0.63	1,260.0	2,000.00	1	0.63	1,260.0	2,000.00	1	0.63	1,260.0
1.50	2,000.00	1	0.63	1,260.0	2,000.00	1	0.63	1,260.0	2,000.00	1	0.63	1,260.0
1.75	2,000.00	1	0.63	1,260.0	2,000.00	1	0.63	1,260.0	2,000.00	1	0.63	1,260.0
2.00	2,000.00	1	0.63	1,260.0	2,000.00	1	0.63	1,260.0	2,000.00	1	0.63	1,260.0
3.00	2,000.00	1	0.63	1,260.0	2,000.00	1	0.63	1,260.0	2,000.00	1	0.63	1,260.0
4.00												
5.00												
6.00												
7.00												
8.00												
9.00												
10.00												
POLARIZATION INDEX												

POLARIZATON INDEX = 10 MINUTE RDG. / 1 MINUTE RDG.

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: N. HERRST Tested By: E. KOEPFGEN

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER TURNS RATIO TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 357

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/3/2020 — TEMPERATURE 50 °F — HUMIDITY 40 % — EQPT. LOCATION OUTSIDE NEXT TO UV STATION

SUBSTATION 7 — POSITION PT-UV-1B

NAMEPLATE DATA

MANUFACTURER HAMMOND MFG TRANSFORMER GROUP — SERIAL NO. ---

SPECIFICATION NO. 158685 — kVA 150 / / — TYPE K — CLASS ---

PHASE 3 — TEMPERATURE RISE 150 °C 220 °C — IMPEDANCE 4.1 % — B.I.L. RATING --- kV PRI. --- kV SEC.

COOLANT --- — CAPACITY --- --- — TOTAL WEIGHT 1100

WINDING POLARITY --- — WINDING MATERIAL CU — K FACTOR ---

PRIMARY VOLTAGE 480 — (●) DELTA ( ) WYE — RATED CURRENT 180 / / AMPERES

SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 180 / / AMPERES

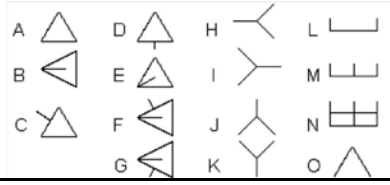
TAP VOLTAGES	504	492	480	468	456			
TAP CONNECTIONS	1	2	3	4	5			

TAP SETTING 3 — 480 VOLTS — # FANS --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE ☑

TRANSFORMER TURNS RATIO TESTS

TAP NUMBER		WINDING VOLTAGES	CALCULATED RATIO	MEASURED RATIO		
				H_1H_3/X_1X_0	H_2H_1/X_2X_0	H_3H_2/X_3X_0
1	1	504 / 277	1.8195			
2	2	492 / 277	1.7762			
3	3	480 / 277	1.7329	1.7378	1.7370	1.7384
4	4	468 / 277	1.6895			
5	5	456 / 277	1.6462			
6		/				
7		/				
8		/				

VECTOR DIAGRAM



PRI. VECTOR: E

SEC. VECTOR: H

CORRECTION FACTOR FOR UNACCESSIBLE NEUTRAL

PHASE TESTED	BLACK	RED	BLACK	RED	JUMPER	READING MULTIPLIER	TEST SHEET DESIGNATION
DELTA-WYE							
A	H1	H3	X1	X2	H2H3	1.547	H1-H3 X1-X2
B	H2	H1	X2	X3	H1H3	1.547	H2-H3 X2-X3
C	H3	H2	X3	X1	H1H2	1.547	H3-H2 X3-X1
WYE-DELTA							
A	H1	H3	X1	X2	X2X3	1.5000	H1-H3 X1-X2
B	H2	H1	X2	X3	X1X3	1.5000	H2-H1 X2-X3
C	H3	H2	X3	X1	X1X2	1.5000	H3-H2 X3-X1

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #177319

Tested By: N. HERRST Tested By: E. KOEPFGEN

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE SWITCHBOARD INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 358
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/2/2020 — TEMPERATURE 70 °F — HUMIDITY 70 % — EQPT. LOCATION CEB
SUBSTATION 7 — POSITION SUB 7

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. G-801121 — TYPE ---
CATALOG NO. --- — DRAWING NO. --- — VOLTAGE CLASS 480 / 277
PHASE AMPACITY 3200 A — WITHSTAND RATING 100 kA — CONDUCTOR ☑ Cu ☐ Al

INSTALLED DEVICES

DRAWOUT LVACB 11 — BOLT-IN LVACB --- — DRAWOUT MCCB --- — BOLT-IN MCCB ---
BOLTED PRESSURE SWITCHES --- — FUSED DISCONNECTS --- — PROTECTIVE RELAYS --- — PANEL METERS 2
kWh METERS --- — VT's 6 — CT's 10 — CPT's 2
Other 2 - SQUARE D SURGE LOGIC UNITS

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C/L
INSULATING MEMBERS	☑	Acceptable	C/L
CUBICLES	☑	Acceptable	C/L
GROUND CONNECTION	☑	Acceptable	C/L
AUXILIARY DEVICES	☑	Acceptable	C/L

TEST VOLTAGE 1 kVdc — EQUIPMENT TEMPERATURE 16 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.8

BUS SECTION TESTED		INSULATION RESISTANCE TEST RESULTS - MEGOHMS									
		A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C	A - N	B - N	C - N
A SIDE BUS	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	1,600	1,600	1,600		1,600	1,600	1,600			
B SIDE BUS	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	1,600	1,600	1,600		1,600	1,600	1,600			
ISOLATION BUS	RDG.	2,000	2,000	2,000		2,000	2,000	2,000			
	20°C	1,600	1,600	1,600		1,600	1,600	1,600			
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										
	RDG.										
	20°C										

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539

Tested By: DF / AS — Tested By: NH / TD

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

SWITCHBOARD BUS CONNECTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 359
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/2/2020 — TEMPERATURE 70 °F — HUMIDITY 70 % — EQPT. LOCATION CEB
SUBSTATION 7 — POSITION SUB 7

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. G-801121 — TYPE ---
CATALOG NO. --- — DRAWING NO. --- — VOLTAGE CLASS 480/277
PHASE AMPACITY 3200 A — WITHSTAND RATING 100 kA — CONDUCTOR (•) CU ( ) AL

BUS SECTION TESTED		RESISTANCE IN [x] MICRO-OHMS [ ] MILLI-OHMS					BUS SECTION TESTED		RESISTANCE IN [ ] MICRO-OHMS [ ] MILLI-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
A1	A3	23	24	30		102							
I3	I4	20	17	17		40							
B4	B6	28	26	26		52							

COMMENTS: LUGS IN FAR RIGHT CABINET ON BACK SIDE ARE STARTING TO LEAK NO-OX FROM INSIDE LUGS BEHIND THE PLUGS. LUGS ARE SPARES FOR A-SIDE EQUIPPED SPACE.

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: DLRO #193761

Tested By: A. SHERWOOD Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER DIELECTRIC ABSORPTION TEST

NETA ACCREDITED COMPANY

CUSTOMER: Ann Arbor, City of — PAGE: 360
ADDRESS: 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB #: AACI207024-1
USER: Ann Arbor WWTP
OWNER REPRESENTATIVE: Jeremy Holbrook — TELEPHONE:
DATE: 3/2/2020 — TEMPERATURE: 70 °F — HUMIDITY: 60 % — EQPT. LOCATION: CEB
SUBSTATION: 7 — POSITION: SUB 7 TRANSFORMER 1

NAMEPLATE DATA

MANUFACTURER: SQUARE D — SERIAL NO.: 30951271-026-01-1
SPECIFICATION NO.: --- — KVA: 1,500 / / — TYPE: VPI — CLASS: AA
PHASE: 3 — TEMPERATURE RISE: 115 °C / °C — IMPEDANCE: 5.73 % — B.I.L. RATING: 95 kV PRI. / 10 kV SEC.
COOLANT: --- — CAPACITY: --- GALLONS — TOTAL WEIGHT: 9800
WINDING POLARITY: SUBTRACTIVE — WINDING MATERIAL: CU — K FACTOR: ---
PRIMARY VOLTAGE: 13,200 — (●) DELTA ( ) WYE — RATED CURRENT: 66 / / AMPERES
SECONDARY VOLTAGE: 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT: 1,804 / / AMPERES
TAP VOLTAGES: 13,860 | 13,530 | 13,200 | 12,870 | 12,540
TAP CONNECTIONS: E-F | D-F | E-G | D-G | C-G
TAP SETTING: E-G 13,200 VOLTS — # FANS: --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE ☑

TEST VOLTAGE:
PRIMARY TO SECONDARY: 5 kVdc — TEST VOLTAGE MULTIPLIER, K1: 1 — K2=(TCF) (K1)
PRIMARY TO GROUND: 5 kVdc — TEST VOLTAGE MULTIPLIER, K1: 1
SECONDARY TO GROUND: 1 kVdc — TEST VOLTAGE MULTIPLIER, K1: 1

CORE/COIL TEMPERATURE: 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF — DRY: 1.05 — LIQUID: 1.080

MINUTES	PRIMARY TO SECONDARY GROUND GUARDED				PRIMARY TO GROUND SECONDARY GUARDED				SECONDARY TO GROUND PRIMARY GUARDED			
	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C
0.25	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
0.50	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
0.75	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
1.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
1.25	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
1.50	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
1.75	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
2.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
3.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
4.00												
5.00												
6.00												
7.00												
8.00												
9.00												
10.00												
POLARIZATION INDEX												

POLARIZATON INDEX = 10 MINUTE RDG. / 1 MINUTE RDG.

COMMENTS: PRIMARY VOLTAGE RATED CURRENT: 62.5 - 64.0 - 65.6 - 67.3 - 69.1 AMPERES.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: T. DODGE Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER INSPECTION

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 361

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/2/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB

SUBSTATION 7 — POSITION SUB 7 TRANSFORMER 1

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-026-01-1

SPECIFICATION NO. --- — kVA 1,500 / / — TYPE VPI — CLASS AA

PHASE 3 — TEMPERATURE RISE 115 °C / °C — IMPEDANCE 5.73 % — B.I.L. RATING 95 kV PRI. / 10 kV SEC.

COOLANT --- — CAPACITY --- GALLONS — TOTAL WEIGHT 9800

WINDING POLARITY SUBTRACTIVE — WINDING MATERIAL CU — K FACTOR ---

PRIMARY VOLTAGE 13,200 — (●) DELTA ( ) WYE — RATED CURRENT 66 / / AMPERES

SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 1,804 / / AMPERES

TAP VOLTAGES	13,860	13,530	13,200	12,870	12,540			
TAP CONNECTIONS	E-F	D-F	E-G	D-G	C-G			

TAP SETTING E-G 13,200 VOLTS — # FANS --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE [x]

GAUGES:

COOLANT TEMPERATURE 21 °C — MAXIMUM TEMPERATURE --- °C — RESET TEMPERATURE GAUGE [ ]

COOLANT LEVEL --- — PRESSURE VACUUM --- # — LCR COUNTER ---

OTHER GAUGES ---

VISUAL INSPECTION:

BUSHINGS ACCEPTABLE — SUPPORT INSULATORS ACCEPTABLE — CONNECTIONS ACCEPTABLE

PAINT ACCEPTABLE — RADIATORS --- — FANS ---

NO-LOAD TAP CHANGER --- — LEAKS ---

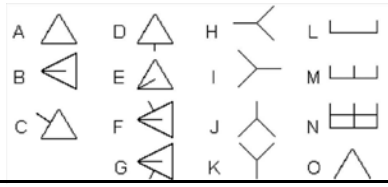
MAIN TANK DIELECTRIC SAMPLE SYRINGE # --- — BOTTLE # ---

LTC DIELECTRIC SAMPLE SYRINGE # --- — BOTTLE # ---

GROUND CONDUCTOR SIZE 4/0 AWG/kcm — NO. OF GROUND CONDUCTORS 1 — GROUND CONDUCTOR CONDITION ACC

ADDITIONAL EQUIPMENT ---

VECTOR DIAGRAM



PRI. VECTOR: E

SEC. VECTOR: H

POST TEST VOLTAGES

NO LOAD SECONDARY VOLTAGE			
X1 - X2	V	X0 - G	V
X1 - X3	V	X0 - X1	V
X2 - X3	V	X0 - X2	V
		X0 - X3	V

COMMENTS: PRIMARY VOLTAGE RATED CURRENT: 62.5 - 64.0 - 65.6 - 67.3 - 69.1 AMPERES.

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: T. DODGE — Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER TURNS RATIO TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 362
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/2/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB
SUBSTATION 7 — POSITION SUB 7 TRANSFORMER 1

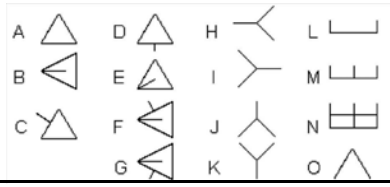
NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-026-01-1
SPECIFICATION NO. --- — KVA 1,500 / / — TYPE VPI — CLASS AA
PHASE 3 — TEMPERATURE RISE 115 °C °C — IMPEDANCE 5.73 % — B.I.L. RATING 95 kV PRI. 10 kV SEC.
COOLANT --- — CAPACITY --- GALLONS — TOTAL WEIGHT 9800
WINDING POLARITY SUBTRACTIVE — WINDING MATERIAL CU — K FACTOR ---
PRIMARY VOLTAGE 13,200 — (●) DELTA ( ) WYE — RATED CURRENT 66 / / AMPERES
SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 1,804 / / AMPERES
TAP VOLTAGES 13,860 | 13,530 | 13,200 | 12,870 | 12,540
TAP CONNECTIONS E-F | D-F | E-G | D-G | C-G
TAP SETTING E-G 13,200 VOLTS — # FANS --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE ☑

TRANSFORMER TURNS RATIO TESTS

TAP NUMBER		WINDING VOLTAGES	CALCULATED RATIO	MEASURED RATIO H_1H_3/X_1X_0	MEASURED RATIO H_2H_1/X_2X_0	MEASURED RATIO H_3H_2/X_3X_0
1	E-F	13,860 / 277	50.0361			
2	D-F	13,530 / 277	48.8448			
3	E-G	13,200 / 277	47.6534	47.7400	47.7400	47.7400
4	D-G	12,870 / 277	46.4621			
5	C-G	12,540 / 277	45.2708			
6		/				
7		/				
8		/				

VECTOR DIAGRAM



PRI. VECTOR: E
SEC. VECTOR: H

CORRECTION FACTOR FOR UNACCESSIBLE NEUTRAL

PHASE TESTED	BLACK	RED	BLACK	RED	JUMPER	READING MULTIPLIER	TEST SHEET DESIGNATION
DELTA-WYE							
A	H1	H3	X1	X2	H2H3	1.547	H1-H3 X1-X2
B	H2	H1	X2	X3	H1H3	1.547	H2-H3 X2-X3
C	H3	H2	X3	X1	H1H2	1.547	H3-H2 X3-X1
WYE-DELTA							
A	H1	H3	X1	X2	X2X3	1.5000	H1-H3 X1-X2
B	H2	H1	X2	X3	X1X3	1.5000	H2-H1 X2-X3
C	H3	H2	X3	X1	X1X2	1.5000	H3-H2 X3-X1

COMMENTS: PRIMARY VOLTAGE RATED CURRENT: 62.5 - 64.0 - 65.6 - 67.3 - 69.1 AMPERES.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: TTR #177319

Tested By: T. DODGE Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LIGHTNING ARRESTER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 363
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/2/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB
SUBSTATION 7 — POSITION SUB 7 TRANSFORMER 1

NAMEPLATE DATA

MANUFACTURER COOPER — TYPE DISTRIBUTION — MODEL VARISTAR
CATALOG NO. --- — SERIAL NO. --- — RELIEF ---
RATED RMS VOLTAGE 8.4 kV — RATED MCOV 10 kV — RMS CURRENT RATING kA — RATED CREST kA
SYSTEM VOLTAGE 13.2 kV — ARRESTER TYPE STATION ○ INTERMEDIATE ○ DISTRIBUTION ◉ — MATERIAL TYPE PORCELAIN ○ POLYMER ◉

INSULATION TEST VOLTAGE 5.00 kV DC — TEST VOLTAGE MULTIPLIER 1
RANGE MULTIPLIER 1.0 — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION TEST

POSITION	TOTAL CORRECTION MULTIPLIER	A PHASE TO GROUND		B PHASE TO GROUND		C PHASE TO GROUND	
		ACTUAL MEGOHMS	CORRECTED MEGOHMS	ACTUAL MEGOHMS	CORRECTED MEGOHMS	ACTUAL MEGOHMS	CORRECTED MEGOHMS
INCOMING LEFT	1.05	100,000	105,000.0	100,000	105,000.0	100,000	105,000.0

WATT LOSS TEST

TEST kV SWITCH SETTING
OUTPUT TEST VOLTAGE
READING CORRECTION FACTOR

○ GROUNDED SPECIMEN TEST
○ UNGROUNDED SPECIMEN TEST

MILLI-WATT LOSS

POSITION	A PHASE	B PHASE	C PHASE

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: T. DODGE Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

CAPACITOR TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 364
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE
DATE 3/2/2020 TEMPERATURE 70 °F HUMIDITY 60 % EQPT. LOCATION CEB
SUBSTATION 7 POSITION SUB 7 TRANSFORMER 1

INST. MANUAL: --- STYLE #: ---
SERIAL #: (1) 500877223-40-0004 VOLTAGE: 13.8 KV
kVac-kvar: --- PHASE: 1 HERTZ: 60
FLUID TYPE: FARADOL 810 FLUID gal: 1 GAL CLASS: ---

PHASE	ACTUAL	ALLOWABLE		CHARGE
		MIN.	MAX.	
X	249nF			
Y	249nF			
Z	251nF			

COMMENTS: MEGGER: X = 138.1 MEGOHMS, Y = 138.1 MEGOHMS, Z = 139.8 MEGOHMS.
CAPACITOR S/N (2) 500877223-40-0001, (3) 500877223-40-0005.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, FLUKE #156396

Tested By: T. DODGE Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER DIELECTRIC ABSORPTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 365
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/3/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB
SUBSTATION 7 — POSITION SUB 7 TRANSFORMER 2

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-028-01-1
SPECIFICATION NO. --- — kVA 1,500 / / — TYPE VPI — CLASS AA
PHASE 3 — TEMPERATURE RISE 115 °C °C — IMPEDANCE 5.76 % — B.I.L. RATING 95 kV PRI. 10 kV SEC.
COOLANT --- — CAPACITY --- GALLONS — TOTAL WEIGHT 9800
WINDING POLARITY SUBTRACTIVE — WINDING MATERIAL CU — K FACTOR NA
PRIMARY VOLTAGE 13,200 — (●) DELTA ( ) WYE — RATED CURRENT 66 / / AMPERES
SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 1,804 / / AMPERES
TAP VOLTAGES 13,860 | 13,530 | 13,200 | 12,870 | 12,540
TAP CONNECTIONS E-F | D-F | E-G | D-G | C-G
TAP SETTING E-G 13,200 VOLTS — # FANS --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE ☑

TEST VOLTAGE:
PRIMARY TO SECONDARY 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 1 — K2=(TCF) (K1)
PRIMARY TO GROUND 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 1
SECONDARY TO GROUND 1 kVdc — TEST VOLTAGE MULTIPLIER, K1 1

CORE/COIL TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF — DRY 1.05 — LIQUID 1.080

MINUTES	PRIMARY TO SECONDARY GROUND GUARDED				PRIMARY TO GROUND SECONDARY GUARDED				SECONDARY TO GROUND PRIMARY GUARDED			
	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C
0.25	76,000.00	1	1.05	79,800.0	30,400.00	1	1.05	31,920.0	30,300.00	1	1.05	31,815.0
0.50	97,400.00	1	1.05	102,270.0	42,500.00	1	1.05	44,625.0	65,200.00	1	1.05	68,460.0
0.75	100,000.0	1	1.05	105,000.0	48,300.00	1	1.05	50,715.0	84,500.00	1	1.05	88,725.0
1.00	100,000.0	1	1.05	105,000.0	52,000.00	1	1.05	54,600.0	100,000.0	1	1.05	105,000.0
1.25	100,000.0	1	1.05	105,000.0	52,600.00	1	1.05	55,230.0	100,000.0	1	1.05	105,000.0
1.50	100,000.0	1	1.05	105,000.0	55,800.00	1	1.05	58,590.0	100,000.0	1	1.05	105,000.0
1.75	100,000.0	1	1.05	105,000.0	57,000.00	1	1.05	59,850.0	100,000.0	1	1.05	105,000.0
2.00	100,000.0	1	1.05	105,000.0	58,000.00	1	1.05	60,900.0	100,000.0	1	1.05	105,000.0
3.00	100,000.0	1	1.05	105,000.0	60,600.00	1	1.05	63,630.0	100,000.0	1	1.05	105,000.0
4.00	100,000.0	1	1.05	105,000.0	61,800.00	1	1.05	64,890.0	100,000.0	1	1.05	105,000.0
5.00												
6.00												
7.00												
8.00												
9.00												
10.00												
POLARIZATION INDEX												

POLARIZATON INDEX = 10 MINUTE RDG. / 1 MINUTE RDG.

COMMENTS: PRIMARY VOLTAGE RATED CURRENT: 62.5 - 64.0 - 65.6 - 67.3 - 69.1 AMPERES.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539

Tested By: E. KOEPFGEN Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER INSPECTION

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 366

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/3/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION

SUBSTATION 7 — POSITION SUB 7 TRANSFORMER 2

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-028-01-1

SPECIFICATION NO. --- — KVA 1,500 / / — TYPE VPI — CLASS AA

PHASE 3 — TEMPERATURE RISE 115 °C / °C — IMPEDANCE 5.76 % — B.I.L. RATING 95 kV PRI. / 10 kV SEC.

COOLANT --- — CAPACITY --- GALLONS — TOTAL WEIGHT 9800

WINDING POLARITY SUBTRACTIVE — WINDING MATERIAL CU — K FACTOR NA

PRIMARY VOLTAGE 13,200 — (●) DELTA ( ) WYE — RATED CURRENT 66 / / AMPERES

SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 1,804 / / AMPERES

TAP VOLTAGES	13,860	13,530	13,200	12,870	12,540			
TAP CONNECTIONS	E-F	D-F	E-G	D-G	C-G			

TAP SETTING E-G 13,200 VOLTS — # FANS — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE [x]

GAUGES:

COOLANT TEMPERATURE --- °C — MAXIMUM TEMPERATURE --- °C — RESET TEMPERATURE GAUGE [ ]

COOLANT LEVEL --- — PRESSURE VACUUM --- # — LCR COUNTER ---

OTHER GAUGES ---

VISUAL INSPECTION:

BUSHINGS ACCEPTABLE — SUPPORT INSULATORS ACCEPTABLE — CONNECTIONS ACCEPTABLE

PAINT ACCEPTABLE — RADIATORS --- — FANS ---

NO-LOAD TAP CHANGER --- — LEAKS ---

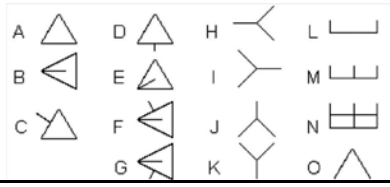
MAIN TANK DIELECTRIC SAMPLE SYRINGE # --- — BOTTLE # ---

LTC DIELECTRIC SAMPLE SYRINGE # --- — BOTTLE # ---

GROUND CONDUCTOR SIZE 4/0 AWG/kcm — NO. OF GROUND CONDUCTORS 1 — GROUND CONDUCTOR CONDITION ACC

ADDITIONAL EQUIPMENT ---

VECTOR DIAGRAM



PRI. VECTOR: E

SEC. VECTOR: H

POST TEST VOLTAGES

NO LOAD SECONDARY VOLTAGE			
X1 - X2	V	X0 - G	V
X1 - X3	V	X0 - X1	V
X2 - X3	V	X0 - X2	V
		X0 - X3	V

COMMENTS: PRIMARY VOLTAGE RATED CURRENT: 62.5 - 64.0 - 65.6 - 67.3 - 69.1 AMPERES.

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: E. KOEPFGEN Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER TURNS RATIO TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 367
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/3/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB
SUBSTATION 7 — POSITION SUB 7 TRANSFORMER 2

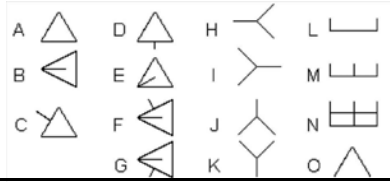
NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-028-01-1
SPECIFICATION NO. --- — KVA 1,500 / / — TYPE VPI — CLASS AA
PHASE 3 — TEMPERATURE RISE 115 °C °C — IMPEDANCE 5.76 % — B.I.L. RATING 95 kV PRI. 10 kV SEC.
COOLANT --- — CAPACITY --- GALLONS — TOTAL WEIGHT 9800
WINDING POLARITY SUBTRACTIVE — WINDING MATERIAL CU — K FACTOR NA
PRIMARY VOLTAGE 13,200 — (●) DELTA ( ) WYE — RATED CURRENT 66 / / AMPERES
SECONDARY VOLTAGE 480 / 277 — ( ) DELTA (●) WYE — RATED CURRENT 1,804 / / AMPERES
TAP VOLTAGES 13,860 | 13,530 | 13,200 | 12,870 | 12,540
TAP CONNECTIONS E-F | D-F | E-G | D-G | C-G
TAP SETTING E-G 13,200 VOLTS — # FANS — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE ☑

TRANSFORMER TURNS RATIO TESTS

TAP NUMBER		WINDING VOLTAGES	CALCULATED RATIO	MEASURED RATIO		
				H_1H_3/X_1X_0	H_2H_1/X_2X_0	H_3H_2/X_3X_0
1	E-F	13,860 / 277	50.0361			
2	D-F	13,530 / 277	48.8448			
3	E-G	13,200 / 277	47.6534	47.7690	47.7390	47.7510
4	D-G	12,870 / 277	46.4621			
5	C-G	12,540 / 277	45.2708			
6		/				
7		/				
8		/				

VECTOR DIAGRAM



PRI. VECTOR: E
SEC. VECTOR: H

CORRECTION FACTOR FOR UNACCESSIBLE NEUTRAL

PHASE TESTED	BLACK	RED	BLACK	RED	JUMPER	READING MULTIPLIER	TEST SHEET DESIGNATION
DELTA-WYE							
A	H1	H3	X1	X2	H2H3	1.547	H1-H3 X1-X2
B	H2	H1	X2	X3	H1H3	1.547	H2-H3 X2-X3
C	H3	H2	X3	X1	H1H2	1.547	H3-H2 X3-X1
WYE-DELTA							
A	H1	H3	X1	X2	X2X3	1.5000	H1-H3 X1-X2
B	H2	H1	X2	X3	X1X3	1.5000	H2-H1 X2-X3
C	H3	H2	X3	X1	X1X2	1.5000	H3-H2 X3-X1

COMMENTS: PRIMARY VOLTAGE RATED CURRENT: 62.5 - 64.0 - 65.6 - 67.3 - 69.1 AMPERES.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: TTR #184970

Tested By: E. KOEPFGEN Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LIGHTNING ARRESTER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 368
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 3/3/2020 | TEMPERATURE 70 °F | HUMIDITY 60 % | EQPT. LOCATION CEB
SUBSTATION 7 | POSITION SUB 7 TRANSFORMER 2

NAMEPLATE DATA

MANUFACTURER COOPER | TYPE DISTRIBUTION | MODEL VARISTAR
CATALOG NO. --- | SERIAL NO. --- | RELIEF ---
RATED RMS VOLTAGE 8.4 kV | RATED MCOV 10 kV | RMS CURRENT RATING 0 kA | RATED CREST 0 kA
SYSTEM VOLTAGE 13.2 kV | ARRESTER TYPE STATION ○ INTERMEDIATE ○ DISTRIBUTION ◉ | MATERIAL TYPE PORCELAIN ○ POLYMER ◉

INSULATION TEST VOLTAGE 5.00 kV DC | TEST VOLTAGE MULTIPLIER 1
RANGE MULTIPLIER 1.0 | EQUIPMENT TEMPERATURE 21 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION TEST

POSITION	TOTAL CORRECTION MULTIPLIER	A PHASE TO GROUND		B PHASE TO GROUND		C PHASE TO GROUND	
		ACTUAL MEGOHMS	CORRECTED MEGOHMS	ACTUAL MEGOHMS	CORRECTED MEGOHMS	ACTUAL MEGOHMS	CORRECTED MEGOHMS
INCOMING RIGHT	1.05	59,600	62,580.00	58,400	61,320.00	54,500	57,225.00

WATT LOSS TEST

TEST kV SWITCH SETTING
OUTPUT TEST VOLTAGE
READING CORRECTION FACTOR

○ GROUNDED SPECIMEN TEST
○ UNGROUNDED SPECIMEN TEST

MILLI-WATT LOSS

POSITION	A PHASE	B PHASE	C PHASE

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539

Tested By: E. KOEPFGEN Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

CAPACITOR TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 369
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE
DATE 3/3/2020 TEMPERATURE 50 °F HUMIDITY 60 % EQPT. LOCATION CEB
SUBSTATION 7 POSITION SUB 7 TRANSFORMER 2

INST. MANUAL: --- STYLE #: 2GUS031801A3
SERIAL #: (1) 500850299-10-0023 VOLTAGE: 13.8 KV
kVac-kvar: --- PHASE: 1 HERTZ: 60
FLUID TYPE: FARADOL 810 FLUID gal: 1 GAL CLASS: ---

PHASE	ACTUAL	ALLOWABLE		CHARGE
		MIN.	MAX.	
X	255			
Y	253			
Z	252			

COMMENTS: MEGGER: X = 139 MEGOHMS, Y = 139 MEGOHMS, Z = 137 MEGOHMS.
CAP SERIAL NUMBERS: (2) 50087723-40-0007, (3) 500877223-40-0008.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, FLUKE #206123

Tested By: E. KOEPFGEN Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 370
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/2/2020 — TEMPERATURE 70 °F — HUMIDITY 70 % — EQPT. LOCATION CEB
SUBSTATION 7 — POSITION TIE

MANUFACTURER	SQUARE D	SN / SO NO.	085255257502	FRAME SIZE(F)	3200
BREAKER TYPE	MASTER PACT	SENSOR TAPS	3200	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	3 -B/C	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0 A	CATALOG NO.	WA6JJR44A9CFFFWSAA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	3200	LONG TIME PU	0.6	x	3200	A =	1920	A	DELAY	4		
SENSOR TAP	3,200	SHORT TIME PU	4	=	7680	A			DELAY	0.3	I²T	○ IN ◉ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	10	=	32000	A	◉ ON ○ OFF					
		GRD. FLT. PU	A	=	500	A	◉ ON ○ OFF		DELAY	0.3	I²T	○ IN ◉ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	3200	LONG TIME PU	0.6	x	3200	A =	1920	A	DELAY	4		
SENSOR TAP	3,200	SHORT TIME PU	4	=	7680	A			DELAY	0.3	I²T	○ IN ◉ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	10	=	32000	A	◉ ON ○ OFF					
		GRD. FLT. PU	A	=	500	A	◉ ON ○ OFF		DELAY	0.3	I²T	○ IN ◉ OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	40000	---	---	---	0.037	0.037	---	---	---	---
	IPU									
SHORT TIME	19840	---	---	---	0.262	0.262	---	---	---	---
	STPU									
LONG TIME	5760	---	---	---	15.678	15.678	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	1000	---	---	---	0.264	0.264	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2) READING	POLE 1 20°C	POLE 2 MΩ (P2-P3) READING	POLE 2 20°C	POLE 3 MΩ (P3-P1) READING	POLE 3 20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.023	0.024	0.02

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761, SI #1512

Tested By: DF / AS Tested By: NH / TD

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MOLDED CASE WITH SOLID STATE TRIP UNIT CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 371

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/2/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB

SUBSTATION 7 — POSITION TIE BREAKER

MANUFACTURER	SQUARE D	SN / SO NO.	---	FRAME SIZE(F)	600
BREAKER TYPE	POWER PACT LJ 600	SENSOR TAPS	600	MOUNTING	(●) B.I. ( ) D.O.
FUSE CAT. NO.	---	CUBICLE CODE	---	THERMAL MEMORY	(●) ON ( ) OFF
TRIP UNIT TYPE	MICROLOGIC 6.3 A	CATALOG NO.	LJP3660OU44XENLH2	ZONE INTLK ☐	TARGETS ☐

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C
CONTACT FINGERS	☑	Acceptable	C
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	C

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C
LOAD CONDUCTOR NO. 0	Size		Cu ( ) Al ( )

SETTINGS AS FOUND

RATING PLUG(R)	600	LONG TIME PU	---	x	---	A =	500	A	DELAY	2.0		
SENSOR TAP	600	SHORT TIME PU	6	=	3000	A			DELAY	---	I²T ( ) IN	(●) OUT ( ) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	3	=	1800	A	(●) ON	( ) OFF				
		GRD. FLT. PU	0.2	=	120	A	(●) ON	( ) OFF	DELAY	---	I²T ( ) IN	(●) OUT ( ) N/A

SETTINGS AS LEFT

RATING PLUG(R)	600	LONG TIME PU	---	x	---	A =	500	A	DELAY	2.0		
SENSOR TAP	600	SHORT TIME PU	6	=	3000	A			DELAY	---	I²T ( ) IN	(●) OUT ( ) N/A
GRD. FLT. ( ) 3W ( ) 4W		INST. PU	3	=	1800	A	(●) ON	( ) OFF				
		GRD. FLT. PU	0.2	=	120	A	(●) ON	( ) OFF	DELAY	---	I²T ( ) IN	(●) OUT ( ) N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	2250	375%	0.011	0.083	0.058	0.058	0.058	0.058	0.058	0.058
	IPU									
SHORT TIME	4464	892%	0.02	0.08	0.044	0.044	0.044	0.044	0.044	0.044
	STPU									
LONG TIME	1403	280%	7.76	9.96	8.862	8.862	8.862	8.862	8.862	8.862
	LTPU									
GROUND FAULT	240	200%	0.02	0.08	0.039	0.039	0.039	0.039	0.039	0.039
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.056

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P4)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
POLE TO FRAME	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00
LINE TO LOAD	2,000	2,112.00	2,000	2,112.00	2,000	2,112.00

POLE RESISTANCE READING — ☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.3828	0.398	0.3348

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572, SI #1482

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 372
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/2/2020 — TEMPERATURE 70 °F — HUMIDITY 70 % — EQPT. LOCATION CEB
SUBSTATION 7 — POSITION UV -1A

MANUFACTURER	SQUARE D	SN / SO NO.	085255257401	FRAME SIZE(F)	800
BREAKER TYPE	MASTER PACT	SENSOR TAPS	250	MOUNTING	○ B.I. ◉ D.O.
FUSE CAT. NO.	---	CUBICLE CODE	2 -B1	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0 A	CATALOG NO.	WA6PPR44A9SXFXXXAA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	250	LONG TIME PU	0.8	x	250	A =	200	A	DELAY	0.5		
SENSOR TAP	250	SHORT TIME PU	8	=	1600	A			DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	12	=	3000	A	◉ ON ○ OFF					
		GRD. FLT. PU	A	=	75	A	◉ ON ○ OFF		DELAY	0.1	I²T ○ IN	◉ OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	250	LONG TIME PU	0.8	x	250	A =	200	A	DELAY	0.5		
SENSOR TAP	250	SHORT TIME PU	8	=	1600	A			DELAY	0.2	I²T ○ IN	◉ OUT ○ N/A
GRD. FLT.	◉ 3W ○ 4W	INST. PU	12	=	3000	A	◉ ON ○ OFF					
		GRD. FLT. PU	A	=	75	A	◉ ON ○ OFF		DELAY	0.1	I²T ○ IN	◉ OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	3750	---	---	---	0.045	0.045	---	---	---	---
	IPU									
SHORT TIME	2300	---	---	---	0.165	0.165	---	---	---	---
	STPU									
LONG TIME	1133	---	---	---	0.505	0.505	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	150	---	---	---	0.277	0.277	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.012	0.013	0.012

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761, SI #1512

Tested By: DF / AS Tested By: NH / TD

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOW VOLTAGE
POWER CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 373
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/3/2020 — TEMPERATURE 70 °F — HUMIDITY 70 % — EQPT. LOCATION CEB
SUBSTATION 7 — POSITION UV-1B

MANUFACTURER	SQUARE D	SN / SO NO.	085255257403	FRAME SIZE(F)	800
BREAKER TYPE	MASTER PACT	SENSOR TAPS	250	MOUNTING	○ B.I. ● D.O.
FUSE CAT. NO.	---	CUBICLE CODE	5 -B1	THERMAL MEMORY	○ ON ○ OFF
TRIP UNIT TYPE	MICROLOGIC 6.0 A	CATALOG NO.	WA6PPR44A9SXFXXXAA	ZONE INTLK ☐	TARGETS ☑

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CUBICLE AND RACKING DEVICES	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
LOADING AND ARCING CONTACTS	☑	Acceptable	C
OVERCURRENT DEV. BATTERY	☑	Acceptable	N/A

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
ARC CHUTES	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
LOAD CONDUCTOR NO. 0	Size		CU ○ AL ○

SETTINGS AS FOUND

RATING PLUG(R)	250	LONG TIME PU	0.8	x	250	A =	200	A	DELAY	0.5		
SENSOR TAP	250	SHORT TIME PU	8	=	1600	A			DELAY	0.2	I²T	○ IN ● OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	12	=	3000	A	● ON ○ OFF					
		GRD. FLT. PU	A	=	75	A	● ON ○ OFF		DELAY	0.1	I²T	○ IN ● OUT ○ N/A

SETTINGS AS LEFT

RATING PLUG(R)	250	LONG TIME PU	0.8	x	250	A =	200	A	DELAY	0.5		
SENSOR TAP	250	SHORT TIME PU	8	=	1600	A			DELAY	0.2	I²T	○ IN ● OUT ○ N/A
GRD. FLT.	● 3W ○ 4W	INST. PU	12	=	3000	A	● ON ○ OFF					
		GRD. FLT. PU	A	=	75	A	● ON ○ OFF		DELAY	0.1	I²T	○ IN ● OUT ○ N/A

TCC NO. ---

FUNCTION	TEST AMPERES	CURRENT MULTIPLE	TIME BAND MINIMUM	TIME BAND MAXIMUM	POLE 1 AS FOUND (seconds)	POLE 1 AS LEFT (seconds)	POLE 2 AS FOUND (seconds)	POLE 2 AS LEFT (seconds)	POLE 3 AS FOUND (seconds)	POLE 3 AS LEFT (seconds)
INSTANTANEOUS	3750	---	---	---	0.045	0.045	---	---	---	---
	IPU									
SHORT TIME	2300	---	---	---	0.165	0.165	---	---	---	---
	STPU									
LONG TIME	1133	---	---	---	0.504	0.504	---	---	---	---
	LTPU									
	VOLTAGE DROP @ LONG TIME TEST CURRENT									
GROUND FAULT	150	---	---	---	0.101	0.101	---	---	---	---
	GFPU									

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION RESISTANCE

	POLE 1 MΩ (P1-P2)		POLE 2 MΩ (P2-P3)		POLE 3 MΩ (P3-P1)	
	READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
POLE TO FRAME	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00
LINE TO LOAD	2,000	2,100.00	2,000	2,100.00	2,000	2,100.00

CONTROL WIRING			COUNTER READING BEG/END	
READING		20°C		

POLE RESISTANCE READING

☐ MICRO-OHMS ☑ MILLI-OHMS

POLE 1	POLE 2	POLE 3
0.01	0.01	0.011

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761, SI #1512

Tested By: AS / DF Tested By: NH / EK

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER DIELECTRIC ABSORPTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 374
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/11/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 — POSITION 8A-XFMR 1

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-030-01-1
SPECIFICATION NO. TX11721001 — KVA 2,500 / / — TYPE VP1 — CLASS AA
PHASE 3 — TEMPERATURE RISE 115 °C °C — IMPEDANCE 5.7 % — B.I.L. RATING 95 kV PRI. 30 kV SEC.
COOLANT AIR — CAPACITY --- GALLONS — TOTAL WEIGHT 20100
WINDING POLARITY SUBTRACTIVE — WINDING MATERIAL CU/CU — K FACTOR ---
PRIMARY VOLTAGE 13,200 — (●) DELTA ( ) WYE — RATED CURRENT 109 / / AMPERES
SECONDARY VOLTAGE 4,160 / 2,402 — ( ) DELTA (●) WYE — RATED CURRENT 347 / / AMPERES
TAP VOLTAGES 13,860 | 13,530 | 13,200 | 12,870 | 12,540
TAP CONNECTIONS E-F | D-F | E-G | D-G | C-G
TAP SETTING E-G 13,200 VOLTS — # FANS --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE ☑

TEST VOLTAGE:
PRIMARY TO SECONDARY 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 1 — K2=(TCF) (K1)
PRIMARY TO GROUND 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 1
SECONDARY TO GROUND 2.5 kVdc — TEST VOLTAGE MULTIPLIER, K1 1

CORE/COIL TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF — DRY 1.05 — LIQUID 1.080

MINUTES	PRIMARY TO SECONDARY GROUND GUARDED				PRIMARY TO GROUND SECONDARY GUARDED				SECONDARY TO GROUND PRIMARY GUARDED			
	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C
0.25	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
0.50	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
0.75	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
1.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
1.25	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
1.50	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
1.75	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
2.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
3.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
4.00												
5.00												
6.00												
7.00												
8.00												
9.00												
10.00												
POLARIZATION INDEX												

POLARIZATON INDEX = 10 MINUTE RDG. / 1 MINUTE RDG.

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563

Tested By: D. FLEMING Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER INSPECTION

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 375
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 3/11/2020 | TEMPERATURE 70 °F | HUMIDITY 60 % | EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 | POSITION 8A-XFMR 1

NAMEPLATE DATA

MANUFACTURER SQUARE D | SERIAL NO. 30951271-030-01-1
SPECIFICATION NO. TX11721001 | kVA 2,500 / / | TYPE VP1 | CLASS AA
PHASE 3 | TEMPERATURE RISE 115 °C / °C | IMPEDANCE 5.7 % | B.I.L. RATING 95 kV PRI. / 30 kV SEC.
COOLANT AIR | CAPACITY --- GALLONS | TOTAL WEIGHT 20100
WINDING POLARITY SUBTRACTIVE | WINDING MATERIAL CU/CU | K FACTOR ---
PRIMARY VOLTAGE 13,200 | (●) DELTA ( ) WYE | RATED CURRENT 109 / / AMPERES
SECONDARY VOLTAGE 4,160 / 2,402 | ( ) DELTA (●) WYE | RATED CURRENT 347 / / AMPERES

TAP VOLTAGES	13,860	13,530	13,200	12,870	12,540			
TAP CONNECTIONS	E-F	D-F	E-G	D-G	C-G			

TAP SETTING E-G 13,200 VOLTS | # FANS --- | TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL | DRY TYPE [x]

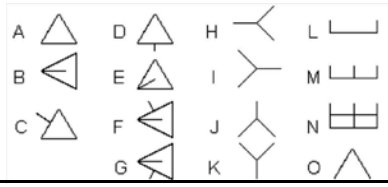
GAUGES:

COOLANT TEMPERATURE --- °C | MAXIMUM TEMPERATURE --- °C | RESET TEMPERATURE GAUGE [ ]
COOLANT LEVEL --- | PRESSURE VACUUM --- # | LCR COUNTER ---
OTHER GAUGES ---

VISUAL INSPECTION:

BUSHINGS --- | SUPPORT INSULATORS ACCEPTABLE | CONNECTIONS ACCEPTABLE
PAINT ACCEPTABLE | RADIATORS --- | FANS ---
NO-LOAD TAP CHANGER --- | LEAKS ---
MAIN TANK DIELECTRIC SAMPLE SYRINGE # | BOTTLE #
LTC DIELECTRIC SAMPLE SYRINGE # | BOTTLE #
GROUND CONDUCTOR SIZE 4/0 AWG/kcm | NO. OF GROUND CONDUCTORS 1 | GROUND CONDUCTOR CONDITION ACC
ADDITIONAL EQUIPMENT

VECTOR DIAGRAM



PRI. VECTOR: E
SEC. VECTOR: H

POST TEST VOLTAGES

NO LOAD SECONDARY VOLTAGE			
X1 - X2	V	X0 - G	V
X1 - X3	V	X0 - X1	V
X2 - X3	V	X0 - X2	V
		X0 - X3	V

COMMENTS: LOOSE CORE SUPPORTS ON BOTH THE OUTSIDE COILS OF XFMR. CORRECTED ON 3/11/20.
DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: D. FLEMING | Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER TURNS RATIO TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 376

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/11/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING

SUBSTATION 8 — POSITION 8A-XFMR 1

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-030-01-1

SPECIFICATION NO. TX11721001 — KVA 2,500 / / — TYPE VP1 — CLASS AA

PHASE 3 — TEMPERATURE RISE 115 °C / °C — IMPEDANCE 5.7 % — B.I.L. RATING 95 kV PRI. / 30 kV SEC.

COOLANT AIR — CAPACITY --- GALLONS — TOTAL WEIGHT 20100

WINDING POLARITY SUBTRACTIVE — WINDING MATERIAL CU/CU — K FACTOR ---

PRIMARY VOLTAGE 13,200 — (●) DELTA ( ) WYE — RATED CURRENT 109 / / AMPERES

SECONDARY VOLTAGE 4,160 / 2,402 — ( ) DELTA (●) WYE — RATED CURRENT 347 / / AMPERES

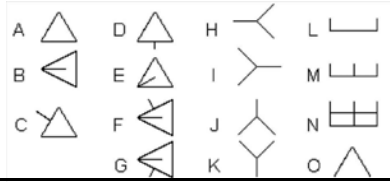
TAP VOLTAGES	13,860	13,530	13,200	12,870	12,540			
TAP CONNECTIONS	E-F	D-F	E-G	D-G	C-G			

TAP SETTING E-G 13,200 VOLTS — # FANS --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE [☑]

TRANSFORMER TURNS RATIO TESTS

TAP NUMBER		WINDING VOLTAGES	CALCULATED RATIO	MEASURED RATIO		
				H_1H_3/X_1X_0	H_2H_1/X_2X_0	H_3H_2/X_3X_0
1	E-F	13,860 / 2,402	5.7702			
2	D-F	13,530 / 2,402	5.6328			
3	E-G	13,200 / 2,402	5.4954	5.5040	5.5030	5.5050
4	D-G	12,870 / 2,402	5.3580			
5	C-G	12,540 / 2,402	5.2206			
6		/				
7		/				
8		/				

VECTOR DIAGRAM



PRI. VECTOR: E

SEC. VECTOR: H

CORRECTION FACTOR FOR UNACCESSIBLE NEUTRAL

PHASE TESTED	BLACK	RED	BLACK	RED	JUMPER	READING MULTIPLIER	TEST SHEET DESIGNATION
DELTA-WYE							
A	H1	H3	X1	X2	H2H3	1.547	H1-H3 X1-X2
B	H2	H1	X2	X3	H1H3	1.547	H2-H3 X2-X3
C	H3	H2	X3	X1	H1H2	1.547	H3-H2 X3-X1
WYE-DELTA							
A	H1	H3	X1	X2	X2X3	1.5000	H1-H3 X1-X2
B	H2	H1	X2	X3	X1X3	1.5000	H2-H1 X2-X3
C	H3	H2	X3	X1	X1X2	1.5000	H3-H2 X3-X1

COMMENTS:

DEFICIENCIES:

[☑] ACCEPTABLE [☐] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: RAYTECH TTR #177319

Tested By: D. FLEMING Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER DIELECTRIC ABSORPTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 377
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/11/2020 — TEMPERATURE 70 °F — HUMIDITY 43 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 — POSITION 8B-XFMR 2

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-032-01-1
SPECIFICATION NO. TX11722001 — KVA 2,500 / / — TYPE VP1 — CLASS AA
PHASE 3 — TEMPERATURE RISE 115 °C °C — IMPEDANCE 5.68 % — B.I.L. RATING 95 kV PRI. 30 kV SEC.
COOLANT AIR — CAPACITY --- GALLONS — TOTAL WEIGHT 14300
WINDING POLARITY SUBTRACTIVE — WINDING MATERIAL CU/CU — K FACTOR ---
PRIMARY VOLTAGE 13,200 — (●) DELTA ( ) WYE — RATED CURRENT 109 / / AMPERES
SECONDARY VOLTAGE 4,160 / 2,402 — ( ) DELTA (●) WYE — RATED CURRENT 347 / / AMPERES
TAP VOLTAGES 13,860 | 13,530 | 13,200 | 12,870 | 12,540
TAP CONNECTIONS E-F | D-F | E-G | D-G | C-G
TAP SETTING E-G 13,200 VOLTS — # FANS --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE ☑

TEST VOLTAGE:
PRIMARY TO SECONDARY 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 1 — K2=(TCF) (K1)
PRIMARY TO GROUND 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 1
SECONDARY TO GROUND 2.5 kVdc — TEST VOLTAGE MULTIPLIER, K1 1

CORE/COIL TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF — DRY 1.05 — LIQUID 1.080

MINUTES	PRIMARY TO SECONDARY GROUND GUARDED				PRIMARY TO GROUND SECONDARY GUARDED				SECONDARY TO GROUND PRIMARY GUARDED			
	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C	RDG.	MULT.	K2	20°C
0.25	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
0.50	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
0.75	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
1.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
1.25	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
1.50	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
1.75	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
2.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
3.00	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0	100,000.0	1	1.05	105,000.0
4.00												
5.00												
6.00												
7.00												
8.00												
9.00												
10.00												
POLARIZATION INDEX												

POLARIZATON INDEX = 10 MINUTE RDG. / 1 MINUTE RDG.

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER INSPECTION

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of PAGE 378

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook TELEPHONE

DATE 3/11/2020 TEMPERATURE 60 °F HUMIDITY 43 % EQPT. LOCATION EAST BLOWER BLDG

SUBSTATION 8 POSITION 8B-XFMR 2

NAMEPLATE DATA

MANUFACTURER SQUARE D SERIAL NO. 30951271-032-01-1

SPECIFICATION NO. TX11722001 kVA 2,500 / / TYPE VP1 CLASS AA

PHASE 3 TEMPERATURE RISE 115 °C °C IMPEDANCE 5.68 % B.I.L. RATING 95 kV PRI. 30 kV SEC.

COOLANT AIR CAPACITY --- GALLONS TOTAL WEIGHT 14300

WINDING POLARITY SUBTRACTIVE WINDING MATERIAL CU/CU K FACTOR ---

PRIMARY VOLTAGE 13,200 (●) DELTA ( ) WYE RATED CURRENT 109 / / AMPERES

SECONDARY VOLTAGE 4,160 / 2,402 ( ) DELTA (●) WYE RATED CURRENT 347 / / AMPERES

TAP VOLTAGES	13,860	13,530	13,200	12,870	12,540			
TAP CONNECTIONS	E-F	D-F	E-G	D-G	C-G			

TAP SETTING E-G 13,200 VOLTS # FANS --- TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL DRY TYPE [x]

GAUGES:

COOLANT TEMPERATURE --- °C MAXIMUM TEMPERATURE --- °C RESET TEMPERATURE GAUGE [ ]

COOLANT LEVEL --- PRESSURE VACUUM --- # LCR COUNTER ---

OTHER GAUGES ---

VISUAL INSPECTION:

BUSHINGS --- SUPPORT INSULATORS ACCEPTABLE CONNECTIONS ACCEPTABLE

PAINT ACCEPTABLE RADIATORS --- FANS ---

NO-LOAD TAP CHANGER --- LEAKS ---

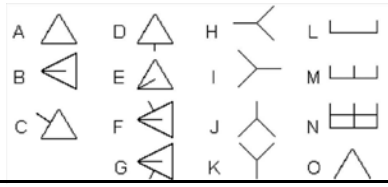
MAIN TANK DIELECTRIC SAMPLE SYRINGE # BOTTLE #

LTC DIELECTRIC SAMPLE SYRINGE # BOTTLE #

GROUND CONDUCTOR SIZE 4/0 AWG/kcm NO. OF GROUND CONDUCTORS 1 GROUND CONDUCTOR CONDITION ACC

ADDITIONAL EQUIPMENT

VECTOR DIAGRAM



PRI. VECTOR: E

SEC. VECTOR: H

POST TEST VOLTAGES

NO LOAD SECONDARY VOLTAGE			
X1 - X2	V	X0 - G	V
X1 - X3	V	X0 - X1	V
X2 - X3	V	X0 - X2	V
		X0 - X3	V

COMMENTS:

DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED:

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

TRANSFORMER TURNS RATIO TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 379
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/11/2020 — TEMPERATURE 70 °F — HUMIDITY 43 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 — POSITION 8B-XFMR 2

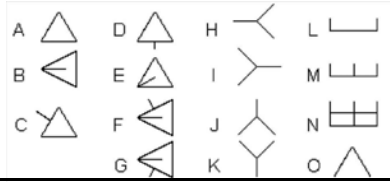
NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. 30951271-032-01-1
SPECIFICATION NO. TX11722001 — KVA 2,500 / / — TYPE VP1 — CLASS AA
PHASE 3 — TEMPERATURE RISE 115 °C / °C — IMPEDANCE 5.68 % — B.I.L. RATING 95 kV PRI. / 30 kV SEC.
COOLANT AIR — CAPACITY --- / GALLONS — TOTAL WEIGHT 14300
WINDING POLARITY SUBTRACTIVE — WINDING MATERIAL CU/CU — K FACTOR ---
PRIMARY VOLTAGE 13,200 — (●) DELTA ( ) WYE — RATED CURRENT 109 / / AMPERES
SECONDARY VOLTAGE 4,160 / 2,402 — ( ) DELTA (●) WYE — RATED CURRENT 347 / / AMPERES
TAP VOLTAGES 13,860 | 13,530 | 13,200 | 12,870 | 12,540
TAP CONNECTIONS E-F | D-F | E-G | D-G | C-G
TAP SETTING E-G 13,200 VOLTS — # FANS --- — TAP CHANGER: ( ) INTERNAL ( ) EXTERNAL — DRY TYPE [☑]

TRANSFORMER TURNS RATIO TESTS

TAP NUMBER		WINDING VOLTAGES	CALCULATED RATIO	MEASURED RATIO		
				H_1H_3/X_1X_0	H_2H_1/X_2X_0	H_3H_2/X_3X_0
1	E-F	13,860 / 2,402	5.7702			
2	D-F	13,530 / 2,402	5.6328			
3	E-G	13,200 / 2,402	5.4954	5.5060	5.5040	5.5050
4	D-G	12,870 / 2,402	5.3580			
5	C-G	12,540 / 2,402	5.2206			
6		/				
7		/				
8		/				

VECTOR DIAGRAM



PRI. VECTOR: E
SEC. VECTOR: H

CORRECTION FACTOR FOR UNACCESSIBLE NEUTRAL

PHASE TESTED	BLACK	RED	BLACK	RED	JUMPER	READING MULTIPLIER	TEST SHEET DESIGNATION
DELTA-WYE							
A	H1	H3	X1	X2	H2H3	1.547	H1-H3 X1-X2
B	H2	H1	X2	X3	H1H3	1.547	H2-H3 X2-X3
C	H3	H2	X3	X1	H1H2	1.547	H3-H2 X3-X1
WYE-DELTA							
A	H1	H3	X1	X2	X2X3	1.5000	H1-H3 X1-X2
B	H2	H1	X2	X3	X1X3	1.5000	H2-H1 X2-X3
C	H3	H2	X3	X1	X1X2	1.5000	H3-H2 X3-X1

COMMENTS:

DEFICIENCIES:

[☑] ACCEPTABLE [☐] NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: TTR #177319

Tested By: T. DODGE Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

SWITCHBOARD BUS CONNECTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 380
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/11/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 — POSITION A BUS

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. FO#17-30951271-033 — TYPE MASTER CLAD
CATALOG NO. --- — DRAWING NO. --- — VOLTAGE CLASS 4.76KV
PHASE AMPACITY 1200 A — WITHSTAND RATING 40 kA — CONDUCTOR ○ CU ◉ AL

BUS SECTION TESTED		RESISTANCE IN ☑ MICRO-OHMS ☐ MILLI-OHMS					BUS SECTION TESTED		RESISTANCE IN ☐ MICRO-OHMS ☐ MILLI-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
XFMR A	MAIN A	52.8	66.2	75.8		94							
MAIN A	BLOWER 3	58.7	57.5	59.9		111							
MAIN A	BLOWER 1	103.9	111	80.8		148							
MAIN A	TIE	117	103	87		179							
XFMR B	MAIN B	91.3	87	72.7		124.2							
MAIN B	BLOWER 2	98.0	58.3	101.8		200.7							
MAIN B	SUB 6B	111.3	58.4	84.8		101.5							
MAIN B	SPARE B	101.6	100.9	83.4		240.9							
MAIN B	ISOLATION	90.6	79.1	64.7		141.8							

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: DLRO #UIS1572

Tested By: DF / ET / NH Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 381
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/11/2020 — TEMPERATURE 70 °F — HUMIDITY 40 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 — POSITION BLOWER 1

MANUFACTURER SQUARE D — SERIAL NUMBER 1780482
TYPE VR — MODEL NO. V5D3153Y000 — DATE MANUFACTURED 5/14
MAXIMUM VOLTAGE 4.76 kV — AMPACITY --- — OPERATING VOLTAGE 4160 kV
INTERRUPTING CAPACITY 40 kA @ 1200 kV TO --- kV = 250 mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	C/L
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTIONS	☑	Acceptable	C
STRUCTURAL MEMBERS	☑	Acceptable	NA
CUBICLE	☑	Acceptable	NA
RACKING DEVICES	☑	Acceptable	NA
SHUTTER	☑	Acceptable	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Acceptable	C/L
VACUUM BOTTLE	☑	Acceptable	C
CONTACT EROSION INDICATOR	☑	Acceptable	NA
OPERATING MECHANISM	☑	Acceptable	NA
CONTACT SEQUENCE	☐	N/A	NA
GROUND CONNECTION	☑	Acceptable	NA
AUXILIARY DEVICES	☐	N/A	NA

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
MILLIWATT LOSS TEST VOLTAGE 1 kVac — HIGH POTENTIAL TEST VOLTAGE 20 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
POLE TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LINE TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LOAD TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LINE TO LOAD	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	1.0	0.12	0.12
HIGH POTENTIAL OPEN TEST	1.2	0.12	0.12

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE ☐ MICRO-OHMS ☐ MILLI-OHMS	RDG.			
	20°C			
CONTACT RESISTANCE ☐ MICRO-OHMS ☑ MILLI-OHMS	RDG.	0.022	0.023	0.022
	20°C	0.0219	0.0229	0.0219

	POLE 1	POLE 2	POLE 3
OPENING SPEED	---	---	---
CLOSING SPEED	---	---	---

COUNTER READING: BEG. 00049
END 00049

COMMENTS:
DEFICIENCIES: OPERATED 5 TIMES. COUNTER NOT FUNCTIONAL.

☐ ACCEPTABLE ☑ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480, DLRO #157082, HIPOT #156393

Tested By: E. TAPPAN Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 382
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/12/2020 — TEMPERATURE 70 °F — HUMIDITY 50 % — EQPT. LOCATION EAST BLOWER HOUSE
SUBSTATION 8 — POSITION BLOWER 2

MANUFACTURER SQUARE D — SERIAL NUMBER 1780485
TYPE VR — MODEL NO. V5D3153Y000 — DATE MANUFACTURED 5/14
MAXIMUM VOLTAGE 4.76 kV — AMPACITY 1200 — OPERATING VOLTAGE 4160 kV
INTERRUPTING CAPACITY 40 kA @ 250MVA kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	NEW
INSULATING MEMBERS	☑	Acceptable	NEW
MECHANICAL CONNECTIONS	☑	Acceptable	NEW
STRUCTURAL MEMBERS	☑	Acceptable	NEW
CUBICLE	☑	Acceptable	NEW
RACKING DEVICES	☑	Acceptable	NEW
SHUTTER	☑	Acceptable	NEW

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Acceptable	NEW
VACUUM BOTTLE	☑	Acceptable	NEW
CONTACT EROSION INDICATOR	☑	Acceptable	NEW
OPERATING MECHANISM	☑	Acceptable	NEW
CONTACT SEQUENCE	☐	N/A	NA
GROUND CONNECTION	☑	Acceptable	NEW
AUXILIARY DEVICES	☐	N/A	NA

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
MILLIWATT LOSS TEST VOLTAGE 1 kVac — HIGH POTENTIAL TEST VOLTAGE 20 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
POLE TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LINE TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LOAD TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LINE TO LOAD	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.18	0.18	0.18
HIGH POTENTIAL OPEN TEST	0.16	0.16	0.16

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE	RDG.	0.022	0.022	0.023
☐ MICRO-OHMS ☑ MILLI-OHMS	20°C	0.0219	0.0219	0.0229
CONTACT RESISTANCE	RDG.			
☐ MICRO-OHMS ☐ MILLI-OHMS	20°C			

	POLE 1	POLE 2	POLE 3
OPENING SPEED	---	---	---
CLOSING SPEED	---	---	---

COUNTER READING: BEG. 00062
END 00066

COMMENTS: MANUALLY OPERATED. NO CHARGING STATION.
ELECTRICALLY OPERATED IN CUBICLE.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #156375, DLRO #201071, HIPOT #191469

Tested By: NH / KM / TD Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 383
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/11/2020 — TEMPERATURE 70 °F — HUMIDITY 40 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 — POSITION BLOWER 3

MANUFACTURER SQUARE D — SERIAL NUMBER 1780478
TYPE VR — MODEL NO. V5D3153Y000 — DATE MANUFACTURED 5/14
MAXIMUM VOLTAGE 4.76 kV — AMPACITY 1200 — OPERATING VOLTAGE 4160 kV
INTERRUPTING CAPACITY 40 kA @ --- kV TO --- kV = 250 mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	C/L
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTIONS	☑	Acceptable	C
STRUCTURAL MEMBERS	☑	Acceptable	NA
CUBICLE	☑	Acceptable	NA
RACKING DEVICES	☑	Acceptable	NA
SHUTTER	☑	Acceptable	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Acceptable	C/L
VACUUM BOTTLE	☑	Acceptable	C
CONTACT EROSION INDICATOR	☑	Acceptable	NA
OPERATING MECHANISM	☑	Acceptable	NA
CONTACT SEQUENCE	☐	N/A	NA
GROUND CONNECTION	☑	Acceptable	NA
AUXILIARY DEVICES	☐	N/A	NA

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
MILLIWATT LOSS TEST VOLTAGE 1 kVac — HIGH POTENTIAL TEST VOLTAGE 20 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
POLE TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LINE TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LOAD TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LINE TO LOAD	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.14	0.14	0.12
HIGH POTENTIAL OPEN TEST	0.12	0.12	0.12

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE ☐ MICRO-OHMS ☐ MILLI-OHMS	RDG.			
	20°C			
CONTACT RESISTANCE ☐ MICRO-OHMS ☑ MILLI-OHMS	RDG.	0.023	0.023	0.023
	20°C	0.0229	0.0229	0.0229

	POLE 1	POLE 2	POLE 3
OPENING SPEED	---	---	---
CLOSING SPEED	---	---	---

COUNTER READING: BEG. 00067
END 00072

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480, DLRO #157082, HIPOT #156393

Tested By: E. TAPPAN Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

CONTROL POWER TRANSFORMER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 384
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 03/12/2020 — TEMPERATURE 70 °F — HUMIDITY 59 % — EQPT. LOCATION EAST BLOWER BLDG
SUBSTATION 8 — POSITION CPT-A / CPT-B

NAMEPLATE DATA

MANUFACTURER INST TRANS INC — CATALOG NO. CPTS3-60-15-4161A — TYPE --- — NAMEPLATE RATIO 34.7 : 1
PRIMARY VOLTAGE 4,160 / — SECONDARY VOLTAGE 120 — kVA 15 — CLASS ---
Other ---
PRIMARY FUSE: MANUFACTURER SHAWMUT — TYPE EJ 0-1 C — SIZE 10E — NO. DJD010
SECONDARY FUSE: MANUFACTURER SQUARE D — TYPE MC CB — SIZE 80 — NO.

EQUIPMENT TEMPERATURE 18 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 0.9

IDENTIFICATION: CPT-A — **SERIAL NUMBER:** 53752534

TURNS RATIO TEST

TEST CONNECTIONS	CALCULATED RATIO	MEASURED RATIO	% Error
H_1 H_2 X_1 X_0	34.666	34.730	0.184
H_1 H_2 X_2 X_0	34.666	34.725	0.170
H_1 H_2 X_1 X_2	17.333	17.364	0.178

POLARITY SUBTRACTIVE

INSULATION TEST

				RDG.	20°C	
PRIMARY - SECONDARY	@ 5	kVdc	100,000			MEGOHMS
PRIMARY - GROUND	@ 5	kVdc	100,000			MEGOHMS
SECONDARY - GROUND	@ 1	kVdc	100,000			MEGOHMS

IDENTIFICATION: CPT-B — **SERIAL NUMBER:** 53752509

TURNS RATIO TEST

TEST CONNECTIONS	CALCULATED RATIO	MEASURED RATIO	% Error
H_1 H_2 X_1 X_0	34.666	34.710	0.126
H_1 H_2 X_2 X_0	34.666	34.710	0.126
H_1 H_2 X_1 X_2	17.333	17.352	0.109

POLARITY SUBTRACTIVE

INSULATION TEST

				RDG.	20°C	
PRIMARY - SECONDARY	@ 5	kVdc	100,000			MEGOHMS
PRIMARY - GROUND	@ 5	kVdc	100,000			MEGOHMS
SECONDARY - GROUND	@ 1.0	kVdc	100,000			MEGOHMS

COMMENTS: SECONDARY VOLTAGE = 120/240
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #172766, RAYTECH TTR #206480

Tested By: K. HAYSLIP Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 385
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/10/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 — POSITION ISOLATION

MANUFACTURER SQUARE D — SERIAL NUMBER 1780480
TYPE VR — MODEL NO. V5D3153Y000 — DATE MANUFACTURED 5/14
MAXIMUM VOLTAGE 4.76 kV — AMPACITY 1200 — OPERATING VOLTAGE 4160 kV
INTERRUPTING CAPACITY 40 kA @ 250MVA kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
MECHANICAL CONNECTIONS	☑	Dirty	C
STRUCTURAL MEMBERS	☑	Dirty	C
CUBICLE	☑	Dirty	C
RACKING DEVICES	☑	Dirty	C
SHUTTER	☑	Dirty	C

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Dirty	C/L
VACUUM BOTTLE	☑	Dirty	C
CONTACT EROSION INDICATOR	☑	Dirty	C
OPERATING MECHANISM	☑	Dirty	C/L
CONTACT SEQUENCE	☐	N/A	NA
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☐	N/A	NA

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
MILLIWATT LOSS TEST VOLTAGE 1 kVac — HIGH POTENTIAL TEST VOLTAGE 20 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
POLE TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LINE TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LOAD TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LINE TO LOAD	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.14	0.14	0.14
HIGH POTENTIAL OPEN TEST	0.16	0.15	0.14

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE ☐ MICRO-OHMS ☐ MILLI-OHMS	RDG.			
	20°C			
CONTACT RESISTANCE ☐ MICRO-OHMS ☑ MILLI-OHMS	RDG.	0.022	0.021	0.02
	20°C	0.0219	0.0209	0.0199

	POLE 1	POLE 2	POLE 3
OPENING SPEED	---	---	---
CLOSING SPEED	---	---	---

COUNTER READING: BEG. 00056
END 00061

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761, HIPOT #156393

Tested By: S. LADD Tested By: A. SHERWOOD

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 386
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/11/2020 — TEMPERATURE 70 °F — HUMIDITY 40 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 — POSITION MAIN A

MANUFACTURER SQUARE D — SERIAL NUMBER 1780475
TYPE VR — MODEL NO. V5D3153Y000 — DATE MANUFACTURED 5/14
MAXIMUM VOLTAGE 4.76 kV — AMPACITY 1200 — OPERATING VOLTAGE 4160 kV
INTERRUPTING CAPACITY 40 kA @ --- kV TO --- kV = 250 mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	C/L
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTIONS	☑	Acceptable	C
STRUCTURAL MEMBERS	☑	Acceptable	NA
CUBICLE	☑	Acceptable	NA
RACKING DEVICES	☑	Acceptable	NA
SHUTTER	☑	Acceptable	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Acceptable	C/L
VACUUM BOTTLE	☑	Acceptable	C
CONTACT EROSION INDICATOR	☑	Acceptable	NA
OPERATING MECHANISM	☑	Acceptable	NA
CONTACT SEQUENCE	☐	N/A	NA
GROUND CONNECTION	☑	Acceptable	NA
AUXILIARY DEVICES	☐	N/A	NA

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
MILLIWATT LOSS TEST VOLTAGE 1 kVac — HIGH POTENTIAL TEST VOLTAGE 20 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
POLE TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LINE TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LOAD TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LINE TO LOAD	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.12	0.14	0.14
HIGH POTENTIAL OPEN TEST	0.12	0.12	0.12

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE ☐ MICRO-OHMS ☐ MILLI-OHMS	RDG.			
	20°C			
CONTACT RESISTANCE ☐ MICRO-OHMS ☑ MILLI-OHMS	RDG.	0.023	0.025	0.025
	20°C	0.0229	0.0249	0.0249

	POLE 1	POLE 2	POLE 3
OPENING SPEED	---	---	---
CLOSING SPEED	---	---	---

COUNTER READING: BEG. 00097
END 00102

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480, DLRO #157082, HIPOT #156393

Tested By: E. TAPPAN Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOADBREAK DISCONNECT TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 387
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 3/11/2020 | TEMPERATURE 70 °F | HUMIDITY 60 % | EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 | POSITION MAIN A

FUSE DATA

MANUFACTURER BUSSMANN | TYPE 150E | HOLDER --- | MAX. AMPS 65KA
REFILL ELEMENT TYPE --- | SIZE 150A | CAT. NO. 175GXQSJD150E | TCC NO. E | VOLTAGE 17.5 kV

NAMEPLATE DATA

MANUFACTURER SQUARE D | SERIAL NO. 04-315870
VOLTAGE 15KV | TYPE HVL | AMPERES 600 | INTERRUPTING RATING 0.6 kA
TYPE OPERATING MECHANISM MANUAL | AGE 5/14 | B.I.L. RATING 95 kV
MOMENTARY FAULT CLOSING AMPS 40 kA | OTHER NAMEPLATE DATA FO#17-30951271-029

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
MECHANICAL CONNECTION	☑	Dirty	C
STRUCTURAL MEMBERS	☑	Dirty	C
CUBICLE	☑	Dirty	C
AUXILIARY DEVICES	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
MAIN CONTACTS	☑	Dirty	C/L
HEATERS	☐	N/A	NA
BEARINGS	☑	Dirty	C/L
CONTACT SEQUENCE	☑	Acceptable	NA
GROUND CONNECTION	☑	Acceptable	NA

INSULATION TEST VOLTAGE 5 kVdc | TEST VOLTAGE MULTIPLIER, K1 = 1 | K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

INSULATION TESTS

	RANGE MULTIPLIER	K2	POLE 1 (P1-P2) MΩ READING	POLE 1 (P1-P2) MΩ 20°C	POLE 2 (P2-P3) MΩ READING	POLE 2 (P2-P3) MΩ 20°C	POLE 3 (P1-P3) MΩ READING	POLE 3 (P1-P3) MΩ 20°C
POLE TO POLE	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
POLE TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LINE TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LOAD TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LINE TO LOAD	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0

Contacts

		POLE 1	POLE 2	POLE 3
CONTACT RESISTANCE SWITCH & FUSE ☐ MICRO-OHMS ☑ MILLI-OHMS		6.35	6.35	6.34
SWITCH CONTACT		0.040	0.037	0.038
FUSE		6.25	6.27	6.26
HI POT (MICRO AMPS)	OPEN 37KV	900	850	850

COMMENTS: HIPOT CLOSED, POLE 1 = 1500, POLE 2 = 1100, POLE 3 = 1000.
HIGH VOLTAGE LEAD TO THE XFMR WAS RESTING ON THE MICARTA CROSS SUPPORT. REROUTED CABLE SO IT WAS NOT TOUCHING. 3/11/2020.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563, DLRO #UIS1572, HIPOT #156393

Tested By: D. FLEMING Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LIGHTNING ARRESTER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 388
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/11/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 — POSITION MAIN A

NAMEPLATE DATA

MANUFACTURER SQUARE D — TYPE HD DIST — MODEL ---
CATALOG NO. 9L20FXX015XHS — SERIAL NO. --- — RELIEF ---
RATED RMS VOLTAGE 15 kV — RATED MCOV 12.7 kV — RMS CURRENT RATING kA — RATED CREST kA
SYSTEM VOLTAGE 13.2 kV — ARRESTER TYPE STATION ○ INTERMEDIATE ○ DISTRIBUTION ◉ — MATERIAL TYPE PORCELAIN ○ POLYMER ◉

INSULATION TEST VOLTAGE 5.00 kV DC — TEST VOLTAGE MULTIPLIER 1
RANGE MULTIPLIER 1.0 — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION TEST

POSITION	TOTAL CORRECTION MULTIPLIER	A PHASE TO GROUND		B PHASE TO GROUND		C PHASE TO GROUND	
		ACTUAL MEGOHMS	CORRECTED MEGOHMS	ACTUAL MEGOHMS	CORRECTED MEGOHMS	ACTUAL MEGOHMS	CORRECTED MEGOHMS
8A MAIN	1.05	100,000	105,000.0	100,000	105,000.0	100,000	105,000.0
8B MAIN	1.05	100,000	105,000.0	100,000	105,000.0	100,000	105,000.0

WATT LOSS TEST

TEST kV SWITCH SETTING
OUTPUT TEST VOLTAGE
READING CORRECTION FACTOR

○ GROUNDED SPECIMEN TEST
○ UNGROUNDED SPECIMEN TEST

MILLI-WATT LOSS

POSITION	A PHASE	B PHASE	C PHASE

COMMENTS: GROUND CONNECTION RESISTANCE : A X=0.2 OHMS Y=0.2 OHMS Z=0.2 OHMS
B X=0.2 OHMS Y=0.2 OHMS Z=0.2 OHMS

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563, FLUKE #156390

Tested By: D. FLEMING Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 389
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/12/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 — POSITION MAIN B

MANUFACTURER SQUARE D — SERIAL NUMBER 1780479
TYPE VR — MODEL NO. V5D3153Y000 — DATE MANUFACTURED 5/14
MAXIMUM VOLTAGE 4.76 kV — AMPACITY 1200 — OPERATING VOLTAGE 4160 kV
INTERRUPTING CAPACITY 40 kA @ 250MVA kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTIONS	☑	Acceptable	C
STRUCTURAL MEMBERS	☑	Acceptable	C
CUBICLE	☑	Acceptable	C
RACKING DEVICES	☑	Acceptable	C
SHUTTER	☑	Acceptable	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Acceptable	C/L
VACUUM BOTTLE	☑	Acceptable	C
CONTACT EROSION INDICATOR	☑	Acceptable	NA
OPERATING MECHANISM	☑	Acceptable	C/L
CONTACT SEQUENCE	☐	N/A	NA
GROUND CONNECTION	☑	Acceptable	C/L
AUXILIARY DEVICES	☐	N/A	NA

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
MILLIWATT LOSS TEST VOLTAGE 1 kVac — HIGH POTENTIAL TEST VOLTAGE 20 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
POLE TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LINE TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LOAD TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LINE TO LOAD	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.19	0.19	0.19
HIGH POTENTIAL OPEN TEST	0.17	0.17	0.17

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE	RDG.	0.023	0.022	0.022
☐ MICRO-OHMS ☑ MILLI-OHMS	20°C	0.0229	0.0219	0.0219
CONTACT RESISTANCE	RDG.			
☐ MICRO-OHMS ☐ MILLI-OHMS	20°C			

	POLE 1	POLE 2	POLE 3
OPENING SPEED	---	---	---
CLOSING SPEED	---	---	---

COUNTER READING: BEG. 00181
END 00186

COMMENTS: MANUALLY OPERATED. NO CHARGING STATION.
ELECTRICALLY OPERATED IN CUBICLE.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #156375, DLRO #201071, HIPOT #191469

Tested By: K. MURPHY Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOADBREAK DISCONNECT TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 390
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 3/12/2020 | TEMPERATURE 70 °F | HUMIDITY 60 % | EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 | POSITION MAIN B

FUSE DATA

MANUFACTURER BUSSMAN | TYPE 15E | HOLDER --- | MAX. AMPS 65KA
REFILL ELEMENT TYPE --- | SIZE 150A | CAT. NO. 175GXQSJD150E | TCC NO. E | VOLTAGE 17.5 kV

NAMEPLATE DATA

MANUFACTURER SQUARE D | SERIAL NO. 04-315860
VOLTAGE 15KV | TYPE HVL | AMPERES 600 | INTERRUPTING RATING 0.6 kA
TYPE OPERATING MECHANISM MANUAL | AGE MAY 2014 | B.I.L. RATING 95 kV
MOMENTARY FAULT CLOSING AMPS 40 kA | OTHER NAMEPLATE DATA FO#17-30951271-031

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Dirty	NA
INSULATING MEMBERS	☑	Dirty	NA
MECHANICAL CONNECTION	☑	Dirty	NA
STRUCTURAL MEMBERS	☑	Dirty	NA
CUBICLE	☑	Dirty	NA
AUXILIARY DEVICES	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
MAIN CONTACTS	☑	Acceptable	C/L
HEATERS	☐	N/A	NA
BEARINGS	☑	Acceptable	C
CONTACT SEQUENCE	☑	Acceptable	NA
GROUND CONNECTION	☑	Acceptable	NA

INSULATION TEST VOLTAGE 5 kVdc | TEST VOLTAGE MULTIPLIER, K1 = 1 | K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

INSULATION TESTS

	RANGE MULTIPLIER	K2	POLE 1 (P1-P2) MΩ READING	POLE 1 (P1-P2) MΩ 20°C	POLE 2 (P2-P3) MΩ READING	POLE 2 (P2-P3) MΩ 20°C	POLE 3 (P1-P3) MΩ READING	POLE 3 (P1-P3) MΩ 20°C
POLE TO POLE	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
POLE TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LINE TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LOAD TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LINE TO LOAD	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0

Contacts		POLE 1	POLE 2	POLE 3
CONTACT RESISTANCE SWITCH & FUSE ☐ MICRO-OHMS ☑ MILLI-OHMS		6.2905	6.4055	6.3520
SWITCH CONTACT		0.042	0.040	0.037
FUSE		6.2710	6.4105	6.3235
HI POT (MICRO AMPS)	OPEN 37KV	90	52	88

COMMENTS: HIPOT CLOSED: POLE 1 = 140, POLE 2 = 96, POLE 3 = 140.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563, DLRO #UIS1572, HIPOT #191469

Tested By: D. FLEMING Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

OVERCURRENT RELAY

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 391
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 3/12/2020 | TEMPERATURE 70 °F | HUMIDITY 80 % | EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 | POSITION MAIN B

NAMEPLATE DATA

MANUFACTURER SQUARE D SEPAM | TYPE S24 / | MODEL / STYLE NO SQ1S24A /
LONG TIME RANGE 1-6250A / 1-6250A | SEAL-IN RANGE O1 | INSTANTANEOUS RANGE 1-6250A / 1-6250A
INSTRUCTION BOOKLET SEPAM / SERIES 20 | TCC. NO. EIT / SIT (PHASE RELAYS / NEUTRAL RELAY)
DEVICES OPERATED 86 | CT RATIO 1200 :5

VISUAL INSPECTION

	A	B	C	N	G
COVER GASKET OK	☐	☐	☐	☐	☐
GLASS CONDITION OK	☐	☐	☐	☐	☐
NO FOREIGN MATERIAL	☑	☐	☐	☐	☐
NO MOISTURE PRESENT	☑	☐	☐	☐	☐
SPIRAL SPRING OK	☐	☐	☐	☐	☐
BEARING ENDPLAY OK	☐	☐	☐	☐	☐
BEARING CONDITION OK	☐	☐	☐	☐	☐
DISC CLEARANCE OK	☐	☐	☐	☐	☐
NO RUST PRESENT	☑	☐	☐	☐	☐

ROUTINE MAINTENANCE

	A	B	C	N	G
GLASS CLEANED	☐	☐	☐	☐	☐
CASE CLEANED	☑	☐	☐	☐	☐
RELAY CLEANED	☑	☐	☐	☐	☐
CONNECTION TIGHTENED	☑	☐	☐	☐	☐
TAPS TIGHTENED	☐	☐	☐	☐	☐
CONTACTS CLEANED	☐	☐	☐	☐	☐
TRIP CIRCUIT TESTED	☐	☐	☐	☐	☐
INSULATION RESISTANCE	☐	☐	☐	☐	☐
CT SHORTING BAR REMOVED	☐	☐	☐	☐	☐

RELAY SETTINGS

	TAP / TIME DIAL			SEAL - IN			INSTANTANEOUS		
	AS FOUND	SPECIFIED	AS LEFT	AS FOUND	SPECIFIED	AS LEFT	AS FOUND	SPECIFIED	AS LEFT
PHASE RELAYS	1.6 A/ 0.3	384 A/ 0.3	1.6 A/ 0.3	O1 ADC	O1 ADC	O1 ADC	14.0 A	3360 A	14.0 A
NEUTRAL RELAYS	-- A/ --	-- A/ --	-- A/ --	-- ADC	-- ADC	-- ADC	-- A	-- A	-- A
GROUND	0.5 A/ 0.4	120 A/ 0.4	0.5 A/ 0.4	O1 ADC	O1 ADC	O1 ADC	OFF A	OFF A	OFF A

PICKUP TESTS

PHASE	TIMING UNIT		SEAL - IN UNIT		INSTANTANEOUS UNIT	
	AS FOUND	AS LEFT	AS FOUND	AS LEFT	AS FOUND	AS LEFT
A	1.91 A	1.91 A	O1 ADC	O1 ADC	14.00 A	14.00 A
B	1.91 A	1.91 A	O1 ADC	O1 ADC	13.99 A	13.99 A
C	1.91 A	1.91 A	O1 ADC	O1 ADC	13.99 A	13.99 A
N	-- A	-- A	-- ADC	-- ADC	-- A	-- A
G	0.57 A	0.57 A	O1 ADC	O1 ADC	-- A	-- A

TIMING TESTS

PHASE	AS FOUND		SPECIFIED		AS LEFT		AS FOUND		SPECIFIED		AS LEFT		AS FOUND		SPECIFIED		AS LEFT	
	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.
A	3.2	9.99	3.2	9.901	3.2	9.99	4.8	3.762	4.8	3.713	4.8	3.762	6.4	2.000	6.4	1.980	6.4	2.000
B	3.2	9.95	3.2	9.901	3.2	9.95	4.8	3.739	4.8	3.713	4.8	3.739	6.4	1.998	6.4	1.980	6.4	1.998
C	3.2	9.95	3.2	9.901	3.2	9.95	4.8	3.741	4.8	3.713	4.8	3.741	6.4	1.995	6.4	1.980	6.4	1.995
N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
G	1.0	1.366	1.0	1.350	1.0	1.366	1.5	0.866	1.5	0.848	1.5	0.866	2.0	0.682	2.0	0.670	2.0	0.682

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER SMRT410 #1588, FLUKE #169574

Tested By: K. HAYSLIP Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOADBREAK DISCONNECT TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 392
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 3/11/2020 | TEMPERATURE 70 °F | HUMIDITY 60 % | EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 | POSITION PAB-E1

FUSE DATA

MANUFACTURER SHAWMUT | TYPE CL | HOLDER --- | MAX. AMPS 9R
REFILL ELEMENT TYPE --- | SIZE 9R | CAT. NO. A055D1DSR0 | TCC NO. D239249 | VOLTAGE 5.50 kV

NAMEPLATE DATA

MANUFACTURER SQUARE D | SERIAL NO. 48-30951271-034
VOLTAGE 5.5KV | TYPE MAG HELD | AMPERES 200 | INTERRUPTING RATING 50 kA
TYPE OPERATING MECHANISM MECH/EL | AGE 2014 | B.I.L. RATING 60 kV
MOMENTARY FAULT CLOSING AMPS 50 kA | OTHER NAMEPLATE DATA ---

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTION	☑	Acceptable	C
STRUCTURAL MEMBERS	☑	Acceptable	C
CUBICLE	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
MAIN CONTACTS	☑	Acceptable	C
HEATERS	☐	N/A	NA
BEARINGS	☑	Acceptable	C
CONTACT SEQUENCE	☐	N/A	NA
GROUND CONNECTION	☑	Acceptable	C

INSULATION TEST VOLTAGE 5 kVdc | TEST VOLTAGE MULTIPLIER, K1 = 1 | K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

INSULATION TESTS

	RANGE MULTIPLIER	K2	POLE 1 (P1-P2) MΩ READING	POLE 1 (P1-P2) MΩ 20°C	POLE 2 (P2-P3) MΩ READING	POLE 2 (P2-P3) MΩ 20°C	POLE 3 (P1-P3) MΩ READING	POLE 3 (P1-P3) MΩ 20°C
POLE TO POLE	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
POLE TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LINE TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LOAD TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LINE TO LOAD	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0

Contacts		POLE 1	POLE 2	POLE 3
CONTACT RESISTANCE SWITCH & FUSE ☐ MICRO-OHMS ☑ MILLI-OHMS		2.785	2.396	2.603
SWITCH CONTACT		0.573	0.183	0.398
FUSE		2.085	2.091	2.137
HI POT (MICRO AMPS)	15KV DC	---	---	---

COMMENTS: UNABLE TO HIPOT DUE TO CABLES ON LINE AND SELF GROUNDING SWITCH ON LOAD. HOURS = 139987.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480, DLRO #1572

Tested By: T. DODGE Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MEDIUM VOLTAGE VACUUM MOTOR STARTER TEST

NETA ACCREDITED COMPANY

CUSTOMER: Ann Arbor, City of | PAGE: 393
ADDRESS: 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB #: AACI207024-1
USER: Ann Arbor WWTP
OWNER REPRESENTATIVE: Jeremy Holbrook | TELEPHONE:
DATE: 3/11/2020 | TEMPERATURE: 70 °F | HUMIDITY: 60 % | EQPT. LOCATION: EAST BLOWER BUILDING
SUBSTATION: 8 | POSITION: PAB-E1

NAMEPLATE DATA

MANUFACTURER: SQUARE D | SERIAL NO.: 48-30951271-034 | TYPE: MAGNETIC
CATALOG NO.: CBD225NB0NM | STARTER SIZE: 200A | FORM: ---
SERIES: --- | MAXIMUM VOLTAGE: 7.2KV | INT. RATING: 60 kA @ 60 kV
OPERATING VOLTAGE: 4160 | CONTROL VOLTAGE: 120V | Other: ---
MOTOR CONTROL CENTER SYSTEM VOLTAGE: --- | STARTER IDENTIFICATION: PAB-E1

OVERCURRENT PROTECTION DEVICES

CONTROL POWER FUSE: MFR. BUSS-B | TYPE: BAF | SIZE: 7
MAIN POWER FUSE: MFR. FERRAZ SHAWMUT | TYPE: AMP TRAP C.L. | SIZE: 9R
OVERLOAD PROTECTION: MFR. MERSEN | TYPE: A055D1DSR0-9R | TESTED: (●) YES ( ) NO

INSTRUMENT TRANSFORMER DATA

CONTROL POWER TRANSFORMER: MFR. --- | VA RATING: --- | TYPE: --- | VOLTAGE: ---
CURRENT TRANSFORMER: MFR. --- | RATIO: --- :5 | TYPE: --- | CAT. NO.: ---

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTIONS	☑	Acceptable	C
STRUCTURAL MEMBERS	☑	Acceptable	C
CUBICLE	☑	Acceptable	C
RACKING DEVICES	☑	Acceptable	C
SHUTTER	☑	Acceptable	C

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OPERATING MECHANISM	☑	Acceptable	C
CONTACT FINGERS	☑	Acceptable	C
VACUUM INTERRUPTER	☑	Acceptable	C
CONTACT EROSION INDICATOR	☑	Acceptable	C
CONTACT SEQUENCE	☐	N/A	NA
GROUND CONNECTIONS	☐	N/A	NA
AUXILIARY DEVICES	☐	N/A	NA

INSULATION TEST VOLTAGE: 5 kVdc | TEST VOLTAGE MULTIPLIER, K1 = 1 | K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE: 21 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 1.06
MILLIWATT LOSS TEST VOLTAGE: kVdc | HIGH POTENTIAL TEST VOLTAGE: 15.3 ☑ kVdc ☐ kVac

INSULATION TESTS	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1 - P2)		POLE 2 MEGOHMS (P2 - P3)		POLE 3 MEGOHMS (P1 - P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
POLE TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LINE TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LOAD TO FRAME	1.000	1.060						
LINE TO LOAD	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0

CONTACT MEASUREMENTS

		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES		---	---	---
POLE RESISTANCE ☐ MICRO-OHMS ☑ MILLI-OHMS	RDG.	0.583	0.581	0.531
	20°C	0.580718	0.578726	0.528922
INTERRUPTER RESISTANCE ☐ MICRO-OHMS ☐ MILLI-OHMS	RDG.			
	20°C			

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1	POLE 2	POLE 3
HIGH POTENTIAL TEST	0.12	0.12	1.6
MILLIWATT LOSS TEST	---	---	---

COMMENTS: POLE TO POLE TAKEN IS OPEN POSITION DUE TO LOAD. UNABLE TO MEG LOAD TO FRAME DUE TO LOAD. DLRO # INCLUDE FACTORY WIRING FROM LINE TO LOAD.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480, DLRO #1572, HIPOT #191469

Tested By: T. DODGE Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

OVERCURRENT RELAY

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 394

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/11/2020 — TEMPERATURE 70 °F — HUMIDITY 80 % — EQPT. LOCATION EAST BLOWER BUILDING

SUBSTATION 8 — POSITION PAB-E1 BLOWER NO.1

NAMEPLATE DATA

MANUFACTURER SQUARE D SEPAM — TYPE S24 / — MODEL / STYLE NO SQ1S24A /

LONG TIME RANGE 1-6250A / 1-6250A — SEAL-IN RANGE O1 — INSTANTANEOUS RANGE 1-6250A / 1-6250A

INSTRUCTION BOOKLET SEPAM / SERIES 20 — TCC. NO. EIT / SIT (PHASE RELAYS / NEUTRAL RELAY)

DEVICES OPERATED 52 — CT RATIO 200 :5

VISUAL INSPECTION

	A	B	C	N	G
COVER GASKET OK	☐	☐	☐	☐	☐
GLASS CONDITION OK	☐	☐	☐	☐	☐
NO FOREIGN MATERIAL	☑	☐	☐	☐	☐
NO MOISTURE PRESENT	☑	☐	☐	☐	☐
SPIRAL SPRING OK	☐	☐	☐	☐	☐
BEARING ENDPLAY OK	☐	☐	☐	☐	☐
BEARING CONDITION OK	☐	☐	☐	☐	☐
DISC CLEARANCE OK	☐	☐	☐	☐	☐
NO RUST PRESENT	☑	☐	☐	☐	☐

ROUTINE MAINTENANCE

	A	B	C	N	G
GLASS CLEANED	☐	☐	☐	☐	☐
CASE CLEANED	☑	☐	☐	☐	☐
RELAY CLEANED	☑	☐	☐	☐	☐
CONNECTION TIGHTENED	☑	☐	☐	☐	☐
TAPS TIGHTENED	☐	☐	☐	☐	☐
CONTACTS CLEANED	☐	☐	☐	☐	☐
TRIP CIRCUIT TESTED	☐	☐	☐	☐	☐
INSULATION RESISTANCE	☐	☐	☐	☐	☐
CT SHORTING BAR REMOVED	☐	☐	☐	☐	☐

RELAY SETTINGS

	TAP / TIME DIAL			SEAL - IN			INSTANTANEOUS		
	AS FOUND	SPECIFIED	AS LEFT	AS FOUND	SPECIFIED	AS LEFT	AS FOUND	SPECIFIED	AS LEFT
PHASE RELAYS	3.0 A/ 2.23	120 A/ 2.23	3.0 A/ 2.23	O1 ADC	O1 ADC	O1 ADC	20.85 A	834 A	20.85 A
NEUTRAL RELAYS	-- A/ --	-- A/ --	-- A/ --	-- ADC	-- ADC	-- ADC	-- A	-- A	-- A
GROUND	1.5 A/ 0.1	60 A/ 0.1	1.5 A/ 0.1	O1 ADC	O1 ADC	O1 ADC	OFF A	OFF A	OFF A

PICKUP TESTS

PHASE	TIMING UNIT		SEAL - IN UNIT		INSTANTANEOUS UNIT	
	AS FOUND	AS LEFT	AS FOUND	AS LEFT	AS FOUND	AS LEFT
A	3.59 A	3.59 A	O1 ADC	O1 ADC	20.86 A	20.86 A
B	3.59 A	3.59 A	O1 ADC	O1 ADC	20.85 A	20.85 A
C	3.59 A	3.59 A	O1 ADC	O1 ADC	20.85 A	20.85 A
N	-- A	-- A	-- ADC	-- ADC	-- A	-- A
G	1.77 A	1.77 A	O1 ADC	O1 ADC	-- A	-- A

TIMING TESTS

PHASE	AS FOUND		SPECIFIED		AS LEFT		AS FOUND		SPECIFIED		AS LEFT		AS FOUND		SPECIFIED		AS LEFT	
	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.
A	9.0	27.89	9.0	27.60	9.0	27.89	12.0	14.83	12.0	14.72	12.0	14.83	15.0	9.266	15.0	9.200	15.0	9.266
B	9.0	27.67	9.0	27.60	9.0	27.67	12.0	14.77	12.0	14.72	12.0	14.77	15.0	9.222	15.0	9.200	15.0	9.222
C	9.0	27.67	9.0	27.60	9.0	27.67	12.0	14.75	16.35	14.72	16.35	14.75	15.0	9.226	15.0	9.200	15.0	9.226
N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
G	3.0	0.353	3.0	0.338	3.0	0.353	4.5	0.226	4.5	0.212	4.5	0.226	6.0	0.179	6.0	0.168	6.0	0.179

COMMENTS: FOUND 50/51-1 TARGET LED NOT SET TO SEAL IN. CORRECTED 3-11-2020.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: SMRT36 # 190134

Tested By: R. WALLS Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOADBREAK DISCONNECT TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 395
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 3/12/2020 | TEMPERATURE 70 °F | HUMIDITY 60 % | EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 | POSITION PAB-E2

FUSE DATA

MANUFACTURER SHAWMUT | TYPE CL | HOLDER --- | MAX. AMPS 9R
REFILL ELEMENT TYPE --- | SIZE 9R | CAT. NO. A055D1DSR0 | TCC NO. D239249 | VOLTAGE 5.5 kV

NAMEPLATE DATA

MANUFACTURER SQUARE D | SERIAL NO. 48-30951271-035
VOLTAGE 5.5KV | TYPE MAG HELD | AMPERES 200 | INTERRUPTING RATING 50 kA
TYPE OPERATING MECHANISM MECH/EL | AGE 2014 | B.I.L. RATING 60 kV
MOMENTARY FAULT CLOSING AMPS 50 kA | OTHER NAMEPLATE DATA ---

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTION	☑	Acceptable	C
STRUCTURAL MEMBERS	☑	Acceptable	C
CUBICLE	☑	Acceptable	C
AUXILIARY DEVICES	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
MAIN CONTACTS	☑	Acceptable	C
HEATERS	☐	N/A	NA
BEARINGS	☑	Acceptable	C
CONTACT SEQUENCE	☐	N/A	NA
GROUND CONNECTION	☑	Acceptable	C

INSULATION TEST VOLTAGE 5 kVdc | TEST VOLTAGE MULTIPLIER, K1 = 1 | K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

INSULATION TESTS

	RANGE MULTIPLIER	K2	POLE 1 (P1-P2) MΩ READING	POLE 1 (P1-P2) MΩ 20°C	POLE 2 (P2-P3) MΩ READING	POLE 2 (P2-P3) MΩ 20°C	POLE 3 (P1-P3) MΩ READING	POLE 3 (P1-P3) MΩ 20°C
POLE TO POLE	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
POLE TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LINE TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LOAD TO FRAME	1.000	1.060						
LINE TO LOAD	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0

Contacts

	POLE 1	POLE 2	POLE 3
CONTACT RESISTANCE SWITCH & FUSE ☐ MICRO-OHMS ☑ MILLI-OHMS	2.269	2.224	2.231
SWITCH CONTACT	0.146	0.094	0.116
FUSE	2.133	2.114	2.126
HI POT (MICRO AMPS) 15KV DC	---	---	---

COMMENTS: UNABLE TO MEGGER LOAD TO FRAME DUE TO SELF-GROUNDING ON LOAD SIDE.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480, DLRO #1572

Tested By: T. DODGE Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MEDIUM VOLTAGE VACUUM MOTOR STARTER TEST

NETA ACCREDITED COMPANY

CUSTOMER: Ann Arbor, City of | PAGE: 396
ADDRESS: 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB #: AACI207024-1
USER: Ann Arbor WWTP
OWNER REPRESENTATIVE: Jeremy Holbrook | TELEPHONE:
DATE: 3/11/2020 | TEMPERATURE: 70 °F | HUMIDITY: 60 % | EQPT. LOCATION: EAST BLOWER BUILDING
SUBSTATION: 8 | POSITION: PAB-E2

NAMEPLATE DATA

MANUFACTURER: SQUARE D | SERIAL NO.: 48-30951271 | TYPE: MAGNETIC
CATALOG NO.: CBD225NB0NM | STARTER SIZE: 200A | FORM: ---
SERIES: --- | MAXIMUM VOLTAGE: 7.2 | INT. RATING: 60 kA @ 60 kV
OPERATING VOLTAGE: 4160 | CONTROL VOLTAGE: 120 | Other: ---
MOTOR CONTROL CENTER SYSTEM VOLTAGE: --- | STARTER IDENTIFICATION: PAB-E2

OVERCURRENT PROTECTION DEVICES

CONTROL POWER FUSE: MFR. BUSS | TYPE: BAF | SIZE: 7
MAIN POWER FUSE: MFR. SHAWMUT | TYPE: AMP TRAP C.L. | SIZE: 9R
OVERLOAD PROTECTION: MFR. --- | TYPE: --- | TESTED: ○ YES ◉ NO

INSTRUMENT TRANSFORMER DATA

CONTROL POWER TRANSFORMER: MFR. --- | VA RATING: --- | TYPE: --- | VOLTAGE: ---
CURRENT TRANSFORMER: MFR. --- | RATIO: --- :5 | TYPE: --- | CAT. NO.: ---

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTIONS	☑	Acceptable	C
STRUCTURAL MEMBERS	☑	Acceptable	C
CUBICLE	☑	Acceptable	C
RACKING DEVICES	☑	Acceptable	C
SHUTTER	☑	Acceptable	C

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OPERATING MECHANISM	☑	Acceptable	C
CONTACT FINGERS	☑	Acceptable	C
VACUUM INTERRUPTER	☑	Acceptable	C
CONTACT EROSION INDICATOR	☑	Acceptable	C
CONTACT SEQUENCE	☐	N/A	NA
GROUND CONNECTIONS	☐	N/A	NA
AUXILIARY DEVICES	☐	N/A	NA

INSULATION TEST VOLTAGE: 5 kVdc | TEST VOLTAGE MULTIPLIER, K1 = 1 | K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE: 21 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 1.06
MILLIWATT LOSS TEST VOLTAGE: kVdc | HIGH POTENTIAL TEST VOLTAGE: 15.3 ☑ kVdc ☐ kVac

INSULATION TESTS	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1 - P2)		POLE 2 MEGOHMS (P2 - P3)		POLE 3 MEGOHMS (P1 - P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
POLE TO FRAME	1.000	1.060						
LINE TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LOAD TO FRAME	1.000	1.060						
LINE TO LOAD	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0

CONTACT MEASUREMENTS

		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES		---	---	---
POLE RESISTANCE ☐ MICRO-OHMS ☑ MILLI-OHMS	RDG.	0.891	0.586	0.628
	20°C	0.887513	0.583706	0.625542
INTERRUPTER RESISTANCE ☐ MICRO-OHMS ☐ MILLI-OHMS	RDG.			
	20°C			

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1	POLE 2	POLE 3
HIGH POTENTIAL TEST	0.13	3.0	3.2
MILLIWATT LOSS TEST	---	---	---

COMMENTS: P TO P LINE SIDE ONLY ON MEGGER TEST DUE TO LOAD. LOAD TO FRAME UNABLE TO MEGGER DUE TO LOAD. UNABLE TO HIPOT DUE TO LOAD. DLRO # INCLUDE FACTORY WIRED JUMPERS LINE TO BUS. HIPOT INCLUDES BOTTOM OF FUSE CLIPS TO LINE SIDE OF MOTOR STARTER.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1572, DLRO #191480. HIPOT #191469

Tested By: T. DODGE Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

OVERCURRENT RELAY

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 397
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 3/12/2020 | TEMPERATURE 70 °F | HUMIDITY 80 % | EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 | POSITION PAB-E2 BLOWER NO.2

NAMEPLATE DATA

MANUFACTURER SQUARE D SEPAM | TYPE S24 / | MODEL / STYLE NO SQ1S24A /
LONG TIME RANGE 1-6250A / 1-6250A | SEAL-IN RANGE O1 | INSTANTANEOUS RANGE 1-6250A / 1-6250A
INSTRUCTION BOOKLET SEPAM / SERIES 20 | TCC. NO. EIT / SIT (PHASE RELAYS / NEUTRAL RELAY)
DEVICES OPERATED 52 | CT RATIO 200 :5

VISUAL INSPECTION

	A	B	C	N	G
COVER GASKET OK	☐	☐	☐	☐	☐
GLASS CONDITION OK	☐	☐	☐	☐	☐
NO FOREIGN MATERIAL	☑	☐	☐	☐	☐
NO MOISTURE PRESENT	☑	☐	☐	☐	☐
SPIRAL SPRING OK	☐	☐	☐	☐	☐
BEARING ENDPLAY OK	☐	☐	☐	☐	☐
BEARING CONDITION OK	☐	☐	☐	☐	☐
DISC CLEARANCE OK	☐	☐	☐	☐	☐
NO RUST PRESENT	☑	☐	☐	☐	☐

ROUTINE MAINTENANCE

	A	B	C	N	G
GLASS CLEANED	☐	☐	☐	☐	☐
CASE CLEANED	☑	☐	☐	☐	☐
RELAY CLEANED	☑	☐	☐	☐	☐
CONNECTION TIGHTENED	☑	☐	☐	☐	☐
TAPS TIGHTENED	☐	☐	☐	☐	☐
CONTACTS CLEANED	☐	☐	☐	☐	☐
TRIP CIRCUIT TESTED	☐	☐	☐	☐	☐
INSULATION RESISTANCE	☐	☐	☐	☐	☐
CT SHORTING BAR REMOVED	☐	☐	☐	☐	☐

RELAY SETTINGS

	TAP / TIME DIAL			SEAL - IN			INSTANTANEOUS		
	AS FOUND	SPECIFIED	AS LEFT	AS FOUND	SPECIFIED	AS LEFT	AS FOUND	SPECIFIED	AS LEFT
PHASE RELAYS	3.0 A/ 2.23	120 A/ 2.23	3.0 A/ 2.23	O1 ADC	O1 ADC	O1 ADC	20.85 A	834 A	20.85 A
NEUTRAL RELAYS	-- A/ --	-- A/ --	-- A/ --	-- ADC	-- ADC	-- ADC	-- A	-- A	-- A
GROUND	1.5 A/ 0.1	60 A/ 0.1	1.5 A/ 0.1	O1 ADC	O1 ADC	O1 ADC	OFF A	OFF A	OFF A

PICKUP TESTS

PHASE	TIMING UNIT		SEAL - IN UNIT		INSTANTANEOUS UNIT	
	AS FOUND	AS LEFT	AS FOUND	AS LEFT	AS FOUND	AS LEFT
A	3.58 A	3.58 A	O1 ADC	O1 ADC	20.85 A	20.85 A
B	3.59 A	3.59 A	O1 ADC	O1 ADC	20.84 A	20.84 A
C	3.59 A	3.59 A	O1 ADC	O1 ADC	20.84 A	20.84 A
N	-- A	-- A	-- ADC	-- ADC	-- A	-- A
G	1.78 A	1.79 A	O1 ADC	O1 ADC	-- A	-- A

TIMING TESTS

PHASE	AS FOUND		SPECIFIED		AS LEFT		AS FOUND		SPECIFIED		AS LEFT		AS FOUND		SPECIFIED		AS LEFT	
	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.
A	9.0	27.63	9.0	27.60	9.0	27.63	12.0	14.73	12.0	14.72	12.0	14.73	15.0	9.221	15.0	9.200	15.0	9.221
B	9.0	27.69	9.0	27.60	9.0	27.69	12.0	14.75	12.0	14.72	12.0	14.75	15.0	9.230	15.0	9.200	15.0	9.230
C	9.0	27.64	9.0	27.60	9.0	27.64	12.0	14.74	12.0	14.72	16.35	14.74	15.0	9.216	15.0	9.200	15.0	9.216
N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
G	3.0	0.351	3.0	0.338	3.0	0.351	4.5	0.223	4.5	0.212	4.5	0.223	6.0	0.185	6.0	0.168	6.0	0.185

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER SMRT410 #1588, FLUKE #169574

Tested By: K. HAYSLIP Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LOADBREAK DISCONNECT TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 398
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 3/11/2020 | TEMPERATURE 70 °F | HUMIDITY 60 % | EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 | POSITION PAB-E3

FUSE DATA

MANUFACTURER SHAWMUT | TYPE CL | HOLDER --- | MAX. AMPS 9R
REFILL ELEMENT TYPE --- | SIZE 9R | CAT. NO. A055D1DSR0 | TCC NO. D239249 | VOLTAGE 5.5 kV

NAMEPLATE DATA

MANUFACTURER SQUARE D | SERIAL NO. 48-30951271-036
VOLTAGE 5.5KV | TYPE MAG HELD | AMPERES 200 | INTERRUPTING RATING 50 kA
TYPE OPERATING MECHANISM MECH/EL | AGE 2014 | B.I.L. RATING 60 kV
MOMENTARY FAULT CLOSING AMPS 50 kA | OTHER NAMEPLATE DATA ---

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTION	☑	Acceptable	C
STRUCTURAL MEMBERS	☑	Acceptable	C
CUBICLE	☑	Good	C
AUXILIARY DEVICES	☐	N/A	NA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
MAIN CONTACTS	☑	Acceptable	C
HEATERS	☐	N/A	NA
BEARINGS	☑	Acceptable	C
CONTACT SEQUENCE	☐	N/A	NA
GROUND CONNECTION	☑	Acceptable	C

INSULATION TEST VOLTAGE 5 kVdc | TEST VOLTAGE MULTIPLIER, K1 = 1 | K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

INSULATION TESTS

	RANGE MULTIPLIER	K2	POLE 1 (P1-P2) MΩ READING	POLE 1 (P1-P2) MΩ 20°C	POLE 2 (P2-P3) MΩ READING	POLE 2 (P2-P3) MΩ 20°C	POLE 3 (P1-P3) MΩ READING	POLE 3 (P1-P3) MΩ 20°C
POLE TO POLE	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
POLE TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LINE TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LOAD TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LINE TO LOAD	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0

Contacts		POLE 1	POLE 2	POLE 3
CONTACT RESISTANCE SWITCH & FUSE ☐ MICRO-OHMS ☑ MILLI-OHMS		2.239	2.201	2.329
SWITCH CONTACT		0.146	0.119	0.197
FUSE		2.045	2.052	2.096
HI POT (MICRO AMPS)	15KV DC	---	---	---

COMMENTS: UNABLE TO HIPOT DUE TO CABLES ON LINE SIDE AND SELF GROUNDING ON LOAD SIDE. HOURS = 122388.

DEFICIENCIES: INTERLOCK AUX CONTACT DOES NOT ALLOW CONTROL POWER TO PASS IF LOADBREAK IS OPENED AND RECLOSED.

☐ ACCEPTABLE ☑ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480, DLRO #1572

Tested By: T. DODGE Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
Dexter, Michigan
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(937) 439-9660

MEDIUM VOLTAGE VACUUM MOTOR STARTER TEST

NETA ACCREDITED COMPANY

CUSTOMER: Ann Arbor, City of | PAGE: 399
ADDRESS: 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB #: AACI207024-1
USER: Ann Arbor WWTP
OWNER REPRESENTATIVE: Jeremy Holbrook | TELEPHONE:
DATE: 3/11/2020 | TEMPERATURE: 70 °F | HUMIDITY: 60 % | EQPT. LOCATION: EAST BLOWER BUILDING
SUBSTATION: 8 | POSITION: PAB-E3

NAMEPLATE DATA

MANUFACTURER	SQUARE D	SERIAL NO.	48-30951271	TYPE	MAGNETIC
CATALOG NO.	CBD225NB0NM	STARTER SIZE	200A	FORM	---
SERIES	---	MAXIMUM VOLTAGE	7.2 KV	INT. RATING	60 kA @ 60 kV
OPERATING VOLTAGE	4160	CONTROL VOLTAGE	110	Other	---
MOTOR CONTROL CENTER SYSTEM VOLTAGE	---	STARTER IDENTIFICATION			PAB-E3

OVERCURRENT PROTECTION DEVICES

CONTROL POWER FUSE:	MFR.	BUSS	TYPE	BAF	SIZE	7
MAIN POWER FUSE:	MFR.	SHAWMUT	TYPE	AMP TRAP C.L.	SIZE	9R
OVERLOAD PROTECTION:	MFR.	---	TYPE	---	TESTED	○ YES ◉ NO

INSTRUMENT TRANSFORMER DATA

CONTROL POWER TRANSFORMER:	MFR.	---	VA RATING	---	TYPE	---	VOLTAGE ---
CURRENT TRANSFORMER:	MFR.	---	RATIO	--- :5	TYPE	---	CAT. NO. ---

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTIONS	☑	Acceptable	C/L
STRUCTURAL MEMBERS	☑	Acceptable	C
CUBICLE	☑	Acceptable	C
RACKING DEVICES	☑	Acceptable	C/L
SHUTTER	☑	Acceptable	C

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OPERATING MECHANISM	☑	Acceptable	C/L
CONTACT FINGERS	☑	Acceptable	C/L
VACUUM INTERRUPTER	☑	Acceptable	C
CONTACT EROSION INDICATOR	☑	Acceptable	C
CONTACT SEQUENCE	☐	N/A	NA
GROUND CONNECTIONS	☐	N/A	NA
AUXILIARY DEVICES	☐	N/A	NA

INSULATION TEST VOLTAGE: 5 kVdc | TEST VOLTAGE MULTIPLIER, K1 = 1 | K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE: 21 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF: 1.06
MILLIWATT LOSS TEST VOLTAGE: kVdc | HIGH POTENTIAL TEST VOLTAGE: 15.3 ☑ kVdc ☐ kVac

INSULATION TESTS	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1 - P2) READING	POLE 1 MEGOHMS (P1 - P2) 20°C	POLE 2 MEGOHMS (P2 - P3) READING	POLE 2 MEGOHMS (P2 - P3) 20°C	POLE 3 MEGOHMS (P1 - P3) READING	POLE 3 MEGOHMS (P1 - P3) 20°C
POLE TO POLE	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
POLE TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LINE TO FRAME	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0
LOAD TO FRAME	1.000	1.060						
LINE TO LOAD	1.000	1.060	100,000.0	106,000.0	100,000.0	106,000.0	100,000.0	106,000.0

CONTACT MEASUREMENTS

		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES		---	---	---
POLE RESISTANCE ☐ MICRO-OHMS ☐ MILLI-OHMS	RDG.			
	20°C			
INTERRUPTER RESISTANCE ☐ MICRO-OHMS ☑ MILLI-OHMS	RDG.	0.593	0.604	0.584
	20°C	0.590679	0.601636	0.581714

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1	POLE 2	POLE 3
HIGH POTENTIAL TEST	9.2	7.6	1.5
MILLIWATT LOSS TEST	---	---	---

COMMENTS: POLE TO POLE & POLE TO FRAME LINE SIDE ONLY. LOAD SIDE CONNECTED TO LOAD. DLRO # INCLUDE MANUFACTURERES WIRING FROM STARTER TRUCK TO LOAD TERMINATION POINT.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #191480, DLRO #1572, HIPOT #191469

Tested By: D. FLEMING Tested By: T. DODGE

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

OVERCURRENT RELAY

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 400
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 3/11/2020 | TEMPERATURE 70 °F | HUMIDITY 80 % | EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 | POSITION PAB-E3 BLOWER NO.3

NAMEPLATE DATA

MANUFACTURER SQUARE D SEPAM | TYPE S24 / | MODEL / STYLE NO SQ1S24A /
LONG TIME RANGE 1-6250A / 1-6250A | SEAL-IN RANGE O1 | INSTANTANEOUS RANGE 1-6250A / 1-6250A
INSTRUCTION BOOKLET SEPAM / SERIES 20 | TCC. NO. EIT / SIT (PHASE RELAYS / NEUTRAL RELAY)
DEVICES OPERATED 52 | CT RATIO 200 :5

VISUAL INSPECTION

	A	B	C	N	G
COVER GASKET OK	☐	☐	☐	☐	☐
GLASS CONDITION OK	☐	☐	☐	☐	☐
NO FOREIGN MATERIAL	☑	☐	☐	☐	☐
NO MOISTURE PRESENT	☑	☐	☐	☐	☐
SPIRAL SPRING OK	☐	☐	☐	☐	☐
BEARING ENDPLAY OK	☐	☐	☐	☐	☐
BEARING CONDITION OK	☐	☐	☐	☐	☐
DISC CLEARANCE OK	☐	☐	☐	☐	☐
NO RUST PRESENT	☑	☐	☐	☐	☐

ROUTINE MAINTENANCE

	A	B	C	N	G
GLASS CLEANED	☐	☐	☐	☐	☐
CASE CLEANED	☑	☐	☐	☐	☐
RELAY CLEANED	☑	☐	☐	☐	☐
CONNECTION TIGHTENED	☑	☐	☐	☐	☐
TAPS TIGHTENED	☐	☐	☐	☐	☐
CONTACTS CLEANED	☐	☐	☐	☐	☐
TRIP CIRCUIT TESTED	☐	☐	☐	☐	☐
INSULATION RESISTANCE	☐	☐	☐	☐	☐
CT SHORTING BAR REMOVED	☐	☐	☐	☐	☐

RELAY SETTINGS

	TAP / TIME DIAL			SEAL - IN			INSTANTANEOUS		
	AS FOUND	SPECIFIED	AS LEFT	AS FOUND	SPECIFIED	AS LEFT	AS FOUND	SPECIFIED	AS LEFT
PHASE RELAYS	3.0 A/ 2.23	120 A/ 2.23	3.0 A/ 2.23	O1 ADC	O1 ADC	O1 ADC	20.85 A	834 A	20.85 A
NEUTRAL RELAYS	-- A/ --	-- A/ --	-- A/ --	-- ADC	-- ADC	-- ADC	-- A	-- A	-- A
GROUND	1.5 A/ 0.1	60 A/ 0.1	1.5 A/ 0.1	O1 ADC	O1 ADC	O1 ADC	OFF A	OFF A	OFF A

PICKUP TESTS

PHASE	TIMING UNIT		SEAL - IN UNIT		INSTANTANEOUS UNIT	
	AS FOUND	AS LEFT	AS FOUND	AS LEFT	AS FOUND	AS LEFT
A	3.60 A	3.60 A	O1 ADC	O1 ADC	20.89 A	20.89 A
B	3.59 A	3.59 A	O1 ADC	O1 ADC	20.89 A	20.89 A
C	3.59 A	3.59 A	O1 ADC	O1 ADC	20.85 A	20.85 A
N	-- A	-- A	-- ADC	-- ADC	-- A	-- A
G	1.79 A	1.79 A	O1 ADC	O1 ADC	-- A	-- A

TIMING TESTS

PHASE	AS FOUND		SPECIFIED		AS LEFT		AS FOUND		SPECIFIED		AS LEFT		AS FOUND		SPECIFIED		AS LEFT	
	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.
A	9.0	28.04	9.0	27.60	9.0	28.04	12.0	14.86	12.0	14.72	12.0	14.86	15.0	9.314	15.0	9.200	15.0	9.314
B	9.0	27.79	9.0	27.60	9.0	27.79	12.0	14.81	12.0	14.72	12.0	14.81	15.0	9.297	15.0	9.200	15.0	9.297
C	9.0	27.67	9.0	27.60	9.0	27.67	12.0	14.74	12.0	14.72	12.0	14.74	15.0	9.221	15.0	9.200	15.0	9.221
N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
G	3.0	0.347	3.0	0.338	3.0	0.347	4.5	0.231	4.5	0.212	4.5	0.231	6.0	0.182	6.0	0.168	6.0	0.182

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: SMRT36 # 190134

Tested By: R. WALLS Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 401
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/9/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 — POSITION SPARE A

MANUFACTURER SQUARE D — SERIAL NUMBER 1780477
TYPE VR — MODEL NO. V5D3153Y000 — DATE MANUFACTURED 5/14
MAXIMUM VOLTAGE 4.76 kV — AMPACITY --- — OPERATING VOLTAGE 4160 kV
INTERRUPTING CAPACITY 40 kA @ 250MVA kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
MECHANICAL CONNECTIONS	☑	Dirty	C
STRUCTURAL MEMBERS	☑	Dirty	C
CUBICLE	☑	Dirty	C
RACKING DEVICES	☑	Dirty	C
SHUTTER	☑	Dirty	C

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Dirty	C/L
VACUUM BOTTLE	☑	Dirty	C
CONTACT EROSION INDICATOR	☑	Dirty	C
OPERATING MECHANISM	☑	Dirty	C
CONTACT SEQUENCE	☐	N/A	NA
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☐	N/A	NA

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
MILLIWATT LOSS TEST VOLTAGE 1 kVac — HIGH POTENTIAL TEST VOLTAGE 20 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
POLE TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LINE TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LOAD TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LINE TO LOAD	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.06	0.06	0.06
HIGH POTENTIAL OPEN TEST	0.08	0.06	0.06

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE ☐ MICRO-OHMS ☐ MILLI-OHMS	RDG.			
	20°C			
CONTACT RESISTANCE ☐ MICRO-OHMS ☑ MILLI-OHMS	RDG.	0.024	0.024	0.023
	20°C	0.0239	0.0239	0.0229

	POLE 1	POLE 2	POLE 3
OPENING SPEED	---	---	---
CLOSING SPEED	---	---	---

COUNTER READING: BEG. 00050
END 00055

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761, HIPOT #156393

Tested By: A. SHERWOOD Tested By: S. LADD

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

OVERCURRENT RELAY

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 402
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 3/10/2020 | TEMPERATURE 70 °F | HUMIDITY 80 % | EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 | POSITION SPARE A

NAMEPLATE DATA

MANUFACTURER SQUARE D SEPAM | TYPE S24 / | MODEL / STYLE NO SQ1S24A /
LONG TIME RANGE 1-6250A / 1-6250A | SEAL-IN RANGE O1 | INSTANTANEOUS RANGE 1-6250A / 1-6250A
INSTRUCTION BOOKLET SEPAM / SERIES 20 | TCC. NO. EIT / SIT (PHASE RELAYS / NEUTRAL RELAY)
DEVICES OPERATED 52 | CT RATIO 200 :5

VISUAL INSPECTION

	A	B	C	N	G
COVER GASKET OK	☐	☐	☐	☐	☐
GLASS CONDITION OK	☐	☐	☐	☐	☐
NO FOREIGN MATERIAL	☑	☐	☐	☐	☐
NO MOISTURE PRESENT	☑	☐	☐	☐	☐
SPIRAL SPRING OK	☐	☐	☐	☐	☐
BEARING ENDPLAY OK	☐	☐	☐	☐	☐
BEARING CONDITION OK	☐	☐	☐	☐	☐
DISC CLEARANCE OK	☐	☐	☐	☐	☐
NO RUST PRESENT	☑	☐	☐	☐	☐

ROUTINE MAINTENANCE

	A	B	C	N	G
GLASS CLEANED	☐	☐	☐	☐	☐
CASE CLEANED	☑	☐	☐	☐	☐
RELAY CLEANED	☑	☐	☐	☐	☐
CONNECTION TIGHTENED	☑	☐	☐	☐	☐
TAPS TIGHTENED	☐	☐	☐	☐	☐
CONTACTS CLEANED	☐	☐	☐	☐	☐
TRIP CIRCUIT TESTED	☐	☐	☐	☐	☐
INSULATION RESISTANCE	☐	☐	☐	☐	☐
CT SHORTING BAR REMOVED	☐	☐	☐	☐	☐

RELAY SETTINGS

	TAP / TIME DIAL			SEAL - IN			INSTANTANEOUS		
	AS FOUND	SPECIFIED	AS LEFT	AS FOUND	SPECIFIED	AS LEFT	AS FOUND	SPECIFIED	AS LEFT
PHASE RELAYS	5.45 A/ 0.63	218 A/ 0.63	5.45 A/ 0.63	O1 ADC	O1 ADC	O1 ADC	55.8 A	2232 A	55.8 A
NEUTRAL RELAYS	-- A/ --	-- A/ --	-- A/ --	-- ADC	-- ADC	-- ADC	-- A	-- A	-- A
GROUND	1.5 A/ 0.1	60 A/ 0.1	1.5 A/ 0.1	O1 ADC	O1 ADC	O1 ADC	OFF A	OFF A	OFF A

PICKUP TESTS

PHASE	TIMING UNIT		SEAL - IN UNIT		INSTANTANEOUS UNIT	
	AS FOUND	AS LEFT	AS FOUND	AS LEFT	AS FOUND	AS LEFT
A	6.52 A	6.52 A	O1 ADC	O1 ADC	55.8 A	55.8 A
B	6.52 A	6.52 A	O1 ADC	O1 ADC	55.8 A	55.8 A
C	6.53 A	6.53 A	O1 ADC	O1 ADC	55.9 A	55.9 A
N	-- A	-- A	-- ADC	-- ADC	-- A	-- A
G	1.77 A	1.77 A	O1 ADC	O1 ADC	-- A	-- A

TIMING TESTS

PHASE	AS FOUND		SPECIFIED		AS LEFT		AS FOUND		SPECIFIED		AS LEFT		AS FOUND		SPECIFIED		AS LEFT	
	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.
A	10.90	20.86	10.90	20.79	10.90	20.86	16.35	7.816	16.35	7.797	16.35	7.816	21.80	4.178	21.80	4.158	21.80	4.178
B	10.90	20.84	10.90	20.79	10.90	20.84	16.35	7.820	16.35	7.797	16.35	7.820	21.80	4.178	21.80	4.158	21.80	4.178
C	10.90	20.89	10.90	20.79	10.90	20.89	16.35	7.892	16.35	7.797	16.35	7.892	21.80	4.204	21.80	4.158	21.80	4.204
N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
G	3.0	0.355	3.0	0.338	3.0	0.355	4.5	0.226	4.5	0.212	4.5	0.226	6.0	0.177	6.0	0.168	6.0	0.177

COMMENTS: RELAY PROGRAMMED AND TESTED AT SAME PARAMATERS AS SUB 6 FEEDER POSITIONS.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: SMRT410 # UIS1589

Tested By: D. FLEMING Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 403
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/9/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 — POSITION SPARE B

MANUFACTURER SQUARE D — SERIAL NUMBER 1780484
TYPE VR — MODEL NO. V5D3153Y000 — DATE MANUFACTURED 5/14
MAXIMUM VOLTAGE 4.76 kV — AMPACITY 1200 — OPERATING VOLTAGE 4160 kV
INTERRUPTING CAPACITY 40 kA @ 250MVA kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
MECHANICAL CONNECTIONS	☑	Dirty	C
STRUCTURAL MEMBERS	☑	Dirty	C
CUBICLE	☑	Dirty	C
RACKING DEVICES	☑	Dirty	C
SHUTTER	☑	Dirty	C

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Dirty	C/L
VACUUM BOTTLE	☑	Dirty	C
CONTACT EROSION INDICATOR	☑	Dirty	C
OPERATING MECHANISM	☑	Dirty	C
CONTACT SEQUENCE	☐	N/A	NA
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☐	N/A	NA

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
MILLIWATT LOSS TEST VOLTAGE 1 kVac — HIGH POTENTIAL TEST VOLTAGE 20 ☐ kVAC ☐ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
POLE TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LINE TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LOAD TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LINE TO LOAD	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.06	0.08	0.07
HIGH POTENTIAL OPEN TEST	0.08	0.08	0.07

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE ☐ MICRO-OHMS ☐ MILLI-OHMS	RDG.			
	20°C			
CONTACT RESISTANCE ☐ MICRO-OHMS ☑ MILLI-OHMS	RDG.	0.025	0.023	0.024
	20°C	0.0249	0.0229	0.0239

	POLE 1	POLE 2	POLE 3
OPENING SPEED	---	---	---
CLOSING SPEED	---	---	---

COUNTER READING: BEG. 00057
END 00062

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761, HIPOT #156393

Tested By: A. SHERWOOD Tested By: S. LADD

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

OVERCURRENT RELAY

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 404
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 3/9/2020 | TEMPERATURE 70 °F | HUMIDITY 60 % | EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 | POSITION SPARE B

NAMEPLATE DATA

MANUFACTURER SQUARE D SEPAM | TYPE S24 / | MODEL / STYLE NO SQ1S24A /
LONG TIME RANGE 1-6250A / 1-6250A | SEAL-IN RANGE O1 | INSTANTANEOUS RANGE 1-6250A / 1-6250A
INSTRUCTION BOOKLET SEPAM / SERIES 20 | TCC. NO. EIT / SIT (PHASE RELAYS / NEUTRAL RELAY)
DEVICES OPERATED 52 | CT RATIO 200 :5

VISUAL INSPECTION

	A	B	C	N	G
COVER GASKET OK	☐	☐	☐	☐	☐
GLASS CONDITION OK	☐	☐	☐	☐	☐
NO FOREIGN MATERIAL	☑	☐	☐	☐	☐
NO MOISTURE PRESENT	☑	☐	☐	☐	☐
SPIRAL SPRING OK	☐	☐	☐	☐	☐
BEARING ENDPLAY OK	☐	☐	☐	☐	☐
BEARING CONDITION OK	☐	☐	☐	☐	☐
DISC CLEARANCE OK	☐	☐	☐	☐	☐
NO RUST PRESENT	☑	☐	☐	☐	☐

ROUTINE MAINTENANCE

	A	B	C	N	G
GLASS CLEANED	☐	☐	☐	☐	☐
CASE CLEANED	☑	☐	☐	☐	☐
RELAY CLEANED	☑	☐	☐	☐	☐
CONNECTION TIGHTENED	☑	☐	☐	☐	☐
TAPS TIGHTENED	☐	☐	☐	☐	☐
CONTACTS CLEANED	☐	☐	☐	☐	☐
TRIP CIRCUIT TESTED	☐	☐	☐	☐	☐
INSULATION RESISTANCE	☐	☐	☐	☐	☐
CT SHORTING BAR REMOVED	☐	☐	☐	☐	☐

RELAY SETTINGS

	TAP / TIME DIAL			SEAL - IN			INSTANTANEOUS		
	AS FOUND	SPECIFIED	AS LEFT	AS FOUND	SPECIFIED	AS LEFT	AS FOUND	SPECIFIED	AS LEFT
PHASE RELAYS	5.45 A/ 0.63	218 A/ 0.63	5.45 A/ 0.63	O1 ADC	O1 ADC	O1 ADC	55.8 A	2232 A	55.8 A
NEUTRAL RELAYS	-- A/ --	-- A/ --	-- A/ --	-- ADC	-- ADC	-- ADC	-- A	-- A	-- A
GROUND	1.5 A/ 0.1	60 A/ 0.1	1.5 A/ 0.1	O1 ADC	O1 ADC	O1 ADC	OFF A	OFF A	OFF A

PICKUP TESTS

PHASE	TIMING UNIT		SEAL - IN UNIT		INSTANTANEOUS UNIT	
	AS FOUND	AS LEFT	AS FOUND	AS LEFT	AS FOUND	AS LEFT
A	6.53 A	6.53 A	O1 ADC	O1 ADC	55.8 A	55.8 A
B	6.52 A	6.52 A	O1 ADC	O1 ADC	55.7 A	55.7 A
C	6.53 A	6.53 A	O1 ADC	O1 ADC	55.7 A	55.8 A
N	-- A	-- A	-- ADC	-- ADC	-- A	-- A
G	1.76 A	1.76 A	O1 ADC	O1 ADC	-- A	-- A

TIMING TESTS

PHASE	AS FOUND		SPECIFIED		AS LEFT		AS FOUND		SPECIFIED		AS LEFT		AS FOUND		SPECIFIED		AS LEFT	
	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.
A	10.90	20.91	10.90	20.79	10.90	20.91	16.35	7.849	16.35	7.797	16.35	7.849	21.80	4.176	21.80	4.158	21.80	4.176
B	10.90	20.90	10.90	20.79	10.90	20.90	16.35	7.833	16.35	7.797	16.35	7.833	21.80	4.174	21.80	4.158	21.80	4.174
C	10.90	20.91	10.90	20.79	10.90	20.91	16.35	7.820	16.35	7.797	16.35	7.820	21.80	4.172	21.80	4.158	21.80	4.172
N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
G	3.0	0.350	3.0	0.338	3.0	0.350	4.5	0.228	4.5	0.212	4.5	0.228	6.0	0.182	6.0	0.168	6.0	0.182

COMMENTS: RELAY PROGRAMMED AND TESTED AT SAME PARAMATERS AS SUB 6 FEEDER POSITIONS.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: SMRT410 # UIS1589

Tested By: D. FLEMING Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 405
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/9/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 — POSITION SUB 6A

MANUFACTURER SQUARE D — SERIAL NUMBER 1780476
TYPE VR — MODEL NO. V5D3153Y000 — DATE MANUFACTURED 5/14
MAXIMUM VOLTAGE 4.76 kV — AMPACITY --- — OPERATING VOLTAGE 4160 kV
INTERRUPTING CAPACITY 40 kA @ 250MVA kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
MECHANICAL CONNECTIONS	☑	Dirty	C
STRUCTURAL MEMBERS	☑	Dirty	C
CUBICLE	☑	Dirty	C
RACKING DEVICES	☑	Dirty	C/L
SHUTTER	☑	Dirty	C

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Dirty	C/L
VACUUM BOTTLE	☑	Dirty	C
CONTACT EROSION INDICATOR	☑	Dirty	C
OPERATING MECHANISM	☑	Dirty	C
CONTACT SEQUENCE	☐	N/A	NA
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☐	N/A	NA

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
MILLIWATT LOSS TEST VOLTAGE 1 kVac — HIGH POTENTIAL TEST VOLTAGE 20 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
POLE TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LINE TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LOAD TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LINE TO LOAD	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.06	0.06	0.06
HIGH POTENTIAL OPEN TEST	0.06	0.06	0.06

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE ☐ MICRO-OHMS ☐ MILLI-OHMS	RDG.			
	20°C			
CONTACT RESISTANCE ☐ MICRO-OHMS ☑ MILLI-OHMS	RDG.	0.022	0.023	0.023
	20°C	0.0219	0.0229	0.0229

	POLE 1	POLE 2	POLE 3
OPENING SPEED	---	---	---
CLOSING SPEED	---	---	---

COUNTER READING: BEG. 00063
END 00068

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761, HIPOT #156393

Tested By: A. SHERWOOD Tested By: S. LADD

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

OVERCURRENT RELAY

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 406
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 3/9/2020 | TEMPERATURE 70 °F | HUMIDITY 60 % | EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 | POSITION SUB 6A

NAMEPLATE DATA

MANUFACTURER SQUARE D SEPAM | TYPE S24 / | MODEL / STYLE NO SQ1S24A /
LONG TIME RANGE 1-6250A / 1-6250A | SEAL-IN RANGE O1 | INSTANTANEOUS RANGE 1-6250A / 1-6250A
INSTRUCTION BOOKLET SEPAM / SERIES 20 | TCC. NO. EIT / SIT (PHASE RELAYS / NEUTRAL RELAY)
DEVICES OPERATED 52 | CT RATIO 200 :5

VISUAL INSPECTION

	A	B	C	N	G
COVER GASKET OK	☐	☐	☐	☐	☐
GLASS CONDITION OK	☐	☐	☐	☐	☐
NO FOREIGN MATERIAL	☑	☐	☐	☐	☐
NO MOISTURE PRESENT	☑	☐	☐	☐	☐
SPIRAL SPRING OK	☐	☐	☐	☐	☐
BEARING ENDPLAY OK	☐	☐	☐	☐	☐
BEARING CONDITION OK	☐	☐	☐	☐	☐
DISC CLEARANCE OK	☐	☐	☐	☐	☐
NO RUST PRESENT	☑	☐	☐	☐	☐

ROUTINE MAINTENANCE

	A	B	C	N	G
GLASS CLEANED	☐	☐	☐	☐	☐
CASE CLEANED	☑	☐	☐	☐	☐
RELAY CLEANED	☑	☐	☐	☐	☐
CONNECTION TIGHTENED	☑	☐	☐	☐	☐
TAPS TIGHTENED	☐	☐	☐	☐	☐
CONTACTS CLEANED	☐	☐	☐	☐	☐
TRIP CIRCUIT TESTED	☐	☐	☐	☐	☐
INSULATION RESISTANCE	☐	☐	☐	☐	☐
CT SHORTING BAR REMOVED	☐	☐	☐	☐	☐

RELAY SETTINGS

	TAP / TIME DIAL			SEAL - IN			INSTANTANEOUS		
	AS FOUND	SPECIFIED	AS LEFT	AS FOUND	SPECIFIED	AS LEFT	AS FOUND	SPECIFIED	AS LEFT
PHASE RELAYS	5.45 A/ 0.63	218 A/ 0.63	5.45 A/ 0.63	O1 ADC	O1 ADC	O1 ADC	55.8 A	2232 A	55.8 A
NEUTRAL RELAYS	-- A/ --	-- A/ --	-- A/ --	-- ADC	-- ADC	-- ADC	-- A	-- A	-- A
GROUND	1.5 A/ 0.1	60 A/ 0.1	1.5 A/ 0.1	O1 ADC	O1 ADC	O1 ADC	OFF A	OFF A	OFF A

PICKUP TESTS

PHASE	TIMING UNIT		SEAL - IN UNIT		INSTANTANEOUS UNIT	
	AS FOUND	AS LEFT	AS FOUND	AS LEFT	AS FOUND	AS LEFT
A	6.52 A	6.52 A	O1 ADC	O1 ADC	55.8 A	55.8 A
B	6.51 A	6.51 A	O1 ADC	O1 ADC	55.7 A	55.7 A
C	6.52 A	6.52 A	O1 ADC	O1 ADC	55.8 A	55.8 A
N	-- A	-- A	-- ADC	-- ADC	-- A	-- A
G	1.76 A	1.76 A	O1 ADC	O1 ADC	-- A	-- A

TIMING TESTS

PHASE	AS FOUND		SPECIFIED		AS LEFT		AS FOUND		SPECIFIED		AS LEFT		AS FOUND		SPECIFIED		AS LEFT	
	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.
A	10.90	20.82	10.90	20.79	10.90	20.82	16.35	7.812	16.35	7.797	16.35	7.812	21.80	4.181	21.80	4.158	21.80	4.181
B	10.90	20.82	10.90	20.79	10.90	20.82	16.35	7.817	16.35	7.797	16.35	7.817	21.80	4.165	21.80	4.158	21.80	4.165
C	10.90	20.85	10.90	20.79	10.90	20.85	16.35	7.808	16.35	7.797	16.35	7.808	21.80	4.166	21.80	4.158	21.80	4.166
N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
G	3.0	0.351	3.0	0.338	3.0	0.351	4.5	0.231	4.5	0.212	4.5	0.231	6.0	0.182	6.0	0.168	6.0	0.182

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: SMRT410 # UIS1589

Tested By: D. FLEMING Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 407
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/10/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER HOUSE
SUBSTATION 8 — POSITION SUB 6B

MANUFACTURER SQUARE D — SERIAL NUMBER 1780483
TYPE VR — MODEL NO. V5D3153Y000 — DATE MANUFACTURED 5/14
MAXIMUM VOLTAGE 4.76 kV — AMPACITY 1200 — OPERATING VOLTAGE 4160 kV
INTERRUPTING CAPACITY 40 kA @ 250MVA kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
MECHANICAL CONNECTIONS	☑	Dirty	C
STRUCTURAL MEMBERS	☑	Dirty	C
CUBICLE	☑	Dirty	C
RACKING DEVICES	☑	Dirty	C
SHUTTER	☑	Dirty	C

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Dirty	C/L
VACUUM BOTTLE	☑	Dirty	C
CONTACT EROSION INDICATOR	☑	Dirty	C
OPERATING MECHANISM	☑	Dirty	C/L
CONTACT SEQUENCE	☐	N/A	NA
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☐	N/A	NA

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
MILLIWATT LOSS TEST VOLTAGE 1 kVac — HIGH POTENTIAL TEST VOLTAGE 20 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
POLE TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LINE TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LOAD TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LINE TO LOAD	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.14	0.14	0.12
HIGH POTENTIAL OPEN TEST	0.10	0.12	0.12

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES		---	---	---
POLE RESISTANCE ☐ MICRO-OHMS ☐ MILLI-OHMS	RDG.			
	20°C			
CONTACT RESISTANCE ☐ MICRO-OHMS ☑ MILLI-OHMS	RDG.	0.021	0.022	0.021
	20°C	0.0209	0.0219	0.0209

	POLE 1	POLE 2	POLE 3
OPENING SPEED	---	---	---
CLOSING SPEED	---	---	---

COUNTER READING: BEG. 00053
END 00058

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761, HIPOT #156393

Tested By: S. LADD Tested By: A. SHERWOOD 16100, REVISED 5/20/2016

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Centerville, Ohio
(937) 439-9660

OVERCURRENT RELAY

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 408
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 3/10/2020 | TEMPERATURE 70 °F | HUMIDITY 80 % | EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 | POSITION SUB 6B

NAMEPLATE DATA

MANUFACTURER SQUARE D SEPAM | TYPE S24 / | MODEL / STYLE NO SQ1S24A /
LONG TIME RANGE 1-6250A / 1-6250A | SEAL-IN RANGE O1 | INSTANTANEOUS RANGE 1-6250A / 1-6250A
INSTRUCTION BOOKLET SEPAM / SERIES 20 | TCC. NO. EIT / SIT (PHASE RELAYS / NEUTRAL RELAY)
DEVICES OPERATED 52 | CT RATIO 200 :5

VISUAL INSPECTION

	A	B	C	N	G
COVER GASKET OK	☐	☐	☐	☐	☐
GLASS CONDITION OK	☐	☐	☐	☐	☐
NO FOREIGN MATERIAL	☑	☐	☐	☐	☐
NO MOISTURE PRESENT	☑	☐	☐	☐	☐
SPIRAL SPRING OK	☐	☐	☐	☐	☐
BEARING ENDPLAY OK	☐	☐	☐	☐	☐
BEARING CONDITION OK	☐	☐	☐	☐	☐
DISC CLEARANCE OK	☐	☐	☐	☐	☐
NO RUST PRESENT	☑	☐	☐	☐	☐

ROUTINE MAINTENANCE

	A	B	C	N	G
GLASS CLEANED	☐	☐	☐	☐	☐
CASE CLEANED	☑	☐	☐	☐	☐
RELAY CLEANED	☑	☐	☐	☐	☐
CONNECTION TIGHTENED	☑	☐	☐	☐	☐
TAPS TIGHTENED	☐	☐	☐	☐	☐
CONTACTS CLEANED	☐	☐	☐	☐	☐
TRIP CIRCUIT TESTED	☐	☐	☐	☐	☐
INSULATION RESISTANCE	☐	☐	☐	☐	☐
CT SHORTING BAR REMOVED	☐	☐	☐	☐	☐

RELAY SETTINGS

	TAP / TIME DIAL			SEAL - IN			INSTANTANEOUS		
	AS FOUND	SPECIFIED	AS LEFT	AS FOUND	SPECIFIED	AS LEFT	AS FOUND	SPECIFIED	AS LEFT
PHASE RELAYS	5.45 A/ 0.63	218 A/ 0.63	5.45 A/ 0.63	O1 ADC	O1 ADC	O1 ADC	55.8 A	2232 A	55.8 A
NEUTRAL RELAYS	-- A/ --	-- A/ --	-- A/ --	-- ADC	-- ADC	-- ADC	-- A	-- A	-- A
GROUND	1.5 A/ 0.1	60 A/ 0.1	1.5 A/ 0.1	O1 ADC	O1 ADC	O1 ADC	OFF A	OFF A	OFF A

PICKUP TESTS

PHASE	TIMING UNIT		SEAL - IN UNIT		INSTANTANEOUS UNIT	
	AS FOUND	AS LEFT	AS FOUND	AS LEFT	AS FOUND	AS LEFT
A	6.53 A	6.53 A	O1 ADC	O1 ADC	55.8 A	55.8 A
B	6.53 A	6.53 A	O1 ADC	O1 ADC	55.7 A	55.7 A
C	6.53 A	6.53 A	O1 ADC	O1 ADC	55.7 A	55.7 A
N	-- A	-- A	-- ADC	-- ADC	-- A	-- A
G	1.77 A	1.77 A	O1 ADC	O1 ADC	-- A	-- A

TIMING TESTS

PHASE	AS FOUND		SPECIFIED		AS LEFT		AS FOUND		SPECIFIED		AS LEFT		AS FOUND		SPECIFIED		AS LEFT	
	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.	AMPS	SEC.
A	10.90	20.94	10.90	20.79	10.90	20.94	16.35	7.826	16.35	7.797	16.35	7.826	21.80	4.176	21.80	4.158	21.80	4.176
B	10.90	20.84	10.90	20.79	10.90	20.84	16.35	7.809	16.35	7.797	16.35	7.809	21.80	4.176	21.80	4.158	21.80	4.176
C	10.90	20.91	10.90	20.79	10.90	20.91	16.35	7.815	16.35	7.797	16.35	7.815	21.80	4.172	21.80	4.158	21.80	4.172
N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
G	3.0	0.356	3.0	0.338	3.0	0.356	4.5	0.229	4.5	0.212	4.5	0.229	6.0	0.185	6.0	0.168	6.0	0.185

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: SMRT410 # UIS1589

Tested By: D. FLEMING Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MEDIUM VOLTAGE SWITCHBOARD INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 409
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/11/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BLDG
SUBSTATION 8 — POSITION SUB 8

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. FO#17-30951271-033 — TYPE MASTER CLAD
CATALOG NO. --- — DRAWING NO. --- — VOLTAGE CLASS 4.76KV
PHASE AMPACITY 1200 A — WITHSTAND RATING 40 kA — CONDUCTOR ☑ Cu ☐ Al

INSTALLED DEVICES

VACUUM BREAKERS 11 — AIR BREAKERS --- — LOADBREAK DISCONNECTS --- — NUMBER OF BAYS 7
VOLTAGE RELAYS --- — OVERCURRENT RELAYS --- — OTHER PROTECTIVE RELAYS 11 — AUXILIARY RELAY ---
PANEL METERS 6 — kWh METERS --- — VT's 2 — CT's --- — CPT's 3
Other ---

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTIONS	☑	Acceptable	NA
AUXILIARY DEVICES	☑	Acceptable	NA

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF = 1.06

INSULATION RESISTANCE TEST RESULTS - MEGOHMS

BUS SECTION TESTED	RANGE MULT.	K2		PHASE A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C
MAIN A LINE	1	1.06	RDG.	100,000	100,000	100,000				
			20°C	106,000	106,000	106,000				
MAIN B LINE	1	1.06	RDG.	100,000	100,000	100,000				
			20°C	106,000	106,000	106,000				
TIE/ISOLATION	1	1.06	RDG.	100,000	100,000	100,000		100,000	100,000	100,000
			20°C	106,000	106,000	106,000		106,000	106,000	106,000
A BUS	1	1.06	RDG.	100,000	100,000	100,000		100,000	100,000	100,000
			20°C	106,000	106,000	106,000		106,000	106,000	106,000
B BUS	1	1.06	RDG.	100,000	100,000	100,000		100,000	100,000	100,000
			20°C	106,000	106,000	106,000		106,000	106,000	106,000

ACTUAL READING — SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563

Tested By: D. FLEMING Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
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(937) 439-9660

MEDIUM VOLTAGE SWITCHBOARD
HIGH POTENTIAL TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 410
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/11/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 — POSITION SUB 8

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. FO#17-30951271-033 — TYPE MASTER CLAD
CATALOG NO. --- — DRAWING NO. --- — VOLTAGE CLASS 4.76KV
PHASE AMPACITY 1200 A — WITHSTAND RATING 40 kA — CONDUCTOR (●) Cu ( ) Al

INSTALLED DEVICES

VACUUM BREAKERS 11 — AIR BREAKERS --- — LOADBREAK DISCONNECTS --- — NUMBER OF BAYS 7
VOLTAGE RELAYS --- — OVERCURRENT RELAYS 11 — OTHER PROTECTIVE RELAYS --- — AUXILIARY RELAYS ---
PANEL METERS 6 — kWh METERS --- — VT's 2 — CT's --- — CPT's 2
Other ---

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
CUBICLES	☑	Dirty	C
GROUND CONNECTIONS	☑	Acceptable	NA
AUXILIARY DEVICES	☑	Acceptable	C

INSULATION TEST VOLTAGE 20 ☐ kVac ☑ kVdc — TEST VOLTAGE MULTIPLIER 1
EQUIPMENT TEMPERATURE 21 °C

K1 = RANGE MULTIPLIER

HIGHPOTENTIAL TESTS

BUS SECTION TESTED	K1		LEAKAGE - MICROAMPS A-GND	B-GND	C-GND	N-GND
MAIN A BUS	1	RDG.	0.12	0.12	0.2	
		TOTAL LEAKAGE	0.12	0.12	0.2	
MAIN B BUS	1	RDG.	0.16	0.16	0.16	
		TOTAL LEAKAGE	0.16	0.16	0.16	
		RDG.				
		TOTAL LEAKAGE				
		RDG.				
		TOTAL LEAKAGE				
		RDG.				
		TOTAL LEAKAGE				

BUS HIGH POTENTIAL TESTS CONDUCTED PHASE TO GROUND, WITH OTHER CONDUCTORS GROUNDED. LEAKAGE RECORDED AFTER TEST VOLTAGE APPLIED FOR ONE MINUTE.

TOTAL LEAKAGE = (K1) (ACTUAL READING)

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: HIPOT #191469

Tested By: D. FLEMING Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
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Centerville, Ohio
(937) 439-9660

LIGHTNING ARRESTER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 411
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/11/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 — POSITION SUB 8-4160 MAIN

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — TYPE STATION — MODEL ---
CATALOG NO. 9L11XPM006S — SERIAL NO. --- — RELIEF ---
RATED RMS VOLTAGE 6 kV — RATED MCOV 5.1 kV — RMS CURRENT RATING 40 kA — RATED CREST kA
SYSTEM VOLTAGE 4,160 kV — ARRESTER TYPE STATION (●) INTERMEDIATE ( ) DISTRIBUTION ( ) — MATERIAL TYPE PORCELAIN ( ) POLYMER (●)

INSULATION TEST VOLTAGE 2.50 kV DC — TEST VOLTAGE MULTIPLIER 1
RANGE MULTIPLIER 1.0 — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION TEST

POSITION	TOTAL CORRECTION MULTIPLIER	A PHASE TO GROUND		B PHASE TO GROUND		C PHASE TO GROUND	
		ACTUAL MEGOHMS	CORRECTED MEGOHMS	ACTUAL MEGOHMS	CORRECTED MEGOHMS	ACTUAL MEGOHMS	CORRECTED MEGOHMS
MAIN BRKR A	1.05	67,300	70,665.00	89,200	93,660.00	42,600	44,730.00
MAIN BRKR B	1.05	66,000	69,300.00	63,600	66,780.00	53,300	55,965.00

WATT LOSS TEST

TEST kV SWITCH SETTING
OUTPUT TEST VOLTAGE
READING CORRECTION FACTOR

( ) GROUNDED SPECIMEN TEST
( ) UNGROUNDED SPECIMEN TEST

MILLI-WATT LOSS

POSITION	A PHASE	B PHASE	C PHASE

COMMENTS: GROUND CONNECTION RESISTANCE : A X=0.1 OHMS Y=0.1 OHMS Z=0.1 OHMS
B X=0.2 OHMS Y=0.2 OHMS Z=0.2 OHMS

DEFICIENCIES:

(☑) ACCEPTABLE ( ) NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563, FLUKE #156390

Tested By: D. FLEMING Tested By: N. HERRST

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 412
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/10/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 — POSITION TIE

MANUFACTURER SQUARE D — SERIAL NUMBER 1780481
TYPE VR — MODEL NO. V5D3153Y000 — DATE MANUFACTURED 5/14
MAXIMUM VOLTAGE 4.76 kV — AMPACITY 1200 — OPERATING VOLTAGE 4160 kV
INTERRUPTING CAPACITY 40 kA @ 250MVA kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Dirty	C
INSULATING MEMBERS	☑	Dirty	C
MECHANICAL CONNECTIONS	☑	Dirty	C
STRUCTURAL MEMBERS	☑	Dirty	C
CUBICLE	☑	Dirty	C
RACKING DEVICES	☑	Dirty	C
SHUTTER	☑	Dirty	C

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Dirty	C/L
VACUUM BOTTLE	☑	Dirty	C
CONTACT EROSION INDICATOR	☑	Dirty	C
OPERATING MECHANISM	☑	Dirty	C
CONTACT SEQUENCE	☐	N/A	NA
GROUND CONNECTION	☑	Dirty	C
AUXILIARY DEVICES	☐	N/A	NA

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
MILLIWATT LOSS TEST VOLTAGE 1 kVac — HIGH POTENTIAL TEST VOLTAGE 20 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
POLE TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LINE TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LOAD TO FRAME	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0
LINE TO LOAD	1.000	1.060	100000+	106,000.0	100000+	106,000.0	100000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.38	0.16	0.18
HIGH POTENTIAL OPEN TEST	0.20	0.18	0.18

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE ☐ MICRO-OHMS ☐ MILLI-OHMS	RDG.			
	20°C			
CONTACT RESISTANCE ☐ MICRO-OHMS ☑ MILLI-OHMS	RDG.	0.023	0.025	0.023
	20°C	0.0229	0.0249	0.0229

	POLE 1	POLE 2	POLE 3
OPENING SPEED	---	---	---
CLOSING SPEED	---	---	---

COUNTER READING: BEG. 00065
END 00070

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #184539, DLRO #193761, HIPOT #156393

Tested By: S. LADD Tested By: A. SHERWOOD 16100, REVISED 5/20/2016

Utilities Instrumentation Service, Inc.

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Centerville, Ohio
(937) 439-9660

VOLTAGE TRANSFORMER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 413

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 03/12/2020 — TEMPERATURE 70 °F — HUMIDITY 59 % — EQPT. LOCATION EAST BLOWER BLDG

SUBSTATION 8 — POSITION VT B-2

NAMEPLATE DATA

MANUFACTURER INST TRANS INC — CATALOG NO. * — TYPE --- — NAMEPLATE RATIO 35 : 1

PRIMARY VOLTAGE 4,160 — SECONDARY VOLTAGE — kVA 750 — CLASS ---

Other ---

PRIMARY FUSE: MANUFACTURER BUSSMANN — TYPE 5.5KV — SIZE 1E — NO. ABWNA

SECONDARY FUSE: MANUFACTURER BUSSMANN — TYPE 250V — SIZE 5A — NO. BAF-5

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

VT IDENTIFICATION: VT B-1 — **SERIAL NUMBER:** 53897236

TURNS RATIO TEST

CALCULATED TURNS RATIO 35.0

MEASURED TURNS RATIO 34.94

CONNECTIONS H_1 H_2 X_1 X_0

POLARITY SUB — ERROR 0.171429 %

INSULATION TEST

			RDG.	20°C	
PRI - SEC	@	5.0 kVdc	100,000.0	106,000.0	MEGOHMS
PRI - GRD	@	5.0 kVdc	100,000.0	106,000.0	MEGOHMS
SEC - GRD	@	1.0 kVdc	100,000.0	106,000.0	MEGOHMS

VT IDENTIFICATION: VT B-2 — **SERIAL NUMBER:** 53897243

TURNS RATIO TEST

CALCULATED TURNS RATIO 35.0

MEASURED TURNS RATIO 34.935

CONNECTIONS H_1 H_2 X_2 X_0

POLARITY SUB — ERROR 0.185714 %

INSULATION TEST

			RDG.	20°C	
PRI - SEC	@	5.0 kVdc	100,000.0	106,000.0	MEGOHMS
PRI - GRD	@	5.0 kVdc	100,000.0	106,000.0	MEGOHMS
SEC - GRD	@	1.0 kVdc	100,000.0	106,000.0	MEGOHMS

VT IDENTIFICATION: — **SERIAL NUMBER:**

TURNS RATIO TEST

CALCULATED TURNS RATIO

MEASURED TURNS RATIO

CONNECTIONS H_1 H_2 X X

POLARITY — ERROR %

INSULATION TEST

			RDG.	20°C	
PRI - SEC	@	kVdc			MEGOHMS
PRI - GRD	@	kVdc			MEGOHMS
SEC - GRD	@	kVdc			MEGOHMS

VT CONNECTION: ○ 1 PHASE ◉ 3 PHASE — PRIMARY: ○ WYE ◉ DELTA — SECONDARY: ○ WYE ○ DELTA

COMMENTS: *= CATALOG NO. PTG3-2-60-422-FFGC
SECONDARY VOLTAGE = 120/240

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #172766, RAYTECH TTR #206480

Tested By: K. HAYSLIP — Tested By: K. MURPHY

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VOLTAGE TRANSFORMER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of | PAGE 414
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 | JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook | TELEPHONE
DATE 3/11/2020 | TEMPERATURE 70 °F | HUMIDITY 80 % | EQPT. LOCATION EAST BLOWER BUILDING
SUBSTATION 8 | POSITION VT-A

NAMEPLATE DATA

MANUFACTURER INSTRUMENT TRANSFORMER | CATALOG NO. PTG3-2-60-422FFGC2 | TYPE --- | NAMEPLATE RATIO 35 : 1
PRIMARY VOLTAGE 4 | SECONDARY VOLTAGE 120 | kVA --- | CLASS 0.3Y
Other BIL = 60KV 750VA @ 30C
PRIMARY FUSE: MANUFACTURER BUSSMAN | TYPE HRC | SIZE 1E | NO. 4
SECONDARY FUSE: MANUFACTURER BUSSMANT | TYPE BAF | SIZE 5 | NO. 2

EQUIPMENT TEMPERATURE 21 °C | TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

VT IDENTIFICATION: VT-1 | **SERIAL NUMBER:** 53897245

TURNS RATIO TEST

CALCULATED TURNS RATIO 35
MEASURED TURNS RATIO 34.935
CONNECTIONS H1 H2 X1 X0
POLARITY ERROR 0.185714 %

INSULATION TEST

			RDG.	20°C	
PRI - SEC	@	5.0 kVdc	100,000.0	106,000.0	MEGOHMS
PRI - GRD	@	5.0 kVdc	100,000.0	106,000.0	MEGOHMS
SEC - GRD	@	1.0 kVdc	100,000.0	106,000.0	MEGOHMS

VT IDENTIFICATION: VT-3 | **SERIAL NUMBER:** 53897244

TURNS RATIO TEST

CALCULATED TURNS RATIO 35
MEASURED TURNS RATIO 34.955
CONNECTIONS H1 H2 X1 X0
POLARITY ERROR 0.128571 %

INSULATION TEST

			RDG.	20°C	
PRI - SEC	@	5.0 kVdc	100,000.0	106,000.0	MEGOHMS
PRI - GRD	@	5.0 kVdc	100,000.0	106,000.0	MEGOHMS
SEC - GRD	@	1.0 kVdc	100,000.0	106,000.0	MEGOHMS

VT IDENTIFICATION: | **SERIAL NUMBER:**

TURNS RATIO TEST

CALCULATED TURNS RATIO
MEASURED TURNS RATIO
CONNECTIONS H1 H2 X X
POLARITY ERROR %

INSULATION TEST

			RDG.	20°C	
PRI - SEC	@	kVdc			MEGOHMS
PRI - GRD	@	kVdc			MEGOHMS
SEC - GRD	@	kVdc			MEGOHMS

VT CONNECTION: ○ 1 PHASE ○ 3 PHASE PRIMARY: ○ WYE ○ DELTA SECONDARY: ○ WYE ○ DELTA

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #UIS1563, RAYTECH TTR #177319

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VOLTAGE TRANSFORMER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 415

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/4/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB

SUBSTATION GEN — POSITION BUS #3

NAMEPLATE DATA

MANUFACTURER INSTRUMENT TRANSFORMER — CATALOG NO. PTG5-1-110-1322FC1 — TYPE --- — NAMEPLATE RATIO 110 : 1

PRIMARY VOLTAGE 13,200 — SECONDARY VOLTAGE 120 — kVA 1.5 — CLASS ---

Other BIL = 110KV, Z = 0.3, 30C.

PRIMARY FUSE: MANUFACTURER COOPER — TYPE CAVH — SIZE 0.5E — NO. 3

SECONDARY FUSE: MANUFACTURER BUS FUSE — TYPE BAF — SIZE 5 — NO. 3

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

VT IDENTIFICATION: A-PHASE — **SERIAL NUMBER:** 53786655

TURNS RATIO TEST

CALCULATED TURNS RATIO 110

MEASURED TURNS RATIO 110.09

CONNECTIONS H1 H2 X1 X2

POLARITY — ERROR 0.0818182 %

INSULATION TEST

			RDG.	20°C	
PRI - SEC	@	5 kVdc	100,000.0	106,000.0	MEGOHMS
PRI - GRD	@	5 kVdc	100,000.0	106,000.0	MEGOHMS
SEC - GRD	@	1 kVdc	100,000.0	106,000.0	MEGOHMS

VT IDENTIFICATION: B-PHASE — **SERIAL NUMBER:** 53786654

TURNS RATIO TEST

CALCULATED TURNS RATIO 110

MEASURED TURNS RATIO 110.06

CONNECTIONS H1 H2 X1 X2

POLARITY — ERROR 0.0545455 %

INSULATION TEST

			RDG.	20°C	
PRI - SEC	@	5 kVdc	100,000.0	106,000.0	MEGOHMS
PRI - GRD	@	5 kVdc	100,000.0	106,000.0	MEGOHMS
SEC - GRD	@	1 kVdc	100,000.0	106,000.0	MEGOHMS

VT IDENTIFICATION: C-PHASE — **SERIAL NUMBER:** 53786653

TURNS RATIO TEST

CALCULATED TURNS RATIO 110

MEASURED TURNS RATIO 110.02

CONNECTIONS H1 H2 X1 X2

POLARITY — ERROR 0.0181818 %

INSULATION TEST

			RDG.	20°C	
PRI - SEC	@	5 kVdc	100,000.0	106,000.0	MEGOHMS
PRI - GRD	@	5 kVdc	100,000.0	106,000.0	MEGOHMS
SEC - GRD	@	1 kVdc	100,000.0	106,000.0	MEGOHMS

VT CONNECTION: ○ 1 PHASE ◉ 3 PHASE — PRIMARY: ◉ WYE ○ DELTA — SECONDARY: ◉ WYE ○ DELTA

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, TTR #172777

Tested By: K. MURPHY — Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MEDIUM VOLTAGE SWITCHBOARD INSULATION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 416
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/4/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB
SUBSTATION GEN — POSITION BUS #3

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. --- — TYPE METAL CLAD
CATALOG NO. 17-28142137-001 — DRAWING NO. --- — VOLTAGE CLASS 15
PHASE AMPACITY 1200 A — WITHSTAND RATING 25 kA — CONDUCTOR ☐ Cu ☑ Al

INSTALLED DEVICES

VACUUM BREAKERS 3 — AIR BREAKERS --- — LOADBREAK DISCONNECTS --- — NUMBER OF BAYS 4
VOLTAGE RELAYS --- — OVERCURRENT RELAYS --- — OTHER PROTECTIVE RELAYS 4 — AUXILIARY RELAY ---
PANEL METERS --- — kWh METERS --- — VT's 9 — CT's 18 — CPT's ---
Other ---

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF = 1.06

INSULATION RESISTANCE TEST RESULTS - MEGOHMS

BUS SECTION TESTED	RANGE MULT.	K2		PHASE A-GND	B-GND	C-GND	N-GND	A - B	A - C	B - C
SEC 1 - 4	1	1.06	RDG.	100,000	100,000	100,000		100,000	100,000	100,000
			20°C	106,000	106,000	106,000		106,000	106,000	106,000
			RDG.							
			20°C							
			RDG.							
			20°C							
			RDG.							
			20°C							
			RDG.							
			20°C							

ACTUAL READING — SHADING INDICATES TEMPERATURE CORRECTED READING TO 20°C

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: DF / NH Tested By: KH / KM

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

MEDIUM VOLTAGE SWITCHBOARD
HIGH POTENTIAL TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 417
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/4/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB
SUBSTATION GEN — POSITION BUS #3

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. --- — TYPE METAL CLAD
CATALOG NO. 17-28142137-001 — DRAWING NO. --- — VOLTAGE CLASS 15 KV
PHASE AMPACITY 1200 A — WITHSTAND RATING 25 kA — CONDUCTOR ○ Cu ◉ Al

INSTALLED DEVICES

VACUUM BREAKERS 3 — AIR BREAKERS --- — LOADBREAK DISCONNECTS --- — NUMBER OF BAYS 4
VOLTAGE RELAYS --- — OVERCURRENT RELAYS --- — OTHER PROTECTIVE RELAYS 4 — AUXILIARY RELAYS ---
PANEL METERS --- — kWh METERS --- — VT's 9 — CT's 18 — CPT's ---
Other ---

DESCRIPTION	INSPECTED	CONDITION	CLEANED/LUBED
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
CUBICLES	☑	Acceptable	C
GROUND CONNECTIONS	☑	Acceptable	C
AUXILIARY DEVICES	☑	Acceptable	C

INSULATION TEST VOLTAGE 38 ☐ kVac ☑ kVdc — TEST VOLTAGE MULTIPLIER 1
EQUIPMENT TEMPERATURE 21 °C

K1 = RANGE MULTIPLIER

HIGHPOTENTIAL TESTS

BUS SECTION TESTED	K1		LEAKAGE - MICROAMPS A-GND	B-GND	C-GND	N-GND
SEC #1 - #4	1	RDG.	260	98	170	
		TOTAL LEAKAGE	260	98	170	
		RDG.				
		TOTAL LEAKAGE				
		RDG.				
		TOTAL LEAKAGE				
		RDG.				
		TOTAL LEAKAGE				
		RDG.				
		TOTAL LEAKAGE				

BUS HIGH POTENTIAL TESTS CONDUCTED PHASE TO GROUND, WITH OTHER CONDUCTORS GROUNDED. LEAKAGE RECORDED AFTER TEST VOLTAGE APPLIED FOR ONE MINUTE.

TOTAL LEAKAGE = (K1) (ACTUAL READING)

COMMENTS: HIPOT WITH CABLES REMOVED & ALL 3 BREAKERS CLOSED.

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: HIPOT #156393

Tested By: DF / NH Tested By: KH / KM

Utilities Instrumentation Service, Inc.
Dexter, Michigan
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Centerville, Ohio
(937) 439-9660

SWITCHBOARD BUS CONNECTION TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 418
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/4/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB
SUBSTATION GEN — POSITION BUS #3

NAMEPLATE DATA

MANUFACTURER SQUARE D — SERIAL NO. --- — TYPE METAL CLAD
CATALOG NO. 17-28142137-001 — DRAWING NO. --- — VOLTAGE CLASS 15 KV
PHASE AMPACITY 1200 A — WITHSTAND RATING 25 kA — CONDUCTOR ○ CU ◉ AL

BUS SECTION TESTED		RESISTANCE IN ☑ MICRO-OHMS ☐ MILLI-OHMS					BUS SECTION TESTED		RESISTANCE IN ☐ MICRO-OHMS ☐ MILLI-OHMS				
FROM	TO	A	B	C	N	G	FROM	TO	A	B	C	N	G
CUB. 1	CUB. 4	161.3	145.7	142.2		280.7							

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: DLRO #1572

Tested By: DF / NH Tested By: KH / KM

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

LIGHTNING ARRESTER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 419
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/4/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB
SUBSTATION GEN — POSITION GEN #1 & #2

NAMEPLATE DATA

MANUFACTURER GENERAL ELECTRIC — TYPE STATION — MODEL 9L11XPM015S
CATALOG NO. --- — SERIAL NO. --- — RELIEF ---
RATED RMS VOLTAGE 15 kV — RATED MCOV 12.7 kV — RMS CURRENT RATING 40 kA — RATED CREST kA
SYSTEM VOLTAGE 13.2 kV — ARRESTER TYPE STATION (●) INTERMEDIATE ( ) DISTRIBUTION ( ) — MATERIAL TYPE PORCELAIN ( ) POLYMER (●)

INSULATION TEST VOLTAGE 5.00 kV DC — TEST VOLTAGE MULTIPLIER 1
RANGE MULTIPLIER 1.0 — EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.05

INSULATION TEST

POSITION	TOTAL CORRECTION MULTIPLIER	A PHASE TO GROUND		B PHASE TO GROUND		C PHASE TO GROUND	
		ACTUAL MEGOHMS	CORRECTED MEGOHMS	ACTUAL MEGOHMS	CORRECTED MEGOHMS	ACTUAL MEGOHMS	CORRECTED MEGOHMS
GEN #1	1.05	100,000	105,000.0	100,000	105,000.0	100,000	105,000.0
GEN #2	1.05	100,000	105,000.0	100,000	105,000.0	100,000	105,000.0

WATT LOSS TEST

TEST kV SWITCH SETTING
OUTPUT TEST VOLTAGE
READING CORRECTION FACTOR

( ) GROUNDED SPECIMEN TEST
( ) UNGROUNDED SPECIMEN TEST

MILLI-WATT LOSS

POSITION	A PHASE	B PHASE	C PHASE

COMMENTS:
DEFICIENCIES:

[x] ACCEPTABLE [ ] NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563

Tested By: DF / NH Tested By: KH / KM

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VOLTAGE TRANSFORMER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 420
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/4/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB
SUBSTATION GEN — POSITION GEN 1

NAMEPLATE DATA

MANUFACTURER INSTRUMENT TRANSFORMER — CATALOG NO. PTG5-1-110-1322FC1 — TYPE --- — NAMEPLATE RATIO 110 : 1
PRIMARY VOLTAGE 13,200 — SECONDARY VOLTAGE 120 — kVA 1.5 — CLASS ---
Other BIL: 110KV, %Z = 0.3, 30C
PRIMARY FUSE: MANUFACTURER BUSSMAN — TYPE CAVH — SIZE 0.5E — NO. 3
SECONDARY FUSE: MANUFACTURER BUS FUSE — TYPE BAF — SIZE 5 — NO. 3

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

VT IDENTIFICATION: A-PHASE — **SERIAL NUMBER:** 53786661

TURNS RATIO TEST

CALCULATED TURNS RATIO 110
MEASURED TURNS RATIO 109.96
CONNECTIONS H1 H2 X1 X2
POLARITY — ERROR 0.0363636 %

INSULATION TEST

			RDG.	20°C	
PRI - SEC	@	5 kVdc	100,000.0	106,000.0	MEGOHMS
PRI - GRD	@	5 kVdc	100,000.0	106,000.0	MEGOHMS
SEC - GRD	@	1 kVdc	100,000.0	106,000.0	MEGOHMS

VT IDENTIFICATION: B-PHASE — **SERIAL NUMBER:** 53786660

TURNS RATIO TEST

CALCULATED TURNS RATIO 110
MEASURED TURNS RATIO 110.01
CONNECTIONS H1 H2 X1 X2
POLARITY — ERROR 0.00909091 %

INSULATION TEST

			RDG.	20°C	
PRI - SEC	@	5 kVdc	100,000.0	106,000.0	MEGOHMS
PRI - GRD	@	5 kVdc	100,000.0	106,000.0	MEGOHMS
SEC - GRD	@	1 kVdc	100,000.0	106,000.0	MEGOHMS

VT IDENTIFICATION: C-PHASE — **SERIAL NUMBER:** 53786659

TURNS RATIO TEST

CALCULATED TURNS RATIO 110
MEASURED TURNS RATIO 110.00
CONNECTIONS H1 H2 X1 X2
POLARITY — ERROR 0 %

INSULATION TEST

			RDG.	20°C	
PRI - SEC	@	5 kVdc	100,000.0	106,000.0	MEGOHMS
PRI - GRD	@	5 kVdc	100,000.0	106,000.0	MEGOHMS
SEC - GRD	@	1 kVdc	100,000.0	106,000.0	MEGOHMS

VT CONNECTION: ○ 1 PHASE ◉ 3 PHASE — PRIMARY: ◉ WYE ○ DELTA — SECONDARY: ◉ WYE ○ DELTA

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, TTR #172

Tested By: K. MURPHY — Tested By:

Utilities Instrumentation Service, Inc.

Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VOLTAGE TRANSFORMER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 421

ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1

USER Ann Arbor WWTP

OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE

DATE 3/4/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEP

SUBSTATION GEN — POSITION GEN 2

NAMEPLATE DATA

MANUFACTURER INSTRUMENT TRANSFORMER — CATALOG NO. PTG5-110-1322 FC1 — TYPE --- — NAMEPLATE RATIO 110 : 1

PRIMARY VOLTAGE 13,200 — SECONDARY VOLTAGE 120 — kVA 1.5 — CLASS ---

Other BIL: 110KV, %Z = 0.3, 30C

PRIMARY FUSE: MANUFACTURER BUSSMAN — TYPE CAVH — SIZE 0.5E — NO. 3

SECONDARY FUSE: MANUFACTURER BUS FUSE — TYPE BAF — SIZE 5 — NO. 3

EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06

VT IDENTIFICATION: A-PHASE — **SERIAL NUMBER:** 53786658

TURNS RATIO TEST

CALCULATED TURNS RATIO 110

MEASURED TURNS RATIO 109.89

CONNECTIONS H1 H2 X1 X2

POLARITY — ERROR 0.1 %

INSULATION TEST

			RDG.	20°C	
PRI - SEC	@	5 kVdc	100,000.0	106,000.0	MEGOHMS
PRI - GRD	@	5 kVdc	100,000.0	106,000.0	MEGOHMS
SEC - GRD	@	1 kVdc	100,000.0	106,000.0	MEGOHMS

VT IDENTIFICATION: B-PHASE — **SERIAL NUMBER:** 53786657

TURNS RATIO TEST

CALCULATED TURNS RATIO 110

MEASURED TURNS RATIO 109.88

CONNECTIONS H1 H2 X1 X2

POLARITY — ERROR 0.109091 %

INSULATION TEST

			RDG.	20°C	
PRI - SEC	@	5 kVdc	100,000.0	106,000.0	MEGOHMS
PRI - GRD	@	5 kVdc	100,000.0	106,000.0	MEGOHMS
SEC - GRD	@	1 kVdc	100,000.0	106,000.0	MEGOHMS

VT IDENTIFICATION: C-PHASE — **SERIAL NUMBER:** 53786656

TURNS RATIO TEST

CALCULATED TURNS RATIO 110

MEASURED TURNS RATIO 110.09

CONNECTIONS H1 H2 X1 X2

POLARITY — ERROR 0.0818182 %

INSULATION TEST

			RDG.	20°C	
PRI - SEC	@	5 kVdc	100,000.0	106,000.0	MEGOHMS
PRI - GRD	@	5 kVdc	100,000.0	106,000.0	MEGOHMS
SEC - GRD	@	1 kVdc	100,000.0	106,000.0	MEGOHMS

VT CONNECTION: ○ 1 PHASE ◉ 3 PHASE — PRIMARY: ◉ WYE ○ DELTA — SECONDARY: ◉ WYE ○ DELTA

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, TTR #172777

Tested By: K. MURPHY — Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 422
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/4/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB
SUBSTATION GEN — POSITION GENERATOR 1 (52-G1)

MANUFACTURER SQUARE D — SERIAL NUMBER 17 77420
TYPE VR — MODEL NO. 17-28142137-001 — DATE MANUFACTURED 10 / 13
MAXIMUM VOLTAGE 15 kV — AMPACITY 1200 — OPERATING VOLTAGE 13.2 kV
INTERRUPTING CAPACITY 25 kA @ --- kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTIONS	☑	Acceptable	C/L
STRUCTURAL MEMBERS	☑	Acceptable	C
CUBICLE	☑	Acceptable	C
RACKING DEVICES	☑	Acceptable	C/L
SHUTTER	☑	Acceptable	C

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Acceptable	C/L
VACUUM BOTTLE	☑	Acceptable	C
CONTACT EROSION INDICATOR	☑	Acceptable	C
OPERATING MECHANISM	☑	Acceptable	C/L
CONTACT SEQUENCE	☑	Acceptable	NA
GROUND CONNECTION	☑	Acceptable	C/L
AUXILIARY DEVICES	☑	Acceptable	C

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
MILLIWATT LOSS TEST VOLTAGE kVac — HIGH POTENTIAL TEST VOLTAGE 38 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
POLE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LOAD TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO LOAD	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.12	0.14	1.6
HIGH POTENTIAL OPEN TEST	0.12	0.1	0.12

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE ☐ MICRO-OHMS ☐ MILLI-OHMS	RDG.			
	20°C			
CONTACT RESISTANCE ☐ MICRO-OHMS ☑ MILLI-OHMS	RDG.	0.0329	0.0321	0.0335
	20°C	0.0328	0.0320	0.0334

	POLE 1	POLE 2	POLE 3
OPENING SPEED	---	---	---
CLOSING SPEED	---	---	---

COUNTER READING: BEG. 00629
END 00637

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572, HI POT #156393

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 423
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/3/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB
SUBSTATION GEN — POSITION GENERATOR 2 (52-G2)

MANUFACTURER SQUARE D — SERIAL NUMBER 17 77419
TYPE VR — MODEL NO. 17-28142137-001 — DATE MANUFACTURED 10 / 13
MAXIMUM VOLTAGE 15 kV — AMPACITY 1200 — OPERATING VOLTAGE 13.2 kV
INTERRUPTING CAPACITY 25 kA @ --- kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTIONS	☑	Acceptable	C/L
STRUCTURAL MEMBERS	☑	Acceptable	C
CUBICLE	☑	Acceptable	C
RACKING DEVICES	☑	Acceptable	C/L
SHUTTER	☑	Acceptable	C

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Acceptable	C/L
VACUUM BOTTLE	☑	Acceptable	C
CONTACT EROSION INDICATOR	☑	Acceptable	C
OPERATING MECHANISM	☑	Acceptable	C/L
CONTACT SEQUENCE	☑	Acceptable	NA
GROUND CONNECTION	☑	Acceptable	C/L
AUXILIARY DEVICES	☑	Acceptable	C

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
MILLIWATT LOSS TEST VOLTAGE kVac — HIGH POTENTIAL TEST VOLTAGE 38 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
POLE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LOAD TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO LOAD	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.16	0.14	0.15
HIGH POTENTIAL OPEN TEST	0.12	0.12	0.14

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE ☐ MICRO-OHMS ☐ MILLI-OHMS	RDG.			
	20°C			
CONTACT RESISTANCE ☐ MICRO-OHMS ☑ MILLI-OHMS	RDG.	0.0344	0.0314	0.0319
	20°C	0.0343	0.0313	0.0318

	POLE 1	POLE 2	POLE 3
OPENING SPEED	---	---	---
CLOSING SPEED	---	---	---

COUNTER READING: BEG. 00543
END 00551

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #1563, DLRO #1572, HIPOT #156393

Tested By: N. HERRST Tested By: D. FLEMING

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

VACUUM CIRCUIT BREAKER TEST

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of — PAGE 424
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105 — JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook — TELEPHONE
DATE 3/2/2020 — TEMPERATURE 70 °F — HUMIDITY 60 % — EQPT. LOCATION CEB
SUBSTATION GEN — POSITION LOAD BANK (52LB)

MANUFACTURER SQUARE D — SERIAL NUMBER 17 77421
TYPE VR — MODEL NO. 17-28142137-002 — DATE MANUFACTURED 10 / 13
MAXIMUM VOLTAGE 15 kV — AMPACITY 1200 — OPERATING VOLTAGE 13.2 kV
INTERRUPTING CAPACITY 25 kA @ --- kV TO --- kV = --- mVA

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
OVERALL CLEANLINESS	☑	Acceptable	C
INSULATING MEMBERS	☑	Acceptable	C
MECHANICAL CONNECTIONS	☑	Acceptable	C/L
STRUCTURAL MEMBERS	☑	Acceptable	C
CUBICLE	☑	Acceptable	C
RACKING DEVICES	☑	Acceptable	C/L
SHUTTER	☑	Acceptable	C

DESCRIPTION	INSPECTED	CONDITION	CLEAN/LUBE
CONTACT FINGERS	☑	Acceptable	C/L
VACUUM BOTTLE	☑	Acceptable	C
CONTACT EROSION INDICATOR	☑	Acceptable	C
OPERATING MECHANISM	☑	Acceptable	C/L
CONTACT SEQUENCE	☑	Acceptable	C
GROUND CONNECTION	☑	Acceptable	C/L
AUXILIARY DEVICES	☑	Acceptable	C

INSULATION TEST VOLTAGE 5 kVdc — TEST VOLTAGE MULTIPLIER, K1 = 1 — K2 = (K1) (TCF)
EQUIPMENT TEMPERATURE 21 °C — TEMPERATURE CORRECTION FACTOR TO 20°C, TCF 1.06
MILLIWATT LOSS TEST VOLTAGE --- kVac — HIGH POTENTIAL TEST VOLTAGE 38 ☐ kVAC ☑ kVDC

INSULATION RESISTANCE	RANGE MULTIPLIER	K2	POLE 1 MEGOHMS (P1-P2)		POLE 2 MEGOHMS (P2-P3)		POLE 3 MEGOHMS (P1-P3)	
			READING	20°C	READING	20°C	READING	20°C
POLE TO POLE	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
POLE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LOAD TO FRAME	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0
LINE TO LOAD	1.000	1.060	100,000+	106,000.0	100,000+	106,000.0	100,000+	106,000.0

CONTROL WIRING - MEGOHMS			
READING		20°C	

	POLE 1 MICRO A	POLE 2 MICRO A	POLE 3 MICRO A
HIGH POTENTIAL CLOSED TEST	0.24	0.26	3.4
HIGH POTENTIAL OPEN TEST	0.2	0.2	0.22

CONTACT MEASUREMENTS		POLE 1	POLE 2	POLE 3
CONTACT TRAVEL - INCHES				
POLE RESISTANCE ☐ MICRO-OHMS ☐ MILLI-OHMS	RDG.			
	20°C			
CONTACT RESISTANCE ☐ MICRO-OHMS ☑ MILLI-OHMS	RDG.	0.031	0.031	0.035
	20°C	0.0309	0.0309	0.0349

	POLE 1	POLE 2	POLE 3
OPENING SPEED	---	---	---
CLOSING SPEED	---	---	---

COUNTER READING: BEG. 00121
END 00129

COMMENTS:
DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE

(THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

TOOLS USED: MEGGER #156386 DUCTOR # 193764 HI POT #156393

Tested By: J. RYSENGA Tested By:

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

RTS RELAY REPORT

NETA ACCREDITED COMPANY

CUSTOMER Ann Arbor, City of
PAGE 425
ADDRESS 49 S. Dixboro Rd; Ann Arbor MI 48105
JOB # AACI207024-1
USER Ann Arbor WWTP
OWNER REPRESENTATIVE Jeremy Holbrook
TELEPHONE
DATE 5/15/2020
TEMPERATURE °F
HUMIDITY %
EQPT. LOCATION VARIOUS
SUBSTATION RTS
POSITION RELAY FILES

RELAYS WERE TESTED WITH ENOSERV RTS SOFTWARE AND THEIR REPORTS ARE ATTACHED.

COMMENTS:

DEFICIENCIES:

☑ ACCEPTABLE ☐ NON - ACCEPTABLE (THIS FORM IS NOT TO BE REPRODUCED EXCEPT IN FULL)

Tested By: D. FLEMING Tested By:

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-551.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 8.2 **Test Date:** 02/19/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	13.2 KV	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	CENTRAL ELECTRICAL BUILDING
POSITION:	52F22 UNIT SUB 2-EQ	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	SEL-551
SERIAL_NUMBER:	1132620123	FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408
RELAY_ID:	AACI207024	CURRENT_TESTDATE:	2/19/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
CONTACT$="4"          'OUTPUT CONTACT TO MASK
SEL_AUTO=1            '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1            'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1              'NO ERROR MESSAGE IF NO OPERATION
```

Routine Notes:

Relay Settings Used for Testing:

```
RID$ = "52F22"
TID$ = "SUB 2 EQ"
CTR = 120
CTRN = 120
TDURD = 9.000
s50P1P = 13.0
s50P2P = 1.3
s50P3P$ = "OFF"
s50P4P$ = "OFF"
s50P5P$ = "OFF"
s50P6P$ = "OFF"
s50ABCP$ = "OFF"
s51P1P = 0.6
s51P1C$ = "C3"
s51P1TD = 1.00
s51P1RS$ = "N"
s51P2P$ = "OFF"
s51P2C$ = "U3"
s51P2TD = 15.00
s51P2RS$ = "N"
s50N1P$ = "OFF"
s50N2P$ = "OFF"
s51N1P$ = "OFF"
s51N1C$ = "U4"
s51N1TD = 3.00
s51N1RS$ = "N"
s50G1P = 5.4
s50G2P$ = "OFF"
s51G1P = 0.5
s51G1C$ = "U1"
s51G1TD = 0.50
```

```
s51G1RS$ = "N"
s50Q1P$ = "OFF"
s50Q2P$ = "OFF"
s51Q1P$ = "OFF"
s51Q1C$ = "U3"
s51Q1TD = 15.00
s51Q1RS$ = "N"
s51Q2P$ = "OFF"
s51Q2C$ = "U3"
s51Q2TD = 15.00
s51Q2RS$ = "N"
s79OI1 = 0.000
s79OI2 = 600.000
s79OI3 = 0.000
s79OI4 = 0.000
s79RSD = 1800.000
s79RSLD = 300.000
CFD = 60.000
DMTC = 5
PDEMP = 5.00
NDEMP = 1.50
GDEMP = 1.50
QDEMP = 1.50
SV5PU = 0.000
SV5DO = 0.000
SV6PU = 0.000
SV6DO = 0.000
SV7PU = 0.000
SV7DO = 0.000
SV8PU = 0.000
SV8DO = 0.000
SV9PU = 0.000
SV9DO = 0.000
SV10PU = 0.000
SV10DO = 0.000
SV11PU = 0.000
SV11DO = 0.000
SV12PU = 0.000
SV12DO = 0.000
SV13PU = 0.000
SV13DO = 0.000
SV14PU = 0.000
SV14DO = 0.000
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
TR$ = "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "
ULTR$ = "!(51P1 + 51G1)"
s51P1TC = 1
s51P2TC = 1
s51N1TC = 1
s51G1TC = 1
s51Q1TC = 1
s51Q2TC = 1
s52A$ = "IN1"
CL$ = "LB4"
ULCL$ = "TRIP"
s79RI$ = "TRIP"
s79RIS$ = "IN1"
s79DTL$ = "!LB1 + LB3"
s79DLS$ = "79LO"
s79SKP$ = "50P2 * SH0"
s79STL$ = "TRIP"
```

```
s79BRS$ = "(51P1 + 51G1) * (79RS + 79CY)"
s79SEQ = 0
ER1$ = "51P1 + 51G1 + 51N1"
ER2 = 0
SV1 = 0
SV2 = 0
SV3 = 0
SV4 = 0
SV5 = 0
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
OUT1$ = "TRIP"
OUT2 = 0
OUT3 = 0
OUT4 = 0
DP1$ = "IN1"
DP2$ = "LB2"
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
```

Relay Test Results for: ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for: LOG INTO THE RELAY

OK?
RAN

Relay Test Results for: DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for: SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

Relay Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

52F22                              Date: 02/19/20    Time: 06:38:23.034
SUB 2 EQ

FID=SEL-551-R514-Vf-Z002002-D20110408      CID=CCFD

SELF TESTS

W=Warn    F=Fail

       IA       IB       IC       IN       MOF
OS      3        3        3        3        0

       +5V_PS   +5V_REG  -5V_REG  +10V_PS  -10V_PS  VBAT
PS      4.96     5.01    -5.17     9.90    -9.97     3.46

       TEMP     RAM      ROM      CR_RAM   EEPROM
        28.6    OK       OK       OK       OK

 Relay Enabled

=>>
```

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR ELEMENT TEST

OK?
RAN

Relay Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	216.0	0.0	PASS
B-N	0.0	0.0	0.0	240.0	239.0	-0.4	PASS
C-N	0.0	0.0	0.0	264.0	265.0	0.4	PASS

Relay Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	13.000	13.000	0.00	PASS
B-N	13.000	13.000	0.00	PASS
C-N	13.000	13.000	0.00	PASS

Relay Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	1.301	1.300	0.08	PASS
B-N	1.301	1.300	0.08	PASS
C-N	1.301	1.300	0.08	PASS

Relay Test Results for: 50P3P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P4P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P5P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P6P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE A OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE B OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE C OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.398	5.400	-0.04	PASS

Relay Test Results for: 50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		0.600	0.600	0.00	PASS
B-N		0.600	0.600	0.00	PASS
C-N		0.612	0.600	2.00	PASS

Relay Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

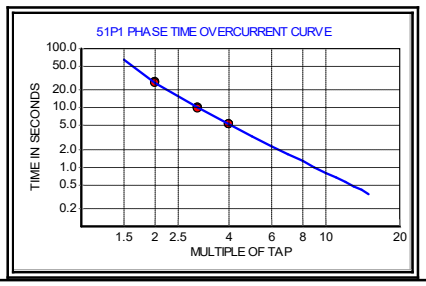
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1629.46	27.158	26.667	1.84	PASS
3.00	1.800	613.82	10.230	10.000	2.30	PASS
4.00	2.400	321.44	5.357	5.333	0.45	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1625.33	27.089	26.667	1.58	PASS
3.00	1.800	606.52	10.109	10.000	1.09	PASS
4.00	2.400	323.39	5.390	5.333	1.06	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1586.47	26.441	26.667	-0.85	PASS
3.00	1.800	592.94	9.882	10.000	-1.18	PASS
4.00	2.400	322.56	5.376	5.333	0.80	PASS



Relay Test Results for: 51P2P PHASE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P2 PHASE TIME OVERCURRENT CURVE

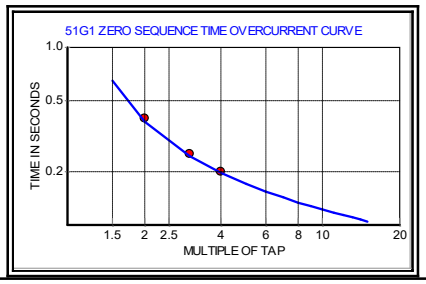
OK?
RAN

Relay Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.485	0.500	-3.00	PASS

Relay Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.000	23.86	0.398	0.384	3.59	PASS
3.00	1.500	15.00	0.250	0.245	1.89	PASS
4.00	2.000	11.99	0.200	0.196	1.80	PASS



Relay Test Results for: 51Q1P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q1 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51Q2P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q2 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: NEUTRAL TEST CONNECTIONS

OK?
RAN

Relay Test Results for: 50N1P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N2P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1P NEUTRAL TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1 NEUTRAL TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: RESTORE LOGIC SETTINGS

OK?
RAN

Relay Test Results for: RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

```
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE
```

Relay Test Results for: LOG OUT OF THE RELAY

OK?
RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-551.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 8.2 **Test Date:** 05/08/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	13.2 KV	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	CENTRAL ELECTRICAL BUILDING
POSITION:	52F210 SPACE 10 BOT	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	SEL-551
SERIAL_NUMBER:	1132620137	FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408
RELAY_ID:	50/51	CURRENT_TESTDATE:	5/8/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
CONTACT$="4"          'OUTPUT CONTACT TO MASK
SEL_AUTO=1            '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1            'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1              'NO ERROR MESSAGE IF NO OPERATION
```

Routine Notes:

»Fri May 08, 2020
JOB # AACI207024

Relay Settings Used for Testing:

```
RID$ = "52F210"
TID$ = "SPACE 10-BOT"
CTR = 120
CTRN = 120
TDURD = 9.000
s50P1P = 13.0
s50P2P = 1.3
s50P3P$ = "OFF"
s50P4P$ = "OFF"
s50P5P$ = "OFF"
s50P6P$ = "OFF"
s50ABCP$ = "OFF"
s51P1P = 0.6
s51P1C$ = "C3"
s51P1TD = 1.00
s51P1RS$ = "N"
s51P2P$ = "OFF"
s51P2C$ = "U3"
s51P2TD = 15.00
s51P2RS$ = "N"
s50N1P$ = "OFF"
s50N2P$ = "OFF"
s51N1P$ = "OFF"
s51N1C$ = "U4"
s51N1TD = 3.00
s51N1RS$ = "N"
s50G1P = 5.4
s50G2P$ = "OFF"
s51G1P = 0.5
s51G1C$ = "U1"
s51G1TD = 0.50
```

```
s51G1RS$ = "N"
s50Q1P$ = "OFF"
s50Q2P$ = "OFF"
s51Q1P$ = "OFF"
s51Q1C$ = "U3"
s51Q1TD = 15.00
s51Q1RS$ = "N"
s51Q2P$ = "OFF"
s51Q2C$ = "U3"
s51Q2TD = 15.00
s51Q2RS$ = "N"
s79OI1 = 0.000
s79OI2 = 600.000
s79OI3 = 0.000
s79OI4 = 0.000
s79RSD = 1800.000
s79RSLD = 300.000
CFD = 60.000
DMTC = 5
PDEMP = 5.00
NDEMP = 1.50
GDEMP = 1.50
QDEMP = 1.50
SV5PU = 0.000
SV5DO = 0.000
SV6PU = 0.000
SV6DO = 0.000
SV7PU = 0.000
SV7DO = 0.000
SV8PU = 0.000
SV8DO = 0.000
SV9PU = 0.000
SV9DO = 0.000
SV10PU = 0.000
SV10DO = 0.000
SV11PU = 0.000
SV11DO = 0.000
SV12PU = 0.000
SV12DO = 0.000
SV13PU = 0.000
SV13DO = 0.000
SV14PU = 0.000
SV14DO = 0.000
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
TR$ = "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "
ULTR$ = "!(51P1 + 51G1)"
s51P1TC = 1
s51P2TC = 1
s51N1TC = 1
s51G1TC = 1
s51Q1TC = 1
s51Q2TC = 1
s52A$ = "IN1"
CL$ = "LB4"
ULCL$ = "TRIP"
s79RI$ = "TRIP"
s79RIS$ = "IN1"
s79DTL$ = "!LB1 + LB3"
s79DLS$ = "79LO"
s79SKP$ = "50P2 * SH0"
s79STL$ = "TRIP"
```

```
s79BRS$ = "(51P1 + 51G1) * (79RS + 79CY)"
s79SEQ = 0
ER1$ = "51P1 + 51G1 + 51N1"
ER2 = 0
SV1 = 0
SV2 = 0
SV3 = 0
SV4 = 0
SV5 = 0
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
OUT1$ = "TRIP"
OUT2 = 0
OUT3 = 0
OUT4 = 0
DP1$ = "IN1"
DP2$ = "LB2"
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
```

Relay Test Results for: ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for: LOG INTO THE RELAY

OK?
RAN

Relay Test Results for: DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for: SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

Relay Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

52F210                              Date: 05/08/20    Time: 09:25:50.659
SPACE 10-BOT

FID=SEL-551-R514-Vf-Z002002-D20110408      CID=CCFD

SELF TESTS

W=Warn    F=Fail

       IA       IB       IC       IN       MOF
OS      3        3        3        3        0

       +5V_PS   +5V_REG  -5V_REG  +10V_PS  -10V_PS  VBAT
PS      4.98     4.99    -5.11     9.94    -10.02    3.48

       TEMP     RAM      ROM      CR_RAM   EEPROM
        28.6    OK       OK       OK       OK

 Relay Enabled

=>>
```

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR ELEMENT TEST

OK?
RAN

Relay Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	216.0	0.0	PASS
B-N	0.0	0.0	0.0	240.0	235.0	-2.1	PASS
C-N	0.0	0.0	0.0	264.0	263.0	-0.4	PASS

Relay Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	13.130	13.000	1.00	PASS
B-N	13.000	13.000	0.00	PASS
C-N	13.000	13.000	0.00	PASS

Relay Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	1.314	1.300	1.08	PASS
B-N	1.340	1.300	3.08	PASS
C-N	1.314	1.300	1.08	PASS

Relay Test Results for: 50P3P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P4P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P5P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P6P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE A OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE B OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE C OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.452	5.400	0.96	PASS

Relay Test Results for: 50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		0.626	0.600	4.33	PASS
B-N		0.608	0.600	1.33	PASS
C-N		0.596	0.600	-0.67	PASS

Relay Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

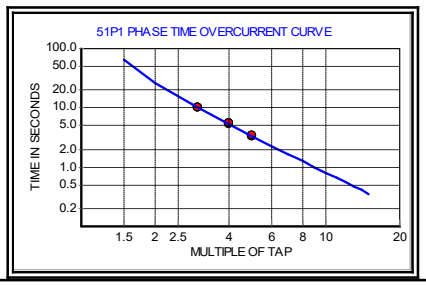
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
3.00	1.800	613.52	10.225	10.000	2.25	PASS
4.00	2.400	325.00	5.417	5.333	1.56	PASS
5.00	3.000	201.92	3.365	3.333	0.96	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
3.00	1.800	612.88	10.215	10.000	2.15	PASS
4.00	2.400	325.62	5.427	5.333	1.76	PASS
5.00	3.000	201.48	3.358	3.333	0.74	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
3.00	1.800	609.00	10.150	10.000	1.50	PASS
4.00	2.400	326.69	5.445	5.333	2.09	PASS
5.00	3.000	202.82	3.380	3.333	1.41	PASS



Relay Test Results for: 51P2P PHASE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P2 PHASE TIME OVERCURRENT CURVE

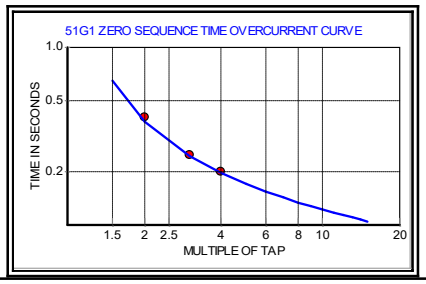
OK?
RAN

Relay Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.480	0.500	-4.00	PASS

Relay Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
2.00	1.000	24.33	0.406	0.340 TO 0.428	PASS
3.00	1.500	14.89	0.248	0.208 TO 0.283	PASS
4.00	2.000	11.95	0.199	0.161 TO 0.231	PASS



Relay Test Results for: 51Q1P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q1 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51Q2P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q2 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: NEUTRAL TEST CONNECTIONS

OK?
RAN

Relay Test Results for: 50N1P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N2P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1P NEUTRAL TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1 NEUTRAL TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: RESTORE LOGIC SETTINGS

OK?
RAN

Relay Test Results for: RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

```
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE
```

Relay Test Results for: LOG OUT OF THE RELAY

OK?
RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-551.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 8.2 **Test Date:** 03/03/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	13.2 KV	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	CENTRAL ELECTRICAL BUILDING
POSITION:	52F27 UNIT SUB 7-CEB	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	SEL-551
SERIAL_NUMBER:	1133390347	FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408
RELAY_ID:	AACI207024	CURRENT_TESTDATE:	3/3/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
CONTACT$="4"          'OUTPUT CONTACT TO MASK
SEL_AUTO=1            '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1            'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1              'NO ERROR MESSAGE IF NO OPERATION
```

Routine Notes:

Relay Settings Used for Testing:

```
RID$ = "FDR-52F27"
TID$ = "SUB 7 CEB"
CTR = 120
CTRN = 120
TDURD = 9.000
s50P1P = 13.0
s50P2P = 3.2
s50P3P$ = "OFF"
s50P4P$ = "OFF"
s50P5P$ = "OFF"
s50P6P$ = "OFF"
s50ABCP$ = "OFF"
s51P1P = 1.0
s51P1C$ = "C3"
s51P1TD = 1.00
s51P1RS$ = "N"
s51P2P$ = "OFF"
s51P2C$ = "U3"
s51P2TD = 15.00
s51P2RS$ = "N"
s50N1P$ = "OFF"
s50N2P$ = "OFF"
s51N1P$ = "OFF"
s51N1C$ = "U4"
s51N1TD = 3.00
s51N1RS$ = "N"
s50G1P = 5.4
s50G2P$ = "OFF"
s51G1P = 0.5
s51G1C$ = "U1"
s51G1TD = 0.50
```

```
s51G1RS$ = "N"
s50Q1P$ = "OFF"
s50Q2P$ = "OFF"
s51Q1P$ = "OFF"
s51Q1C$ = "U3"
s51Q1TD = 15.00
s51Q1RS$ = "N"
s51Q2P$ = "OFF"
s51Q2C$ = "U3"
s51Q2TD = 15.00
s51Q2RS$ = "N"
s79OI1 = 0.000
s79OI2 = 600.000
s79OI3 = 0.000
s79OI4 = 0.000
s79RSD = 1800.000
s79RSLD = 300.000
CFD = 60.000
DMTC = 5
PDEMP = 5.00
NDEMP = 1.50
GDEMP = 1.50
QDEMP = 1.50
SV5PU = 0.000
SV5DO = 0.000
SV6PU = 0.000
SV6DO = 0.000
SV7PU = 0.000
SV7DO = 0.000
SV8PU = 0.000
SV8DO = 0.000
SV9PU = 0.000
SV9DO = 0.000
SV10PU = 0.000
SV10DO = 0.000
SV11PU = 0.000
SV11DO = 0.000
SV12PU = 0.000
SV12DO = 0.000
SV13PU = 0.000
SV13DO = 0.000
SV14PU = 0.000
SV14DO = 0.000
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
TR$ = "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "
ULTR$ = "!(51P1 + 51G1)"
s51P1TC = 1
s51P2TC = 1
s51N1TC = 1
s51G1TC = 1
s51Q1TC = 1
s51Q2TC = 1
s52A$ = "IN1"
CL$ = "LB4"
ULCL$ = "TRIP"
s79RI$ = "TRIP"
s79RIS$ = "IN1"
s79DTL$ = "!LB1 + LB3"
s79DLS$ = "79LO"
s79SKP$ = "50P2 * SH0"
s79STL$ = "TRIP"
```

```
s79BRS$ = "(51P1 + 51G1) * (79RS + 79CY)"
s79SEQ = 0
ER1$ = "51P1 + 51G1 + 51N1"
ER2 = 0
SV1 = 0
SV2 = 0
SV3 = 0
SV4 = 0
SV5 = 0
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
OUT1$ = "TRIP"
OUT2 = 0
OUT3 = 0
OUT4 = 0
DP1$ = "IN1"
DP2$ = "LB2"
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
```

Relay Test Results for: ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for: LOG INTO THE RELAY

OK?
RAN

Relay Test Results for: DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for: SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

Relay Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

FDR-52F27                          Date: 03/03/20    Time: 05:20:29.879
SUB 7 CEB

FID=SEL-551-R514-Vf-Z002002-D20110408      CID=CCFD

SELF TESTS

W=Warn    F=Fail

       IA       IB       IC       IN       MOF
OS      3        3        2        3        0

       +5V_PS   +5V_REG  -5V_REG  +10V_PS  -10V_PS  VBAT
PS      4.98     5.03    -4.98     9.94    -9.99     3.51

       TEMP     RAM      ROM      CR_RAM   EEPROM
        28.6    OK       OK       OK       OK

 Relay Enabled

=>>
```

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR ELEMENT TEST

OK?
RAN

Relay Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	214.0	-0.9	PASS
B-N	0.0	0.0	0.0	240.0	238.0	-0.8	PASS
C-N	0.0	0.0	0.0	264.0	264.0	0.0	PASS

Relay Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		13.000	13.000	0.00	PASS
B-N		13.000	13.000	0.00	PASS
C-N		13.130	13.000	1.00	PASS

Relay Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		3.204	3.200	0.12	PASS
B-N		3.204	3.200	0.12	PASS
C-N		3.204	3.200	0.12	PASS

Relay Test Results for: 50P3P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P4P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P5P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P6P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE A OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE B OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE C OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.398	5.400	-0.04	PASS

Relay Test Results for: 50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		1.020	1.000	2.00	PASS
B-N		1.010	1.000	1.00	PASS
C-N		1.030	1.000	3.00	PASS

Relay Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

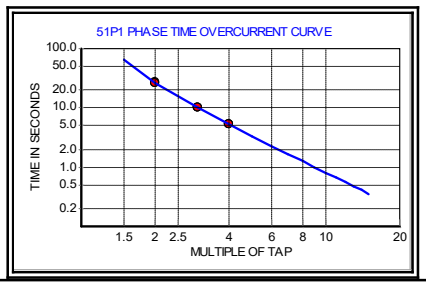
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.000	1626.08	27.101	26.667	1.63	PASS
3.00	3.000	607.62	10.127	10.000	1.27	PASS
4.00	4.000	321.91	5.365	5.333	0.60	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.000	1599.79	26.663	26.667	-0.01	PASS
3.00	3.000	604.18	10.070	10.000	0.70	PASS
4.00	4.000	319.24	5.321	5.333	-0.24	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.000	1605.14	26.752	26.667	0.32	PASS
3.00	3.000	598.13	9.969	10.000	-0.31	PASS
4.00	4.000	323.36	5.389	5.333	1.05	PASS



Relay Test Results for: 51P2P PHASE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P2 PHASE TIME OVERCURRENT CURVE

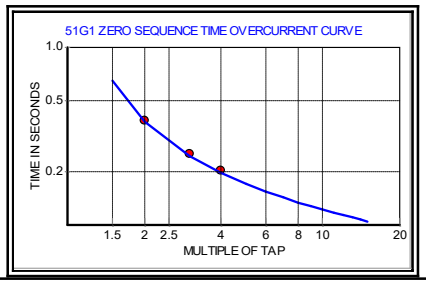
OK?
RAN

Relay Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.485	0.500	-3.00	PASS

Relay Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.000	23.35	0.389	0.384	1.38	PASS
3.00	1.500	15.10	0.252	0.245	2.54	PASS
4.00	2.000	12.16	0.203	0.196	3.28	PASS



Relay Test Results for: 51Q1P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q1 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51Q2P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q2 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: NEUTRAL TEST CONNECTIONS

OK?
RAN

Relay Test Results for: 50N1P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N2P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1P NEUTRAL TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1 NEUTRAL TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: RESTORE LOGIC SETTINGS

OK?
RAN

Relay Test Results for: RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

```
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE
```

Relay Test Results for: LOG OUT OF THE RELAY

OK?
RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-551.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 8.2 **Test Date:** 05/08/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	13.2 KV	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	CENTRAL ELECTRICAL BUILDING
POSITION:	52F29 SPACE 10 TOP	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	SEL-551
SERIAL_NUMBER:	2006074325	FIRMWARE:	SEL-551-R510-VF-Z002002-D20050523
RELAY_ID:	50/51	CURRENT_TESTDATE:	5/8/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
CONTACT$="4"          'OUTPUT CONTACT TO MASK
SEL_AUTO=1            '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1            'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1              'NO ERROR MESSAGE IF NO OPERATION
```

Routine Notes:

»Fri May 08, 2020
JOB # AACI207024

Relay Settings Used for Testing:

```
RID$ = "52F29"
TID$ = "SPACE 10-TOP"
CTR = 120
CTRN = 120
TDURD = 9.000
s50P1P = 13.0
s50P2P = 1.3
s50P3P$ = "OFF"
s50P4P$ = "OFF"
s50P5P$ = "OFF"
s50P6P$ = "OFF"
s50ABCP$ = "OFF"
s51P1P = 0.6
s51P1C$ = "C3"
s51P1TD = 1.00
s51P1RS$ = "N"
s51P2P$ = "OFF"
s51P2C$ = "U3"
s51P2TD = 15.00
s51P2RS$ = "N"
s50N1P$ = "OFF"
s50N2P$ = "OFF"
s51N1P$ = "OFF"
s51N1C$ = "U4"
s51N1TD = 3.00
s51N1RS$ = "N"
s50G1P = 5.4
s50G2P$ = "OFF"
s51G1P = 0.5
s51G1C$ = "U1"
s51G1TD = 0.50
```

```
s51G1RS$ = "N"
s50Q1P$ = "OFF"
s50Q2P$ = "OFF"
s51Q1P$ = "OFF"
s51Q1C$ = "U3"
s51Q1TD = 15.00
s51Q1RS$ = "N"
s51Q2P$ = "OFF"
s51Q2C$ = "U3"
s51Q2TD = 15.00
s51Q2RS$ = "N"
s79OI1 = 0.000
s79OI2 = 600.000
s79OI3 = 0.000
s79OI4 = 0.000
s79RSD = 1800.000
s79RSLD = 300.000
CFD = 60.000
DMTC = 5
PDEMP = 5.00
NDEMP = 1.50
GDEMP = 1.50
QDEMP = 1.50
SV5PU = 0.000
SV5DO = 0.000
SV6PU = 0.000
SV6DO = 0.000
SV7PU = 0.000
SV7DO = 0.000
SV8PU = 0.000
SV8DO = 0.000
SV9PU = 0.000
SV9DO = 0.000
SV10PU = 0.000
SV10DO = 0.000
SV11PU = 0.000
SV11DO = 0.000
SV12PU = 0.000
SV12DO = 0.000
SV13PU = 0.000
SV13DO = 0.000
SV14PU = 0.000
SV14DO = 0.000
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
TR$ = "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "
ULTR$ = "!(51P1 + 51G1)"
s51P1TC = 1
s51P2TC = 1
s51N1TC = 1
s51G1TC = 1
s51Q1TC = 1
s51Q2TC = 1
s52A$ = "IN1"
CL$ = "LB4"
ULCL$ = "TRIP"
s79RI$ = "TRIP"
s79RIS$ = "IN1"
s79DTL$ = "!LB1 + LB3"
s79DLS$ = "79LO"
s79SKP$ = "50P2 * SH0"
s79STL$ = "TRIP"
```

```
s79BRS$ = "(51P1 + 51G1) * (79RS + 79CY)"
s79SEQ = 0
ER1$ = "51P1 + 51G1 + 51N1"
ER2 = 0
SV1 = 0
SV2 = 0
SV3 = 0
SV4 = 0
SV5 = 0
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
OUT1$ = "TRIP"
OUT2 = 0
OUT3 = 0
OUT4 = 0
DP1$ = "IN1"
DP2$ = "LB2"
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
```

Relay Test Results for: ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for: LOG INTO THE RELAY

OK?
RAN

Relay Test Results for: DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for: SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

Relay Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

52F29                              Date: 05/08/20    Time: 11:50:16.126
SPACE 10-TOP

FID=SEL-551-R510-Vf-Z002002-D20050523      CID=4895

SELF TESTS

W=Warn    F=Fail

       IA        IB        IC        IN        MOF
OS      2         3         3         3         0

       +5V_PS    +5V_REG   -5V_REG   +10V_PS   -10V_PS   VBAT
PS      4.99      5.03     -5.01      9.94     -10.15     3.30

       TEMP      RAM       ROM       CR_RAM    EEPROM
        29.6     OK        OK        OK        OK

 Relay Enabled

=>>
```

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR ELEMENT TEST

OK?
RAN

Relay Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	213.0	-1.4	PASS
B-N	0.0	0.0	0.0	240.0	239.0	-0.4	PASS
C-N	0.0	0.0	0.0	264.0	262.0	-0.8	PASS

Relay Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	13.000	13.000	0.00	PASS
B-N	13.000	13.000	0.00	PASS
C-N	13.000	13.000	0.00	PASS

Relay Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	1.301	1.300	0.08	PASS
B-N	1.288	1.300	-0.92	PASS
C-N	1.301	1.300	0.08	PASS

Relay Test Results for: 50P3P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P4P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P5P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P6P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE A OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE B OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE C OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.398	5.400	-0.04	PASS

Relay Test Results for: 50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		0.590	0.600	-1.67	PASS
B-N		0.614	0.600	2.33	PASS
C-N		0.620	0.600	3.33	PASS

Relay Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

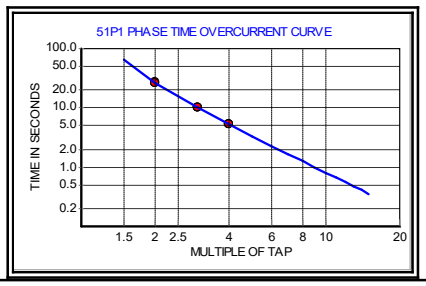
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1578.82	26.314	26.667	-1.32	PASS
3.00	1.800	604.43	10.074	10.000	0.74	PASS
4.00	2.400	316.78	5.280	5.333	-1.01	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1649.16	27.486	26.667	3.07	PASS
3.00	1.800	603.41	10.057	10.000	0.57	PASS
4.00	2.400	321.86	5.364	5.333	0.58	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1586.69	26.445	26.667	-0.83	PASS
3.00	1.800	607.73	10.129	10.000	1.29	PASS
4.00	2.400	321.70	5.362	5.333	0.53	PASS



Relay Test Results for: 51P2P PHASE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P2 PHASE TIME OVERCURRENT CURVE

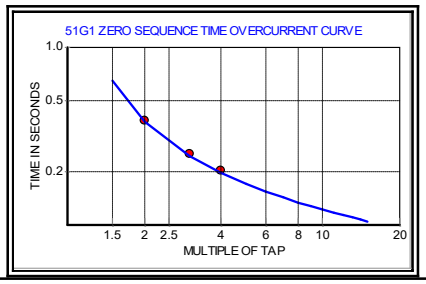
OK?
RAN

Relay Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.490	0.500	-2.00	PASS

Relay Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.000	23.32	0.389	0.384	1.25	PASS
3.00	1.500	14.98	0.250	0.245	1.72	PASS
4.00	2.000	12.09	0.202	0.196	2.67	PASS



Relay Test Results for: 51Q1P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q1 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51Q2P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q2 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: NEUTRAL TEST CONNECTIONS

OK?
RAN

Relay Test Results for: 50N1P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N2P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1P NEUTRAL TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1 NEUTRAL TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: RESTORE LOGIC SETTINGS

OK?
RAN

Relay Test Results for: RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

```
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE
```

Relay Test Results for: LOG OUT OF THE RELAY

OK?
RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-587Z.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 8.1 **Test Date:** 03/11/2020

Relay Data:

```
0:                15002                TESTED_BY:        RICK WALLS
DIVISION:         UIS                  SUBSTATION:       8
CUSTOMER:         AACI207024           USER:             AAWWTP
LOCATION:         EAST BLOWER BUILDING POSITION:         BUS A DIFF
RELAY_MANF:       SEL                  RELAY_TYPE:       SEL-587Z
MODEL_STYLE:      0587Z0X325522XX      IEEE_DEVICE:      MF
IL_IB:            SEL-587Z             SERIAL_NUMBER:    1140860360
FIRMWARE:         SEL-587Z-R102-V0-Z001001-D20020903RELAY_ID:         SEL-
587Z
CURRENT_TESTDATE: 3/11/2020            TESTSET_CALDATE:  10/29/2020
APPROVED_BY:      R WALLS
```

Global Defines:

```
CONTACT$="4"          'OUTPUT CONTACT TO MASK
SEL_AUTO=1            '0=MANUAL, 1=AUTO MASK, 2=MANUAL W/MESSAGES
SKIP_TST=1            'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1              'NO ERROR MESSAGE IF NO OPERATION
```

Routine Notes:

Relay Settings Used for Testing:

```
RID$ = "BUS 1"
TID$ = "STATION A"
CTR = 240
TDURD = 9.000
s87A1P = 200
s87A2P = 90
s87B1P = 200
s87B2P = 90
s87C1P = 200
s87C2P = 90
s50P1P$ = "OFF"
s50P2P$ = "OFF"
s50P3P$ = "OFF"
s50A1P$ = "OFF"
s50A2P$ = "OFF"
s50B1P$ = "OFF"
s50B2P$ = "OFF"
s50C1P$ = "OFF"
s50C2P$ = "OFF"
s51PP$ = "OFF"
s51PC$ = "U3"
s51PTD = 15.00
s51PRS$ = "N"
s51AP$ = "OFF"
s51AC$ = "U3"
s51ATD = 15.00
s51ARS$ = "N"
```

```
s51BP$ = "OFF"
s51BC$ = "U3"
s51BTD = 15.00
s51BRS$ = "N"
s51CP$ = "OFF"
s51CC$ = "U3"
s51CTD = 15.00
s51CRS$ = "N"
s50G1P$ = "OFF"
s50G2P$ = "OFF"
s51GP$ = "OFF"
s51GC$ = "U3"
s51GTD = 15.00
s51GRS$ = "N"
s50Q1P$ = "OFF"
s50Q2P$ = "OFF"
s51QP$ = "OFF"
s51QC$ = "U3"
s51QTD = 15.00
s51QRS$ = "N"
CFD = 60.000
DMTC = 5
PDEMP = 5.00
GDEMP = 1.50
QDEMP = 1.50
SV5PU = 120.000
SV5DO = 0.000
SV6PU = 15.000
SV6DO = 0.000
SV7PU = 0.000
SV7DO = 0.000
SV8PU = 0.000
SV8DO = 0.000
SV9PU = 0.000
SV9DO = 0.000
SV10PU = 0.000
SV10DO = 0.000
SV11PU = 0.000
SV11DO = 0.000
SV12PU = 0.000
SV12DO = 0.000
SV13PU = 0.000
SV13DO = 0.000
SV14PU = 0.000
SV14DO = 0.000
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
TR1$ = "87A1 + 87B1 + 87C1 + 50A1 + 50B1 + 50C1"
TR2 = 0
TR3 = 0
ULTR1$ = "!87A2 * !87B2 * !87C2 * !50A2 * !50B2 * !50C2 "
ULTR2 = 1
ULTR3 = 1
s51PTC = 1
```

```
s51ATC = 1
s51BTC = 1
s51CTC = 1
s51GTC = 1
s51QTC = 1
s52A = 0
CL = 0
ULCL$ = "TRIP1"
ER1$ = "87A1 + 87B1 + 87C1"
ER2$ = "87A2 + 87B2 + 87C2"
SV1 = 0
SV2 = 0
SV3 = 0
SV4 = 0
SV5 = 0
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
OUT1$ = "TRIP1"
OUT2$ = "TRIP1"
OUT3$ = "SV5T + SV6T"
OUT4 = 0
DP1 = 0
DP2 = 0
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
P1_PROTO$ = "MOD"
P1_SPEED = 19200
P1_PARITY$ = "E"
P1_STOP = 1
P1_SLAVE = 3
PF_PROTO$ = "SEL"
PF_SPEED = 19200
PF_BITS = 8
PF_PARITY$ = "N"
PF_STOP = 1
PF_T_OUT = 15
PF_AUTO$ = "N"
PF_RTSCTS$ = "N"
PF_FASTOP$ = "N"
```

Relay Test Results for: ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for: LOG INTO THE RELAY

OK?
RAN

Relay Test Results for: DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for: SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

N/A

Additional Data:
STA

BUS 1 Date: 03/11/2020 Time: 10:09:42.212
STATION A

FID=SEL-587Z-R102-V0-Z001001-D20020903 CID=0C9F

SELF TESTS

W=Warn F=Fail

	87A	87B	87C	IA	IB	IC	MOF
OS	3	3	3	3	3	3	0

	+5V_PS	+5V_REG	-5V_REG	+10V_PS	-10V_PS	VBAT
PS	4.96	4.98	-5.04	9.94	-10.05	3.45

TEMP	RAM	ROM	CR_RAM	EEPROM
29.6	OK	OK	OK	OK

Relay Enabled

=>>

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR ELEMENT TESTS

OK?
RAN

Relay Test Results for: 87A1P PHASE A VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
198.000	200.000	-1.00	PASS

Relay Test Results for: 87A2P PHASE A VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
90.000	90.000	0.00	PASS

Relay Test Results for: 87B1P PHASE B VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
196.000	200.000	-2.00	PASS

Relay Test Results for: 87B2P PHASE B VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
89.100	90.000	-1.00	PASS

Relay Test Results for: 87C1P PHASE C VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
196.000	200.000	-2.00	PASS

Relay Test Results for: 87C2P PHASE C VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
90.000	90.000	0.00	PASS

Relay Test Results for: 50P1P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P2P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P3P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50A1P PHASE A OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50A2P PHASE A OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50B1P PHASE B OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50B2P PHASE B OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50C1P PHASE C OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50C2P PHASE C OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:	50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP	OK? RAN
Relay Test Results for:	51PP PHASE TO PHASE TIME OVERCURRENT PICKUP	OK? RAN
Relay Test Results for:	51P PHASE TIME OVERCURRENT CURVE	OK? RAN
Relay Test Results for:	51AP PHASE A TIME OVERCURRENT PICKUP	OK? RAN
Relay Test Results for:	51A PHASE A TIME OVERCURRENT CURVE	OK? RAN
Relay Test Results for:	51BP PHASE B TIME OVERCURRENT PICKUP	OK? RAN
Relay Test Results for:	51B PHASE B TIME OVERCURRENT CURVE	OK? RAN
Relay Test Results for:	51CP PHASE C TIME OVERCURRENT PICKUP	OK? RAN
Relay Test Results for:	51C PHASE C TIME OVERCURRENT CURVE	OK? RAN
Relay Test Results for:	51GP ZERO SEQUENCE TIME OVERCURRENT PICKUP	OK? RAN
Relay Test Results for:	51G ZERO SEQUENCE TIME OVERCURRENT CURVE	OK? RAN
Relay Test Results for:	51QP NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP	OK? RAN
Relay Test Results for:	51Q NEGATIVE SEQUENCE TIME OVERCURRENT CURVE	OK? RAN
Relay Test Results for:	RESTORE LOGIC SETTINGS	OK? RAN
Relay Test Results for:	RESTORE PORT SETTINGS	OK? RAN
Relay Test Results for:	COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS	OK? PASS

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

```
Additional Data:
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE
```

Relay Test Results for: LOG OUT OF THE RELAY

OK?
RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-587Z.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 8.4 **Test Date:** 03/12/2020

Relay Data:

TESTED_BY:	KERRY HAYSLIP	SUBSTATION:	8
CUSTOMER:	CITY OF ANN ARBOR	USER:	ANN ARBOR WASTEWATER
LOCATION:	EAST BLOWER BLDG	POSITION:	BUS B DIFFERENTIAL
RELAY_MANF:	SEL	RELAY_TYPE:	SEL-587Z
MODEL_STYLE:	0587Z0X325522XX	IEEE_DEVICE:	MF
IL_IB:	SEL-587Z	SERIAL_NUMBER:	1140860359
FIRMWARE:	SEL-587Z-R102-V0-Z001001-D20020903	RELAY_ID:	587Z
CURRENT_TESTDATE:	3/12/2020	TESTSET_CALDATE:	10/29/2019

Global Defines:

```
CONTACT$="2"         'OUTPUT CONTACT TO MASK
SEL_AUTO=1.0000           '0=MANUAL, 1=AUTO MASK, 2=MANUAL W/MESSAGES
SKIP_TST=1.0000           'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1.0000             'NO ERROR MESSAGE IF NO OPERATION
```

Routine Notes:

Relay Settings Used for Testing:

```
RID$ = "BUS 1"
TID$ = "STATION A"
CTR = 240
TDURD = 9.000
s87A1P = 200
s87A2P = 90
s87B1P = 200
s87B2P = 90
s87C1P = 200
s87C2P = 90
s50P1P$ = "OFF"
s50P2P$ = "OFF"
s50P3P$ = "OFF"
s50A1P$ = "OFF"
s50A2P$ = "OFF"
s50B1P$ = "OFF"
s50B2P$ = "OFF"
s50C1P$ = "OFF"
s50C2P$ = "OFF"
s51PP$ = "OFF"
s51PC$ = "U3"
s51PTD = 15.00
s51PRS$ = "N"
s51AP$ = "OFF"
s51AC$ = "U3"
s51ATD = 15.00
s51ARS$ = "N"
s51BP$ = "OFF"
s51BC$ = "U3"
s51BTD = 15.00
s51BRS$ = "N"
s51CP$ = "OFF"
s51CC$ = "U3"
s51CTD = 15.00
```

```
s51CRS$ = "N"
s50G1P$ = "OFF"
s50G2P$ = "OFF"
s51GP$ = "OFF"
s51GC$ = "U3"
s51GTD = 15.00
s51GRS$ = "N"
s50Q1P$ = "OFF"
s50Q2P$ = "OFF"
s51QP$ = "OFF"
s51QC$ = "U3"
s51QTD = 15.00
s51QRS$ = "N"
CFD = 60.000
DMTC = 5
PDEMP = 5.00
GDEMP = 1.50
QDEMP = 1.50
SV5PU = 120.000
SV5DO = 0.000
SV6PU = 15.000
SV6DO = 0.000
SV7PU = 0.000
SV7DO = 0.000
SV8PU = 0.000
SV8DO = 0.000
SV9PU = 0.000
SV9DO = 0.000
SV10PU = 0.000
SV10DO = 0.000
SV11PU = 0.000
SV11DO = 0.000
SV12PU = 0.000
SV12DO = 0.000
SV13PU = 0.000
SV13DO = 0.000
SV14PU = 0.000
SV14DO = 0.000
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
TR1$ = "87A1 + 87B1 + 87C1 + 50A1 + 50B1 + 50C1"
TR2 = 0
TR3 = 0
ULTR1$ = "!87A2 * !87B2 * !87C2 * !50A2 * !50B2 * !50C2 "
ULTR2 = 1
ULTR3 = 1
s51PTC = 1
s51ATC = 1
s51BTC = 1
s51CTC = 1
s51GTC = 1
s51QTC = 1
s52A = 0
CL = 0
ULCL$ = "TRIP1"
ER1$ = "87A1 + 87B1 + 87C1"
ER2$ = "87A2 + 87B2 + 87C2"
SV1 = 0
SV2 = 0
SV3 = 0
SV4 = 0
SV5 = 0
```

```
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
OUT1$ = "TRIP1"
OUT2$ = "TRIP1"
OUT3$ = "SV5T + SV6T"
OUT4 = 0
DP1 = 0
DP2 = 0
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
P1_PROTO$ = "MOD"
P1_SPEED = 19200
P1_PARITY$ = "E"
P1_STOP = 1
P1_SLAVE = 15
PF_PROTO$ = "SEL"
PF_SPEED = 19200
PF_BITS = 8
PF_PARITY$ = "N"
PF_STOP = 1
PF_T_OUT = 15
PF_AUTO$ = "N"
PF_RTSCTS$ = "N"
PF_FASTOP$ = "N"
```

Relay Test Results for: ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for: LOG INTO THE RELAY

OK?
RAN

Relay Test Results for: DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for: SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

Relay Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

BUS 1                              Date: 03/12/2020    Time: 08:04:00.813
STATION A

FID=SEL-587Z-R102-V0-Z001001-D20020903      CID=0C9F

SELF TESTS

W=Warn    F=Fail

       87A      87B      87C      IA       IB       IC       MOF
OS      2        3        3        3        3        3        0

       +5V_PS   +5V_REG  -5V_REG  +10V_PS  -10V_PS  VBAT
PS      4.98     5.01    -5.04     9.94    -10.00    3.45

       TEMP     RAM      ROM      CR_RAM   EEPROM
        27.6    OK       OK       OK       OK

 Relay Enabled

=>>
```

Relay Test Results for: COMPONENT MAINTENANCE NOTES

OK?
RAN

Relay Test Results for: CURRENT\VOLTAGE INJECTION TEST CONNECTIONS

OK?
RAN

Relay Test Results for: SEL-500 SERIES RELAY OUTPUT VERIFICATION

Relay Test Results for: SEL-500 SERIES RELAY OUTPUT VERIFICATION

Select one of the options below to verify
RELAY OUTPUTS are operating properly

( ) Manually verify 'Output' operation as desired,
Select a PASS\FAIL status for result.

(O) Manually verify 'Output' operation as desired,
Auto-create a Yes/No checklist based on existing settings.

( ) Verify 'Output' operation by MODIFYING LOGIC,
Auto-create a Yes/No checklist based on existing settings.

( ) Verify 'Output' operation by APPLYING VALUES to the Test Set,
Determine Test Values using existing tests,
Manually update result form OR Read Test Set Input,
Auto-create a Yes/No checklist based on existing settings.

( ) Provide an explanation of options and return to the form

What RELAY OUTPUTS should be displayed for testing?

[ ] Display ALL available outputs
[x] Display ONLY outputs that contain logic

Manually verify output operations for this relay.

	PASS	FAIL	N/A	COMMENTS
OUT1	[x]	[ ]	[ ]	
OUT2	[x]	[ ]	[ ]	
OUT3	[x]	[ ]	[ ]	

By selecting 'PASS' you have determined that OUTPUTS
on this relay essential to proper functioning of
the Protection System are operational.

Relay Test Results for: CURRENT SIGNAL VALUE VERIFICATION

Verify CURRENT SIGNAL VALUES are
provided to the relay

(O) PASS

( ) FAIL

By selecting PASS you have determined that CURRENT
SIGNAL VALUES are provided to the protective relay.

If selecting FAIL, add an explanation below.

NOTES:

Relay Test Results for: VOLTAGE SIGNAL VALUE VERIFICATION

Relay Test Results for: VOLTAGE SIGNAL VALUE VERIFICATION

Verify VOLTAGE SIGNAL VALUES are
provided to the relay

(O) PASS

( ) FAIL

By selecting PASS you have determined that VOLTAGE SIGNAL VALUES are provided to the protective relay.

If selecting FAIL, add an explanation below.

NOTES:

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR ELEMENT TESTS

OK?
RAN

Relay Test Results for: 87A1P PHASE A VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
196.000	200.000	-2.00	PASS

Relay Test Results for: 87A2P PHASE A VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
90.000	90.000	0.00	PASS

Relay Test Results for: 87B1P PHASE B VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
196.000	200.000	-2.00	PASS

Relay Test Results for: 87B2P PHASE B VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
89.100	90.000	-1.00	PASS

Relay Test Results for: 87C1P PHASE C VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
196.000	200.000	-2.00	PASS

Relay Test Results for: 87C2P PHASE C VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
89.100	90.000	-1.00	PASS

Relay Test Results for: 50P1P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P2P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P3P PHASE OVERCURRENT PICKUP

Relay Test Results for:	50P3P PHASE OVERCURRENT PICKUP
	OK? RAN
Relay Test Results for:	50A1P PHASE A OVERCURRENT PICKUP
	OK? RAN
Relay Test Results for:	50A2P PHASE A OVERCURRENT PICKUP
	OK? RAN
Relay Test Results for:	50B1P PHASE B OVERCURRENT PICKUP
	OK? RAN
Relay Test Results for:	50B2P PHASE B OVERCURRENT PICKUP
	OK? RAN
Relay Test Results for:	50C1P PHASE C OVERCURRENT PICKUP
	OK? RAN
Relay Test Results for:	50C2P PHASE C OVERCURRENT PICKUP
	OK? RAN
Relay Test Results for:	50G1P ZERO SEQUENCE OVERCURRENT PICKUP
	OK? RAN
Relay Test Results for:	50G2P ZERO SEQUENCE OVERCURRENT PICKUP
	OK? RAN
Relay Test Results for:	50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP
	OK? RAN
Relay Test Results for:	50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP
	OK? RAN
Relay Test Results for:	51PP PHASE TO PHASE TIME OVERCURRENT PICKUP
	OK? RAN
Relay Test Results for:	51P PHASE TIME OVERCURRENT CURVE
	OK? RAN
Relay Test Results for:	51AP PHASE A TIME OVERCURRENT PICKUP
	OK? RAN
Relay Test Results for:	51A PHASE A TIME OVERCURRENT CURVE
	OK? RAN
Relay Test Results for:	51BP PHASE B TIME OVERCURRENT PICKUP
	OK? RAN
Relay Test Results for:	51B PHASE B TIME OVERCURRENT CURVE
	OK? RAN
Relay Test Results for:	51CP PHASE C TIME OVERCURRENT PICKUP
	OK? RAN
Relay Test Results for:	51C PHASE C TIME OVERCURRENT CURVE

Relay Test Results for: 51C PHASE C TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51GP ZERO SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51G ZERO SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51QP NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: RESTORE LOGIC SETTINGS

OK?
RAN

Relay Test Results for: RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

OK?
PASS

Additional Data:
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

Relay Test Results for: LOG OUT OF THE RELAY

OK?
RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SR-469.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 2.7 **Test Date:** 02/26/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	3 - MCC-WBB-A	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	WEST BLOWER BLDG
POSITION:	PAB-W1	RELAY_MANF:	GE MULTILIN
RELAY_TYPE:	SR-469	MODEL_STYLE:	469-P5-HI-A20-T
IEEE_DEVICE:	MF	IL_IB:	SR469-RELAY
SERIAL_NUMBER:	B3041646	FIRMWARE:	30I520A8.000
RELAY_ID:	AACI207024	CURRENT_TESTDATE:	2/26/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
RELAY_ADDRESS=1                              'SPECIFIC RELAY ADDRESS USED FOR
MODBUS COMMUNICATIONS (DEFAULT=1)
TRIP_OUTPUT$="F1-E2"                         'OUTPUT CONTACT TO SENSE A TRIP
AUTO_MASK=1                                  'SET TO 2 TO DISPLAY FLEX PROGRAMMING
SKIP_TST=1                                   'SET TO 1 TO SKIP MESSAGES FOR TESTS
SKIPPED
PRINT_RAN_TESTS=1                            'MARKS TESTS IF THEY WERE ATTEMPTED
BUT NOT APPLICABLE
Phase_CT_Secondary=5                         'THIS IS THE RELAYS PHASE NOMINAL CT
INPUT
VTR=Voltage_Transformer_Ratio                'VT RATIO
CTR=Phase_CT_Primary/Phase_CT_Secondary      'CALCULATED CT RATIO
FLA=(MOTOR_Full_load_Amps)/CTR               'SECONDARY FULL LOAD CURRENT
MTR_START_MULT=0.5                           'MULT OF FULL LOAD AMPS
MTR_START_DELAY=120                          'WAIT TIME IN CYCLES FOR START
```

Routine Notes:

Relay Settings Used for Testing:

```
SR_PART_NUM$ = "469-P5-HI-A20-T"  'Information acquired from Settings file
SR_FIRMWARE$ = "5200"  'Information acquired from Settings file
Default_Message_Cycle_Time = 2.0  'Default Message Cycle Time
Default_Message_Timeout = 300  'Default Message Timeout
Average_Motor_Load_Calculation_Period = 15  'Average Motor Load Calculation
Period
Temperature_Display_Units$ = "Celsius"  'Temperature Display Units
Trace_Memory_Trigger_Position = 25  'Trace Memory Trigger Position
Trace_Memory_Buffers$ = "8 x 28 cycles"  'Trace Memory Buffers
Display_Update_Interval = 0.4  'Display Update Interval
Motor_Load_Filter_Interval = 0  'Motor Load Filter Interval
Communication_Port_Passcode = 0  'Communication Port Passcode
Passcode_write_Only_ = 0  'Passcode (write Only)
First_Scratchpad_Message$ = "PAB-W1"  'First Scratchpad Message
Second_Scratchpad_Message$ = ""  'Second Scratchpad Message
Third_Scratchpad_Message$ = ""  'Third Scratchpad Message
Fourth_Scratchpad_Message$ = ""  'Fourth Scratchpad Message
Fifth_Scratchpad_Message$ = ""  'Fifth Scratchpad Message
Phase_CT_Primary = 600  'Phase CT Primary
Motor_Full_Load_Amps = 331  'Motor Full Load Amps
Ethernet_IP_Address = 0  'Ethernet IP Address
Ethernet_Subnet_Mask = 4294966272  'Ethernet Subnet Mask
Ethernet_Gateway_Address = 0  'Ethernet Gateway Address
```

```
DeviceNet_MAC_ID = 1  'DeviceNet MAC ID
DeviceNet_Baud_Rate$ = "125 kbps"  'DeviceNet Baud Rate
Front_RS232_baud_rate$ = "19200 baud"  'Front RS232 baud rate
Slave_Address = 254  'Slave Address
Computer_RS485_Baud_Rate$ = "9600 baud"  'Computer RS485 Baud Rate
Computer_RS485_Parity$ = "None"  'Computer RS485 Parity
Auxiliary_RS485_Baud_Rate$ = "9600 baud"  'Auxiliary RS485 Baud Rate
Auxiliary_RS485_Parity$ = "None"  'Auxiliary RS485 Parity
Ground_CT_Type$ = "Multlin CT 50/0.025"  'Ground CT Type
Phase_Differential_CT_Type$ = "None"  'Phase Differential CT Type
Enable_Two_Speed_Motor_Option$ = "Off/No"  'Enable Two Speed Motor Option
Speed_Two_Phase_CT_Primary = 100  'Speed Two Phase CT Primary
Speed_Two_Motor_Full_Load_Amps = 1  'Speed Two Motor Full Load Amps
VoltageTransformer_Connection_Type$ = "Open Delta"  'VoltageTransformer
Connection Type
Enable_Single_VT_Connection$ = "Off"  'Enable Single VT Connection
Voltage_Transformer_Ratio = 4.00  'Voltage Transformer Ratio
Motor_Nameplate_Voltage = 460  'Motor Nameplate Voltage
Nominal_System_Frequency$ = "60 Hz"  'Nominal System Frequency
System_Phase_Sequence$ = "ABC"  'System Phase Sequence
Serial_Communication_Control$ = "Off/No"  'Serial Communication Control
Assign_Start_Control_Relays$ = "Auxiliary 2"  'Assign Start Control Relays
Reduced_Voltage_Starting$ = "Off/No"  'Reduced Voltage Starting
Control_Relays_for_Reduced_Voltage_Starting$ = "Auxiliary 3"  'Control Relays
for Reduced Voltage Starting
Transition_On$ = "Current Only"  'Transition On
Reduced_Voltage_Start_Level = 100  'Reduced Voltage Start Level
Reduced_Voltage_Start_Timer = 200  'Reduced Voltage Start Timer
Incomplete_Sequence_Trip_Relays$ = "Trip"  'Incomplete Sequence Trip Relays
Starter_Status_Switch$ = "Start Aux a"  'Starter Status Switch
Assignable_Input_1_Function$ = "Off"  'Assignable Input 1 Function
Counter_Alarm_Events$ = "Off/No"  'Counter Alarm Events
Rated_Speed = 3600  'Rated Speed
Tachometer_Alarm$ = "Off"  'Tachometer Alarm
Tachometer_Alarm_Relays$ = "Alarm"  'Tachometer Alarm Relays
Tachometer_Alarm_Speed = 10  'Tachometer Alarm Speed
Tachometer_Alarm_Delay = 1  'Tachometer Alarm Delay
Tachometer_Alarm_Events$ = "Off/No"  'Tachometer Alarm Events
Tachometer_Trip$ = "Off"  'Tachometer Trip
Tachometer_Trip_Relays$ = "Trip"  'Tachometer Trip Relays
Tachometer_Trip_Speed = 10  'Tachometer Trip Speed
Tachometer_Trip_Delay = 1  'Tachometer Trip Delay
General_Switch_A_Name = 0  'General Switch A Name
General_Switch_A_Normal_State$ = "Normally Open"  'General Switch A Normal State
General_Switch_A_Block_Input_From_Start = 0  'General Switch A Block Input From
Start
General_Switch_A_Alarm$ = "Off"  'General Switch A Alarm
General_Switch_A_Alarm_Relays$ = "Alarm"  'General Switch A Alarm Relays
General_Switch_A_Alarm_Delay = 5.0  'General Switch A Alarm Delay
General_Switch_A_Alarm_Events$ = "Off/No"  'General Switch A Alarm Events
General_Switch_A_Trip$ = "Off"  'General Switch A Trip
General_Switch_A_Trip_Relays$ = "Trip"  'General Switch A Trip Relays
General_Switch_A_Trip_Delay = 5.0  'General Switch A Trip Delay
General_Switch_B_Name = 0  'General Switch B Name
General_Switch_B_Normal_State$ = "Normally Open"  'General Switch B Normal State
General_Switch_B_Block_Input_From_Start = 0  'General Switch B Block Input From
Start
General_Switch_B_Alarm$ = "Off"  'General Switch B Alarm
General_Switch_B_Alarm_Relays$ = "Alarm"  'General Switch B Alarm Relays
General_Switch_B_Alarm_Delay = 5.0  'General Switch B Alarm Delay
General_Switch_B_Alarm_Events$ = "Off/No"  'General Switch B Alarm Events
General_Switch_B_Trip$ = "Off"  'General Switch B Trip
General_Switch_B_Trip_Relays$ = "Trip"  'General Switch B Trip Relays
```

```
General_Switch_B_Trip_Delay = 5.0  'General Switch B Trip Delay
General_Switch_C_Name = 0  'General Switch C Name
General_Switch_C_Normal_State$ = "Normally Open"  'General Switch C Normal State
General_Switch_C_Block_Input_From_Start = 0  'General Switch C Block Input From
Start
General_Switch_C_Alarm$ = "Off"  'General Switch C Alarm
General_Switch_C_Alarm_Relays$ = "Alarm"  'General Switch C Alarm Relays
General_Switch_C_Alarm_Delay = 5.0  'General Switch C Alarm Delay
General_Switch_C_Alarm_Events$ = "Off/No"  'General Switch C Alarm Events
General_Switch_C_Trip$ = "Off"  'General Switch C Trip
General_Switch_C_Trip_Relays$ = "Trip"  'General Switch C Trip Relays
General_Switch_C_Trip_Delay = 5.0  'General Switch C Trip Delay
General_Switch_D_Name = 0  'General Switch D Name
General_Switch_D_Normal_State$ = "Normally Open"  'General Switch D Normal State
General_Switch_D_Block_Input_From_Start = 0  'General Switch D Block Input From
Start
General_Switch_D_Alarm$ = "Off"  'General Switch D Alarm
General_Switch_D_Alarm_Relays$ = "Alarm"  'General Switch D Alarm Relays
General_Switch_D_Alarm_Delay = 5.0  'General Switch D Alarm Delay
General_Switch_D_Alarm_Events$ = "Off/No"  'General Switch D Alarm Events
General_Switch_D_Trip$ = "Off"  'General Switch D Trip
General_Switch_D_Trip_Relays$ = "Trip"  'General Switch D Trip Relays
General_Switch_D_Trip_Delay = 5.0  'General Switch D Trip Delay
Assignable_Input_2_Function$ = "Off"  'Assignable Input 2 Function
Assignable_Input_3_Function$ = "Off"  'Assignable Input 3 Function
Assignable_Input_4_Function$ = "Off"  'Assignable Input 4 Function
Reset_Mode_R1_Trip$ = "All Resets"  'Reset Mode R1 Trip
Force_R1_Output_Relay$ = "Disabled"  'Force R1 Output Relay
Force_R1_Operate_Time = 0  'Force R1 Operate Time
Reset_Mode_R4_Auxiliary$ = "All Resets"  'Reset Mode R4 Auxiliary
Force_R4_Output_Relay$ = "Disabled"  'Force R4 Output Relay
Force_R4_Operate_Time = 0  'Force R4 Operate Time
Reset_Mode_R2_Auxiliary$ = "All Resets"  'Reset Mode R2 Auxiliary
Force_R2_Output_Relay$ = "Disabled"  'Force R2 Output Relay
Force_R2_Output_Operate_Time = 0  'Force R2 Output Operate Time
Reset_Mode_R3_Auxiliary$ = "All Resets"  'Reset Mode R3 Auxiliary
Force_R3_Output_Relay$ = "Disabled"  'Force R3 Output Relay
Force_R3_Operate_Time = 0  'Force R3 Operate Time
Force_R5_Output_Relay$ = "Disabled"  'Force R5 Output Relay
Force_R5_Operate_Time = 0  'Force R5 Operate Time
Reset_Mode_R6_Service$ = "All Resets"  'Reset Mode R6 Service
Curve_Style$ = "Standard"  'Curve Style
Overload_Pickup_Level = 1.15  'Overload Pickup Level
Unbalance_k_Factor = 0  'Unbalance k Factor
Cool_Time_Constant_Running = 15  'Cool Time Constant Running
Cool_Time_Constant_Stopped = 30  'Cool Time Constant Stopped
Hot_Cold_Safe_Stall_Ratio = 0.89  'Hot/Cold Safe Stall Ratio
RTD_Blasing$ = "Off/No"  'RTD Blasing
RTD_Blas_Minimum = 40  'RTD Blas Minimum
RTD_Blas_Center_Point = 130  'RTD Blas Center Point
RTD_Blas_Maximum = 155  'RTD Blas Maximum
Thermal_Capacity_Alarm$ = "Off"  'Thermal Capacity Alarm
Thermal_Capacity_Alarm_Relays$ = "Alarm"  'Thermal Capacity Alarm Relays
Thermal_Capacity_Alarm_Level = 75  'Thermal Capacity Alarm Level
Thermal_Capacity_Alarm_Events$ = "Off/No"  'Thermal Capacity Alarm Events
Overload_Trip_Relays$ = "Trip"  'Overload Trip Relays
Standard_Overload_Curve_Number = 2  'Standard Overload Curve Number
Minimum_Allowable_Line_Voltage = 80  'Minimum Allowable Line Voltage
Stall_Current_at_Min_Vline = 4.80  'Stall Current at Min Vline
Safe_Stall_Time_at_Min_Vline = 20.0  'Safe Stall Time at Min Vline
Accel_Intersect_at_Min_Vline = 3.80  'Accel. Intersect at Min Vline
Stall_Current_at_100_Vline = 6.00  'Stall Current at 100% Vline
Safe_Stall_Time_at_100_Vline = 10.0  'Safe Stall Time at 100% Vline
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Accel_Intersect_at_100_Vline = 5.00  'Accel. Intersect at 100% Vline
Short_Circuit_Trip$ = "Latched"  'Short Circuit Trip
Short_Circuit_Trip_Backup$ = "Off/No"  'Short Circuit Trip Backup
Short_Circuit_Backup_Relays$ = "Aux2"  'Short Circuit Backup Relays
Short_Circuit_Trip_Backup_Delay = 200  'Short Circuit Trip Backup Delay
Overload_Alarm$ = "Off"  'Overload Alarm
Overload_Alarm_Relays$ = "Alarm"  'Overload Alarm Relays
Overload_Alarm_Events$ = "Off/No"  'Overload Alarm Events
Overload_Alarm_Delay = 0.1  'Overload Alarm Delay
Mechanical_Jam_Trip$ = "Off"  'Mechanical Jam Trip
Mechanical_Jam_Trip_Relays$ = "Trip"  'Mechanical Jam Trip Relays
Mechanical_Jam_Pickup = 1.50  'Mechanical Jam Pickup
Mechanical_Jam_Delay = 1  'Mechanical Jam Delay
Block_Undercurrent_from_Start = 0  'Block Undercurrent from Start
Undercurrent_Alarm$ = "Off"  'Undercurrent Alarm
Undercurrent_Alarm_Relays$ = "Alarm"  'Undercurrent Alarm Relays
Undercurrent_Alarm_Pickup = 0.70  'Undercurrent Alarm Pickup
Undercurrent_Alarm_Delay = 1  'Undercurrent Alarm Delay
Undercurrent_Alarm_Events$ = "Off/No"  'Undercurrent Alarm Events
Undercurrent_Trip$ = "Off"  'Undercurrent Trip
Undercurrent_Trip_Relays$ = "Trip"  'Undercurrent Trip Relays
Undercurrent_Trip_Pickup = 0.70  'Undercurrent Trip Pickup
Undercurrent_Trip_Delay = 1  'Undercurrent Trip Delay
Current_Unbalance_Alarm$ = "Off"  'Current Unbalance Alarm
Current_Unbalance_Alarm_Relays$ = "Alarm"  'Current Unbalance Alarm Relays
Current_Unbalance_Alarm_Pickup = 15  'Current Unbalance Alarm Pickup
Current_Unbalance_Alarm_Delay = 1  'Current Unbalance Alarm Delay
Current_Unbalance_Alarm_Events$ = "Off/No"  'Current Unbalance Alarm Events
Current_Unbalance_Trip$ = "Off"  'Current Unbalance Trip
Current_Unbalance_Trip_Relays$ = "Trip"  'Current Unbalance Trip Relays
Current_Unbalance_Trip_Pickup = 20  'Current Unbalance Trip Pickup
Current_Unbalance_Trip_Delay = 1  'Current Unbalance Trip Delay
Ground_Fault_Alarm$ = "Off"  'Ground Fault Alarm
Ground_Fault_Alarm_Relays$ = "Alarm"  'Ground Fault Alarm Relays
Ground_Fault_Alarm_Pickup = 0.10  'Ground Fault Alarm Pickup
Alarm_Pickup_for_Multlin_CT_50_025 = 1.00  'Alarm Pickup for Multlin CT 50/.025
Intentional_GF_Alarm_Delay = 0  'Intentional GF Alarm Delay
Ground_Fault_Alarm_Events$ = "Off/No"  'Ground Fault Alarm Events
Ground_Fault_Trip$ = "Latched"  'Ground Fault Trip
Ground_Fault_Trip_Relays$ = "Trip"  'Ground Fault Trip Relays
Ground_Fault_Trip_Pickup = 0.20  'Ground Fault Trip Pickup
Trip_Pickup_for_Multlin_CT_50_025 = 1.00  'Trip Pickup for Multlin CT 50/.025
Intentional_GF_Trip_Delay = 200  'Intentional GF Trip Delay
Ground_Fault_Trip_Backup$ = "Off/No"  'Ground Fault Trip Backup
Phase_Differential_Trip$ = "Off"  'Phase Differential Trip
Phase_Differential_Trip_Relays$ = "Trip"  'Phase Differential Trip Relays
Differential_Trip_Pickup_While_Starting = 0.10  'Differential Trip Pickup While
Starting
Differential_Trip_Delay_While_Starting = 0  'Differential Trip Delay While
Starting
Differential_Trip_Pickup_While_Running = 0.10  'Differential Trip Pickup While
Running
Differential_Trip_Delay_While_Running = 0  'Differential Trip Delay While Running
Accleration_Timer_Trip$ = "Off"  'Accleration Timer Trip
Acceleration_Timer_Trip_Relays$ = "Trip"  'Acceleration Timer Trip Relays
Acceleration_Timer_from_Start = 10.0  'Acceleration Timer from Start
Start_Inhibit_Block$ = "Off/No"  'Start Inhibit Block
Thermal_Capacity_Used_Margin = 25  'Thermal Capacity Used Margin
Jogging_Block$ = "Off/No"  'Jogging Block
Maximum_Starts_Hour_Permissible = 3  'Maximum Starts/Hour Permissible
Time_Between_Starts = 10  'Time Between Starts
Restart_Block$ = "Off/No"  'Restart Block
Restart_Block_Time = 1  'Restart Block Time
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Stator_RTD_Type$ = "100 Ohm Platinum"  'Stator RTD Type
Bearing_RTD_Type$ = "100 Ohm Platinum"  'Bearing RTD Type
Ambient_RTD_Type$ = "100 Ohm Platinum"  'Ambient RTD Type
Other_RTD_Type$ = "100 Ohm Platinum"  'Other RTD Type
RTD_1_Application$ = "None"  'RTD #1 Application
RTD_1_Name = 0  'RTD #1 Name
RTD_1_Alarm$ = "Off"  'RTD #1 Alarm
RTD_1_Alarm_Relays$ = "Alarm"  'RTD #1 Alarm Relays
RTD_1_Alarm_Temperature = 130  'RTD #1 Alarm Temperature
RTD_1_Alarm_Events$ = "Off/No"  'RTD #1 Alarm Events
RTD_1_Trip$ = "Off"  'RTD #1 Trip
RTD_1_Trip_Voting$ = "RTD #1"  'RTD #1 Trip Voting
RTD_1_Trip_Relays$ = "Trip"  'RTD #1 Trip Relays
RTD_1_Trip_Temperature = 155  'RTD #1 Trip Temperature
RTD_1_Hi_Alarm$ = "Off"  'RTD #1 Hi Alarm
RTD_1_Hi_Alarm_Relays$ = "Alarm"  'RTD #1 Hi Alarm Relays
RTD_1_Hi_Alarm_Level = 130  'RTD #1 Hi Alarm Level
RTD_2_Application$ = "None"  'RTD #2 Application
RTD_2_Name = 0  'RTD #2 Name
RTD_2_Alarm$ = "Off"  'RTD #2 Alarm
RTD_2_Alarm_Relays$ = "Alarm"  'RTD #2 Alarm Relays
RTD_2_Alarm_Temperature = 130  'RTD #2 Alarm Temperature
RTD_2_Alarm_Events$ = "Off/No"  'RTD #2 Alarm Events
RTD_2_Trip$ = "Off"  'RTD #2 Trip
RTD_2_Trip_Voting$ = "RTD #2"  'RTD #2 Trip Voting
RTD_2_Trip_Relays$ = "Trip"  'RTD #2 Trip Relays
RTD_2_Trip_Temperature = 155  'RTD #2 Trip Temperature
RTD_2_Hi_Alarm$ = "Off"  'RTD #2 Hi Alarm
RTD_2_Hi_Alarm_Relays$ = "Alarm"  'RTD #2 Hi Alarm Relays
RTD_2_Hi_Alarm_Level = 130  'RTD #2 Hi Alarm Level
RTD_3_Application$ = "None"  'RTD #3 Application
RTD_3_Name = 0  'RTD #3 Name
RTD_3_Alarm$ = "Off"  'RTD #3 Alarm
RTD_3_Alarm_Relays$ = "Alarm"  'RTD #3 Alarm Relays
RTD_3_Alarm_Temperature = 130  'RTD #3 Alarm Temperature
RTD_3_Alarm_Events$ = "Off/No"  'RTD #3 Alarm Events
RTD_3_Trip$ = "Off"  'RTD #3 Trip
RTD_3_Trip_Voting$ = "RTD #3"  'RTD #3 Trip Voting
RTD_3_Trip_Relays$ = "Trip"  'RTD #3 Trip Relays
RTD_3_Trip_Temperature = 155  'RTD #3 Trip Temperature
RTD_3_Hi_Alarm$ = "Off"  'RTD #3 Hi Alarm
RTD_3_Hi_Alarm_Relays$ = "Alarm"  'RTD #3 Hi Alarm Relays
RTD_3_Hi_Alarm_Level = 130  'RTD #3 Hi Alarm Level
RTD_4_Application$ = "None"  'RTD #4 Application
RTD_4_Name = 0  'RTD #4 Name
RTD_4_Alarm$ = "Off"  'RTD #4 Alarm
RTD_4_Alarm_Relays$ = "Alarm"  'RTD #4 Alarm Relays
RTD_4_Alarm_Temperature = 130  'RTD #4 Alarm Temperature
RTD_4_Alarm_Events$ = "Off/No"  'RTD #4 Alarm Events
RTD_4_Trip$ = "Off"  'RTD #4 Trip
RTD_4_Trip_Voting$ = "RTD #4"  'RTD #4 Trip Voting
RTD_4_Trip_Relays$ = "Trip"  'RTD #4 Trip Relays
RTD_4_Trip_Temperature = 155  'RTD #4 Trip Temperature
RTD_4_Hi_Alarm$ = "Off"  'RTD #4 Hi Alarm
RTD_4_Hi_Alarm_Relays$ = "Alarm"  'RTD #4 Hi Alarm Relays
RTD_4_Hi_Alarm_Level = 130  'RTD #4 Hi Alarm Level
RTD_5_Application$ = "None"  'RTD #5 Application
RTD_5_Name = 0  'RTD #5 Name
RTD_5_Alarm$ = "Off"  'RTD #5 Alarm
RTD_5_Alarm_Relays$ = "Alarm"  'RTD #5 Alarm Relays
RTD_5_Alarm_Temperature = 130  'RTD #5 Alarm Temperature
RTD_5_Alarm_Events$ = "Off/No"  'RTD #5 Alarm Events
RTD_5_Trip$ = "Off"  'RTD #5 Trip
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RTD_5_Trip_Voting$ = "RTD #5"  'RTD #5 Trip Voting
RTD_5_Trip_Relays$ = "Trip"  'RTD #5 Trip Relays
RTD_5_Trip_Temperature = 155  'RTD #5 Trip Temperature
RTD_5_Hi_Alarm$ = "Off"  'RTD #5 Hi Alarm
RTD_5_Hi_Alarm_Relays$ = "Alarm"  'RTD #5 Hi Alarm Relays
RTD_5_Hi_Alarm_Level = 130  'RTD #5 Hi Alarm Level
RTD_6_Application$ = "None"  'RTD #6 Application
RTD_6_Name = 0  'RTD #6 Name
RTD_6_Alarm$ = "Off"  'RTD #6 Alarm
RTD_6_Alarm_Relays$ = "Alarm"  'RTD #6 Alarm Relays
RTD_6_Alarm_Temperature = 130  'RTD #6 Alarm Temperature
RTD_6_Alarm_Events$ = "Off/No"  'RTD #6 Alarm Events
RTD_6_Trip$ = "Off"  'RTD #6 Trip
RTD_6_Trip_Voting$ = "RTD #6"  'RTD #6 Trip Voting
RTD_6_Trip_Relays$ = "Trip"  'RTD #6 Trip Relays
RTD_6_Trip_Temperature = 155  'RTD #6 Trip Temperature
RTD_6_Hi_Alarm$ = "Off"  'RTD #6 Hi Alarm
RTD_6_Hi_Alarm_Relays$ = "Alarm"  'RTD #6 Hi Alarm Relays
RTD_6_Hi_Alarm_Level = 130  'RTD #6 Hi Alarm Level
RTD_7_Application$ = "None"  'RTD #7 Application
RTD_7_Name = 0  'RTD #7 Name
RTD_7_Alarm$ = "Off"  'RTD #7 Alarm
RTD_7_Alarm_Relays$ = "Alarm"  'RTD #7 Alarm Relays
RTD_7_Alarm_Temperature = 80  'RTD #7 Alarm Temperature
RTD_7_Alarm_Events$ = "Off/No"  'RTD #7 Alarm Events
RTD_7_Trip$ = "Off"  'RTD #7 Trip
RTD_7_Trip_Voting$ = "RTD #7"  'RTD #7 Trip Voting
RTD_7_Trip_Relays$ = "Trip"  'RTD #7 Trip Relays
RTD_7_Trip_Temperature = 90  'RTD #7 Trip Temperature
RTD_7_Hi_Alarm$ = "Off"  'RTD #7 Hi Alarm
RTD_7_Hi_Alarm_Relays$ = "Alarm"  'RTD #7 Hi Alarm Relays
RTD_7_Hi_Alarm_Level = 80  'RTD #7 Hi Alarm Level
RTD_8_Application$ = "None"  'RTD #8 Application
RTD_8_Name = 0  'RTD #8 Name
RTD_8_Alarm$ = "Off"  'RTD #8 Alarm
RTD_8_Alarm_Relays$ = "Alarm"  'RTD #8 Alarm Relays
RTD_8_Alarm_Temperature = 80  'RTD #8 Alarm Temperature
RTD_8_Alarm_Events$ = "Off/No"  'RTD #8 Alarm Events
RTD_8_Trip$ = "Off"  'RTD #8 Trip
RTD_8_Trip_Voting$ = "RTD #8"  'RTD #8 Trip Voting
RTD_8_Trip_Relays$ = "Trip"  'RTD #8 Trip Relays
RTD_8_Trip_Temperature = 90  'RTD #8 Trip Temperature
RTD_8_Hi_Alarm$ = "Off"  'RTD #8 Hi Alarm
RTD_8_Hi_Alarm_Relays$ = "Alarm"  'RTD #8 Hi Alarm Relays
RTD_8_Hi_Alarm_Level = 80  'RTD #8 Hi Alarm Level
RTD_9_Application$ = "None"  'RTD #9 Application
RTD_9_Name = 0  'RTD #9 Name
RTD_9_Alarm$ = "Off"  'RTD #9 Alarm
RTD_9_Alarm_Relays$ = "Alarm"  'RTD #9 Alarm Relays
RTD_9_Alarm_Temperature = 80  'RTD #9 Alarm Temperature
RTD_9_Alarm_Events$ = "Off/No"  'RTD #9 Alarm Events
RTD_9_Trip$ = "Off"  'RTD #9 Trip
RTD_9_Trip_Voting$ = "RTD #9"  'RTD #9 Trip Voting
RTD_9_Trip_Relays$ = "Trip"  'RTD #9 Trip Relays
RTD_9_Trip_Temperature = 90  'RTD #9 Trip Temperature
RTD_9_Hi_Alarm$ = "Off"  'RTD #9 Hi Alarm
RTD_9_Hi_Alarm_Relays$ = "Alarm"  'RTD #9 Hi Alarm Relays
RTD_9_Hi_Alarm_Level = 80  'RTD #9 Hi Alarm Level
RTD_10_Application$ = "None"  'RTD #10 Application
RTD_10_Name = 0  'RTD #10 Name
RTD_10_Alarm$ = "Off"  'RTD #10 Alarm
RTD_10_Alarm_Relays$ = "Alarm"  'RTD #10 Alarm Relays
RTD_10_Alarm_Temperature = 80  'RTD #10 Alarm Temperature
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RTD_10_Alarm_Events$ = "Off/No"  'RTD #10 Alarm Events
RTD_10_Trip$ = "Off"  'RTD #10 Trip
RTD_10_Trip_Voting$ = "RTD #10"  'RTD #10 Trip Voting
RTD_10_Trip_Relays$ = "Trip"  'RTD #10 Trip Relays
RTD_10_Trip_Temperature = 90  'RTD #10 Trip Temperature
RTD_10_Hi_Alarm$ = "Off"  'RTD #10 Hi Alarm
RTD_10_Hi_Alarm_Relays$ = "Alarm"  'RTD #10 Hi Alarm Relays
RTD_10_Hi_Alarm_Level = 80  'RTD #10 Hi Alarm Level
RTD_11_Application$ = "None"  'RTD #11 Application
RTD_11_Name = 0  'RTD #11 Name
RTD_11_Alarm$ = "Off"  'RTD #11 Alarm
RTD_11_Alarm_Relays$ = "Alarm"  'RTD #11 Alarm Relays
RTD_11_Alarm_Temperature = 80  'RTD #11 Alarm Temperature
RTD_11_Alarm_Events$ = "Off/No"  'RTD #11 Alarm Events
RTD_11_Trip$ = "Off"  'RTD #11 Trip
RTD_11_Trip_Voting$ = "RTD #11"  'RTD #11 Trip Voting
RTD_11_Trip_Relays$ = "Trip"  'RTD #11 Trip Relays
RTD_11_Trip_Temperature = 90  'RTD #11 Trip Temperature
RTD_11_Hi_Alarm$ = "Off"  'RTD #11 Hi Alarm
RTD_11_Hi_Alarm_Relays$ = "Alarm"  'RTD #11 Hi Alarm Relays
RTD_11_Hi_Alarm_Level = 80  'RTD #11 Hi Alarm Level
RTD_12_Application$ = "None"  'RTD #12 Application
RTD_12_Name = 0  'RTD #12  Name
RTD_12_Alarm$ = "Off"  'RTD #12 Alarm
RTD_12_Alarm_Relays$ = "Alarm"  'RTD #12 Alarm Relays
RTD_12_Alarm_Temperature = 60  'RTD #12 Alarm Temperature
RTD_12_Alarm_Events$ = "Off/No"  'RTD #12 Alarm Events
RTD_12_Trip$ = "Off"  'RTD #12 Trip
RTD_12_Trip_Voting$ = "RTD #12"  'RTD #12 Trip Voting
RTD_12_Trip_Relays$ = "Trip"  'RTD #12 Trip Relays
RTD_12_Trip_Temperature = 80  'RTD #12 Trip Temperature
RTD_12_Hi_Alarm$ = "Off"  'RTD #12 Hi Alarm
RTD_12_Hi_Alarm_Relays$ = "Alarm"  'RTD #12 Hi Alarm Relays
RTD_12_Hi_Alarm_Level = 60  'RTD #12 Hi Alarm Level
Open_RTD_Sensor_Alarm$ = "Off"  'Open RTD Sensor Alarm
Open_RTD_Sensor_Alarm_Relays$ = "Alarm"  'Open RTD Sensor Alarm Relays
Open_RTD_Sensor_Alarm_Events$ = "Off/No"  'Open RTD Sensor Alarm Events
RTD_Short_Low_Temp_Alarm$ = "Off"  'RTD Short/Low Temp Alarm
RTD_Short_Low_Temp_Alarm_Relays$ = "Alarm"  'RTD Short/Low Temp. Alarm Relays
RTD_Short_Low_Temp_Alarm_Events$ = "Off/No"  'RTD Short/Low Temp. Alarm Events
Undervoltage_Active_Only_If_Bus_Energized$ = "Off/No"  'Undervoltage Active Only
If Bus Energized
Undervoltage_Alarm$ = "Off"  'Undervoltage Alarm
Undervoltage_Alarm_Relays$ = "Alarm"  'Undervoltage Alarm Relays
Undervoltage_Alarm_Pickup = 0.85  'Undervoltage Alarm Pickup
Starting_Undervoltage_Alarm_Pickup = 0.85  'Starting Undervoltage Alarm Pickup
Undervoltage_Alarm_Delay = 3.0  'Undervoltage Alarm Delay
Undervoltage_Alarm_Events$ = "Off/No"  'Undervoltage Alarm Events
Undervoltage_Trip$ = "Off"  'Undervoltage Trip
Undervoltage_Trip_Mode$ = "1-Phase"  'Undervoltage Trip Mode
Undervoltage_Trip_Relays$ = "Trip"  'Undervoltage Trip Relays
Undervoltage_Trip_Pickup = 0.80  'Undervoltage Trip Pickup
Starting_Undervoltage_Trip_Pickup = 0.80  'Starting Undervoltage Trip Pickup
Undervoltage_Trip_Delay = 3.0  'Undervoltage Trip Delay
Overvoltage_Alarm$ = "Off"  'Overvoltage Alarm
Overvoltage_Relays$ = "Alarm"  'Overvoltage Relays
Overvoltage_Alarm_Pickup = 1.05  'Overvoltage Alarm Pickup
Overvoltage_Alarm_Delay = 3.0  'Overvoltage Alarm Delay
Overvoltage_Alarm_Events$ = "Off/No"  'Overvoltage Alarm Events
Overvoltage_Trip$ = "Off"  'Overvoltage Trip
Overvoltage_Trip_Relays$ = "Trip"  'Overvoltage Trip Relays
Overvoltage_Trip_Pickup = 1.10  'Overvoltage Trip Pickup
Overvoltage_Trip_Delay = 3.0  'Overvoltage Trip Delay
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Voltage_Phase_Reversal_Trip$ = "Off"  'Voltage Phase Reversal Trip
Voltage_Phase_Reversal_Trip_Relays$ = "Trip"  'Voltage Phase Reversal Trip Relays
Voltage_Frequency_Alarm$ = "Off"  'Voltage Frequency Alarm
Voltage_Frequency_Alarm_Relays$ = "Alarm"  'Voltage Frequency Alarm Relays
Overfrequency_Alarm_Level = 60.50  'Overfrequency Alarm Level
Underfrequency_Alarm_Level = 59.50  'Underfrequency Alarm Level
Voltage_Frequency_Alarm_Delay = 1.0  'Voltage Frequency Alarm Delay
Voltage_Frequency_Alarm_Events$ = "Off/No"  'Voltage Frequency Alarm Events
Voltage_Frequency_Trip$ = "Off"  'Voltage Frequency Trip
Voltage_Frequency_Trip_Relays$ = "Trip"  'Voltage Frequency Trip Relays
Overfrequency_Trip_Level = 60.50  'Overfrequency Trip Level
Underfrequency_Trip_Level = 59.50  'Underfrequency Trip Level
Voltage_Frequency_Trip_Delay = 1.0  'Voltage Frequency Trip Delay
Block_Power_Factor_Element_from_Start = 1  'Block Power Factor Element from Start
Power_Factor_Alarm$ = "Off"  'Power Factor Alarm
Power_Factor_Alarm_Relays$ = "Alarm"  'Power Factor Alarm Relays
Power_Factor_Lead_Alarm_Level = 1.00  'Power Factor Lead Alarm Level
Power_Factor_Lag_Alarm_Level = 1.00  'Power Factor Lag Alarm Level
Power_Factor_Alarm_Delay = 1.0  'Power Factor Alarm Delay
Power_Factor_Alarm_Events$ = "Off/No"  'Power Factor Alarm Events
Power_Factor_Trip$ = "Off"  'Power Factor Trip
Power_Factor_Trip_Relays$ = "Trip"  'Power Factor Trip Relays
Power_Factor_Lead_Trip_Level = 1.00  'Power Factor Lead Trip Level
Power_Factor_Lag_Trip_Level = 1.00  'Power Factor Lag Trip Level
Power_Factor_Trip_Delay = 1.0  'Power Factor Trip Delay
Block_kvar_Element_from_Start = 1  'Block kvar Element from Start
Reactive_Power_Alarm$ = "Off"  'Reactive Power Alarm
Reactive_Power_Alarm_Relays$ = "Alarm"  'Reactive Power Alarm Relays
Positive_Reactive_Power_Alarm_Level = 10  'Positive Reactive Power Alarm Level
Negative_Reactive_Power_Alarm_Level = 10  'Negative Reactive Power Alarm Level
Reactive_Power_Alarm_Delay = 1.0  'Reactive Power Alarm Delay
Reactive_Power_Alarm_Events$ = "Off/No"  'Reactive Power Alarm Events
Reactive_Power_Trip$ = "Off"  'Reactive Power Trip
Reactive_Power_Trip_Relays$ = "Trip"  'Reactive Power Trip Relays
Positive_Reactive_Power_Trip_Level = 25  'Positive Reactive Power Trip Level
Negative_Reactive_Power_Trip_Level = 25  'Negative Reactive Power Trip Level
Reactive_Power_Trip_Delay = 1.0  'Reactive Power Trip Delay
Block_Underpower_From_Start = 0  'Block Underpower From Start
Underpower_Alarm$ = "Off"  'Underpower Alarm
Underpower_Alarm_Relays$ = "Alarm"  'Underpower Alarm Relays
Underpower_Alarm_Level = 2  'Underpower Alarm Level
Underpower_Alarm_Delay = 1  'Underpower Alarm Delay
Underpower_Alarm_Events$ = "Off/No"  'Underpower Alarm Events
Underpower_Trip$ = "Off"  'Underpower Trip
Underpower_Trip_Relays$ = "Trip"  'Underpower Trip Relays
Underpower_Trip_Level = 1  'Underpower Trip Level
Underpower_Trip_Delay = 1  'Underpower Trip Delay
Block_Reverse_Power_From_Start = 0  'Block Reverse Power From Start
Reverse_Power_Alarm$ = "Off"  'Reverse Power Alarm
Reverse_Power_Alarm_Relays$ = "Alarm"  'Reverse Power Alarm Relays
Reverse_Power_Alarm_Level = 1  'Reverse Power Alarm Level
Reverse_Power_Alarm_Delay = 1.0  'Reverse Power Alarm Delay
Reverse_Power_Alarm_Events$ = "Off/No"  'Reverse Power Alarm Events
Reverse_Power_Trip$ = "Off"  'Reverse Power Trip
Reverse_Power_Trip_Relays$ = "Trip"  'Reverse Power Trip Relays
Reverse_Power_Trip_Level = 1  'Reverse Power Trip Level
Reverse_Power_Trip_Delay = 1.0  'Reverse Power Trip Delay
Torque_Metering$ = "Disabled"  'Torque Metering
Stator_Resistance = 0.004  'Stator Resistance
Pole_Pairs = 2  'Pole Pairs
Torque_Unit$ = "Newton-meter"  'Torque Unit
Overtorque_Alarm$ = "Off"  'Overtorque Alarm
Overtorque_Alarm_Relays$ = "Alarm"  'Overtorque Alarm Relays
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Overtorque_Alarm_Level = 4000.0  'Overtorque Alarm Level
Overtorque_Alarm_Delay = 1.0  'Overtorque Alarm Delay
Overtorque_Alarm_Events$ = "Off/No"  'Overtorque Alarm Events
Trip_Counter_Alarm$ = "Off"  'Trip Counter Alarm
Trip_Counter_Alarm_Relays$ = "Alarm"  'Trip Counter Alarm Relays
Trip_Counter_Alarm_Level = 25  'Trip Counter Alarm Level
Trip_Counter_Alarm_Events$ = "Off/No"  'Trip Counter Alarm Events
Starter_Failure_Alarm_Starter_Failure_$ = "Off"  'Starter Failure Alarm (Starter
Failure)
Starter_Type$ = "Breaker"  'Starter Type
Starter_Failure_Alarm_Relays$ = "Alarm"  'Starter Failure Alarm Relays
Starter_Failure_Alarm_Delay = 100  'Starter Failure Alarm Delay
Supervision_of_Trip_Coil$ = "Disabled"  'Supervision of Trip Coil
Starter_Failure_Alarm_Events$ = "Off/No"  'Starter Failure Alarm Events
Current_Demand_Period = 15  'Current Demand Period
Current_Demand_Alarm$ = "Off"  'Current Demand Alarm
Current_Demand_Alarm_Relays$ = "Alarm"  'Current Demand Alarm Relays
Current_Demand_Alarm_Level = 100  'Current Demand Alarm Level
Current_Demand_Alarm_Events$ = "Off/No"  'Current Demand Alarm Events
kW_Demand_Period = 15  'kW Demand Period
kW_Demand_Alarm$ = "Off"  'kW Demand Alarm
kW_Demand_Alarm_Relays$ = "Alarm"  'kW Demand Alarm Relays
kW_Demand_Alarm_Level = 100  'kW Demand Alarm Level
kW_Demand_Alarm_Events$ = "Off/No"  'kW Demand Alarm Events
kvar_Demand_Period = 15  'kvar Demand Period
kvar_Demand_Alarm$ = "Off"  'kvar Demand Alarm
kvar_Demand_Alarm_Relays$ = "Alarm"  'kvar Demand Alarm Relays
kvar_Demand_Alarm_Level = 100  'kvar Demand Alarm Level
kvar_Demand_Alarm_Events$ = "Off/No"  'kvar Demand Alarm Events
kVA_Demand_Period = 15  'kVA Demand Period
kVA_Demand_Alarm$ = "Off"  'kVA Demand Alarm
kVA_Demand_Alarm_Relays$ = "Alarm"  'kVA Demand Alarm Relays
kVA_Demand_Alarm_Level = 100  'kVA Demand Alarm Level
kVA_Demand_Alarm_Events$ = "Off/No"  'kVA Demand Alarm Events
Positive_kWh_Pulse_Output_Relay$ = "Off"  'Positive kWh Pulse Output Relay
Positive_kWh_Pulse_Output_Interval = 1  'Positive kWh Pulse Output Interval
Positive_kvarh_Pulse_Output_Relay$ = "Off"  'Positive kvarh Pulse Output Relay
Positive_kvarh_Pulse_Output_Interval = 1  'Positive kvarh Pulse Output Interval
Negative_kvarh_Pulse_Output_Relay$ = "Off"  'Negative kvarh Pulse Output Relay
Negative_kvarh_Pulse_Output_Interval = 1  'Negative kvarh Pulse Output Interval
Analog_Output_1_Selection$ = "Average Phase Current"  'Analog Output 1 Selection
Analog_Output_2_Selection$ = "None"  'Analog Output 2 Selection
Analog_Output_3_Selection$ = "None"  'Analog Output 3 Selection
Analog_Output_4_Selection$ = "None"  'Analog Output 4 Selection
RTD_1_Minimum = -50  'RTD #1 Minimum
RTD_1_Maximum = 250  'RTD #1 Maximum
RTD_2_Minimum = -50  'RTD #2 Minimum
RTD_2_Maximum = 250  'RTD #2 Maximum
RTD_3_Minimum = -50  'RTD #3 Minimum
RTD_3_Maximum = 250  'RTD #3 Maximum
RTD_4_Minimum = -50  'RTD #4 Minimum
RTD_4_Maximum = 250  'RTD #4 Maximum
RTD_5_Minimum = -50  'RTD #5 Minimum
RTD_5_Maximum = 250  'RTD #5 Maximum
RTD_6_Minimum = -50  'RTD #6 Minimum
RTD_6_Maximum = 250  'RTD #6 Maximum
RTD_7_Minimum = -50  'RTD #7 Minimum
RTD_7_Maximum = 250  'RTD #7 Maximum
RTD_8_Minimum = -50  'RTD #8 Minimum
RTD_8_Maximum = 250  'RTD #8 Maximum
RTD_9_Minimum = -50  'RTD #9 Minimum
RTD_9_Maximum = 250  'RTD #9 Maximum
RTD_10_Minimum = -50  'RTD #10 Minimum
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RTD_10_Maximum = 250  'RTD #10 Maximum
RTD_11_Minimum = -50  'RTD #11 Minimum
RTD_11_Maximum = 250  'RTD #11 Maximum
RTD_12_Minimum = -50  'RTD #12 Minimum
RTD_12_Maximum = 250  'RTD #12 Maximum
Power_Factor_Minimum = -0.80  'Power Factor Minimum
Power_Factor_Maximum = 0.80  'Power Factor Maximum
Reactive_Power_Minimum = 0  'Reactive Power Minimum
Reactive_Power_Maximum = 750  'Reactive Power Maximum
Real_Power_Minimum = 0  'Real Power Minimum
Real_Power_Maximum = 1000  'Real Power Maximum
Apparent_Power_Minimum = 0  'Apparent Power Minimum
Apparent_Power_Maximum = 1250  'Apparent Power Maximum
Thermal_Capacity_Used_Minimum = 0  'Thermal Capacity Used Minimum
Thermal_Capacity_Used_Maximum = 100  'Thermal Capacity Used Maximum
Relay_Lockout_Time_Minimum = 0  'Relay Lockout Time Minimum
Relay_Lockout_Time_Maximum = 150  'Relay Lockout Time Maximum
Current_Demand_Minimum = 0  'Current Demand Minimum
Current_Demand_Maximum = 700  'Current Demand Maximum
kvar_Demand_Minimum = 0  'kvar Demand Minimum
kvar_Demand_Maximum = 1000  'kvar Demand Maximum
kW_Demand_Minimum = 0  'kW Demand Minimum
kW_Demand_Maximum = 1250  'kW Demand Maximum
kVA_Demand_Minimum = 0  'kVA Demand Minimum
kVA_Demand_Maximum = 1500  'kVA Demand Maximum
Speed2_Standard_Overload_Curve_Number = 4  'Speed2 Standard Overload Curve Number
Speed2_Undercurrent_Alarm$ = "Off"  'Speed2 Undercurrent Alarm
Speed2_Undercurrent_Alarm_Pickup = 0.70  'Speed2 Undercurrent Alarm Pickup
Speed2_Undercurrent_Alarm_Delay = 1  'Speed2 Undercurrent Alarm Delay
Speed2_Undercurrent_Alarm_Events$ = "Off/No"  'Speed2 Undercurrent Alarm Events
Speed2_Undercurrent_Trip$ = "Off"  'Speed2 Undercurrent Trip
Speed2_Undercurrent_Trip_Pickup = 0.70  'Speed2 Undercurrent Trip Pickup
Speed2_Undercurrent_Trip_Delay = 1  'Speed2 Undercurrent Trip Delay
Speed2_Acceleration_Timer_From_Start = 10.0  'Speed2 Acceleration Timer From
Start
Acceleration_Timer_From_Speed_One_to_Two = 10.0  'Acceleration Timer From Speed
One to Two
Ground_CT_Primary = 100  'Ground CT Primary
Phase_Differential_CT_Primary = 100  'Phase Differential CT Primary
Speed_2_Phase_Sequence$ = "ABC"  'Speed 2 Phase Sequence
Remote_Alarm_Name = 0  'Remote Alarm Name
Remote_Alarm_Function$ = "Unlatched"  'Remote Alarm Function
Remote_Alarm_Relays$ = "Alarm"  'Remote Alarm Relays
Remote_Alarm_Events$ = "Off/No"  'Remote Alarm Events
Remote_Trip_Name = 0  'Remote Trip Name
Remote_Trip_Relays$ = "Trip"  'Remote Trip Relays
Speed_Switch_Trip_Relays$ = "Trip"  'Speed Switch Trip Relays
Speed_Switch_Trip_Delays = 5.0  'Speed Switch Trip Delays
Load_Shed_Trip_Relays$ = "Trip"  'Load Shed Trip Relays
Block_Pressure_Switch_Alarm_from_Start = 0  'Block Pressure Switch Alarm from
Start
Pressure_Switch_Alarm_Function$ = "Unlatched"  'Pressure Switch Alarm Function
Pressure_Switch_Alarm_Relays$ = "Alarm"  'Pressure Switch Alarm Relays
Pressure_Switch_Alarm_Delay = 5.0  'Pressure Switch Alarm Delay
Pressure_Switch_Alarm_Events$ = "Off/No"  'Pressure Switch Alarm Events
Block_Pressure_Switch_Trip_from_Start = 0  'Block Pressure Switch Trip from Start
Pressure_Switch_Trip_Relays$ = "Trip"  'Pressure Switch Trip Relays
Pressure_Switch_Trip_Delay = 5.0  'Pressure Switch Trip Delay
Vibration_Switch_Alarm_Function$ = "Unlatched"  'Vibration Switch Alarm Function
Vibration_Switch_Alarm_Relays$ = "Alarm"  'Vibration Switch Alarm Relays
Vibration_Switch_Alarm_Delay = 5.0  'Vibration Switch Alarm Delay
Vibration_Switch_Alarm_Events$ = "Off/No"  'Vibration Switch Alarm Events
Vibration_Switch_Trip_Relays$ = "Trip"  'Vibration Switch Trip Relays
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Vibration_Switch_Trip_Delay = 5.0  'Vibration Switch Trip Delay
Counter_Units_Name = 0  'Counter Units Name
Counter_Preset_Value = 0  'Counter Preset Value
Counter_Type$ = "Increment"  'Counter Type
Counter_Alarm$ = "Off"  'Counter Alarm
Counter_Alarm_Relays$ = "Alarm"  'Counter Alarm Relays
Counter_Alarm_Level = 100  'Counter Alarm Level
Counter_Alarm_Pickup$ = "Over"  'Counter Alarm Pickup
Time_to_Trip_at_1_01_FLA = 17414.5  'Time to Trip at 1.01 x FLA
Time_to_Trip_at_1_05_FLA = 3414.9  'Time to Trip at 1.05 x FLA
Time_to_Trip_at_1_10_FLA = 1666.7  'Time to Trip at 1.10 x FLA
Time_to_Trip_at_1_20_FLA = 795.4  'Time to Trip at 1.20 x FLA
Time_to_Trip_at_1_30_FLA = 507.2  'Time to Trip at 1.30 x FLA
Time_to_Trip_at_1_40_FLA = 364.6  'Time to Trip at 1.40 x FLA
Time_to_Trip_at_1_50_FLA = 280.0  'Time to Trip at 1.50 x FLA
Time_to_Trip_at_1_75_FLA = 169.7  'Time to Trip at 1.75 x FLA
Time_to_Trip_at_2_00_FLA = 116.6  'Time to Trip at 2.00 x FLA
Time_to_Trip_at_2_25_FLA = 86.1  'Time to Trip at 2.25 x FLA
Time_to_Trip_at_2_50_FLA = 66.6  'Time to Trip at 2.50 x FLA
Time_to_Trip_at_2_75_FLA = 53.3  'Time to Trip at 2.75 x FLA
Time_to_Trip_at_3_00_FLA = 43.7  'Time to Trip at 3.00 x FLA
Time_to_Trip_at_3_25_FLA = 36.6  'Time to Trip at 3.25 x FLA
Time_to_Trip_at_3_50_FLA = 31.1  'Time to Trip at 3.50 x FLA
Time_to_Trip_at_3_75_FLA = 26.8  'Time to Trip at 3.75 x FLA
TIme_to_Trip_at_4_00_FLA = 23.3  'TIme to Trip at 4.00 x FLA
Time_to_Trip_at_4_25_FLA = 20.5  'Time to Trip at 4.25 x FLA
Time_to_Trip_at_4_50_FLA = 18.2  'Time to Trip at 4.50 x FLA
Time_to_Trip_at_4_75_FLA = 16.2  'Time to Trip at 4.75 x FLA
Time_to_Trip_at_5_00_FLA = 14.6  'Time to Trip at 5.00 x FLA
Time_to_Trip_at_5_50_FLA = 12.0  'Time to Trip at 5.50 x FLA
Time_to_Trip_at_6_00_FLA = 10.0  'Time to Trip at 6.00 x FLA
Time_to_Trip_at_6_50_FLA = 8.5  'Time to Trip at 6.50 x FLA
Time_to_Trip_at_7_00_FLA = 7.3  'Time to Trip at 7.00 x FLA
Time_to_Trip_at_7_50_FLA = 6.3  'Time to Trip at 7.50 x FLA
Time_to_Trip_at_8_00_FLA = 5.6  'Time to Trip at 8.00 x FLA
Time_to_Trip_at_10_0_FLA = 5.6  'Time to Trip at 10.0 x FLA
Time_to_Trip_at_15_0_FLA = 5.6  'Time to Trip at 15.0 x FLA
Time_to_Trip_at_20_0_FLA = 5.6  'Time to Trip at 20.0 x FLA
Overreach_Filter$ = "Off/No"  'Overreach Filter
Short_Circuit_Trip_Relays$ = "Trip"  'Short Circuit Trip Relays
Short_Circuit_Trip_Pickup = 7.5  'Short Circuit Trip Pickup
Intentional_Short_Circuit_Trip_Delay = 210  'Intentional Short Circuit Trip Delay
Ground_Fault_Trip_Backup_Relays$ = "Aux2"  'Ground Fault Trip Backup Relays
Ground_FaultTrip_Backup_Delay = 200  'Ground FaultTrip Backup Delay
Running_Time_Pulse_Relay$ = "Off"  'Running Time Pulse Relay
Running_Time_Pulse_Interval = 1  'Running Time Pulse Interval
Loss_Of_Comms_Function$ = "Off"  'Loss Of Comms Function
Loss_Of_Comms_Function_Type$ = "Alarm"  'Loss Of Comms Function Type
Loss_Of_Comms_Port$ = "COMP_RS485"  'Loss Of Comms Port
Assign_Loss_Of_Comms_Alarm_Relay$ = "Alarm"  'Assign Loss Of Comms Alarm Relay
Assign_Loss_Of_Comms_Trip_Relay$ = "Trip"  'Assign Loss Of Comms Trip Relay
Loss_Of_Comms_Delay = 1  'Loss Of Comms Delay
Loss_Of_Comms_Alarm_Event$ = "Off/No"  'Loss Of Comms Alarm Event
Phase_A_Current_Minimum = 0  'Phase A Current Minimum
Phase_A_Current_Maximum = 100  'Phase A Current Maximum
Phase_B_Current_Minimum = 0  'Phase B Current Minimum
Phase_B_Current_Maximum = 100  'Phase B Current Maximum
Phase_C_Current_Minimum = 0  'Phase C Current Minimum
Phase_C_Current_Maximum = 100  'Phase C Current Maximum
Average_Phase_Current_Minimum = 0  'Average Phase Current Minimum
Average_Phase_Current_Maximum = 496  'Average Phase Current Maximum
AB_Line_Voltage_Minimum = 3200  'AB Line Voltage Minimum
AB_Line_Voltage_Maximum = 4500  'AB Line Voltage Maximum
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BC_Line_Voltage_Minimum = 3200  'BC Line Voltage Minimum
BC_Line_Voltage_Maximum = 4500  'BC Line Voltage Maximum
CA_Line_Voltage_Minimum = 3200  'CA Line Voltage Minimum
CA_Line_Voltage_Maximum = 4500  'CA Line Voltage Maximum
Average_Line_Voltage_Minimum = 3200  'Average Line Voltage Minimum
Average_Line_Voltage_Maximum = 4500  'Average Line Voltage Maximum
Phase_AN_Voltage_Minimum = 1900  'Phase AN Voltage Minimum
Phase_AN_Voltage_Maximum = 2500  'Phase AN Voltage Maximum
Phase_BN_Voltage_Minimum = 1900  'Phase BN Voltage Minimum
Phase_BN_Voltage_Maximum = 2500  'Phase BN Voltage Maximum
Phase_CN_Voltage_Minimum = 1900  'Phase CN Voltage Minimum
Phase_CN_Voltage_Maximum = 2500  'Phase CN Voltage Maximum
Average_Phase_Voltage_Minimum = 1900  'Average Phase Voltage Minimum
Average_Phase_Voltage_Maximum = 2500  'Average Phase Voltage Maximum
Hottest_Stator_RTD_Minimum = 0  'Hottest Stator RTD Minimum
Hottest_Stator_RTD_Maximum = 200  'Hottest Stator RTD Maximum
Hottest_Bearing_RTD_Minimum = 0  'Hottest Bearing RTD Minimum
Hottest_Bearing_RTD_Maximum = 200  'Hottest Bearing RTD Maximum
Hottest_Ambient_RTD_Minimum = -50  'Hottest Ambient RTD Minimum
Hottest_Ambient_RTD_Maximum = 60  'Hottest Ambient RTD Maximum
Analog_Input_1_Minimum = 0  'Analog Input 1 Minimum
Analog_Input_1_Maximum = 50000  'Analog Input 1 Maximum
Analog_Input_2_Minimum = 0  'Analog Input 2 Minimum
Analog_Input_2_Maximum = 50000  'Analog Input 2 Maximum
Analog_Input_3_Minimum = 0  'Analog Input 3 Minimum
Analog_Input_3_Maximum = 50000  'Analog Input 3 Maximum
Analog_Input_4_Minimum = 0  'Analog Input 4 Minimum
Analog_Input_4_Maximum = 50000  'Analog Input 4 Maximum
Tachometer_Min = 3500  'Tachometer Min
Tachometer_Max = 3700  'Tachometer Max
MWh_Minimum = 50.000  'MWh Minimum
MWh_Maximum = 100.000  'MWh Maximum
Torque_Minimum = 0.0  'Torque Minimum
Torque_Maximum = 0.0  'Torque Maximum
Analog_Input_Diff_1_2_Minimum = 0  'Analog Input Diff 1-2 Minimum
Analog_Input_Diff_1_2_Maximum = 100  'Analog Input Diff 1-2 Maximum
Analog_Input_Diff_3_4_Minimum = 0  'Analog Input Diff 3-4 Minimum
Analog_Input_Diff_3_4_Maximum = 100  'Analog Input Diff 3-4 Maximum
Analog_Input_1_Setup$ = "Disabled"  'Analog Input 1 Setup
Analog_Input_1_Units = 0  'Analog Input 1 Units
Analog_Input_1_Minimum_analog_in_1_ = 0  'Analog Input 1 Minimum (analog in 1)
Analog_Input_1_Maximum_analog_in_1_ = 100  'Analog Input 1 Maximum (analog in 1)
Block_Analog_Input_1_From_Start = 0  'Block Analog Input 1 From Start
Analog_Input_1_Alarm$ = "Off"  'Analog Input 1 Alarm
Analog_Input_1_Alarm_Relays$ = "Alarm"  'Analog Input 1 Alarm Relays
Analog_Input_1_Alarm_Level = 10  'Analog Input 1 Alarm Level
Analog_Input_1_Alarm_Pickup$ = "Over"  'Analog Input 1 Alarm Pickup
Analog_Input_1_Alarm_Delay = 0.1  'Analog Input 1 Alarm Delay
Analog_Input_1_Alarm_Events$ = "Off/No"  'Analog Input 1 Alarm Events
Analog_Input_1_Trip$ = "Off"  'Analog Input 1 Trip
Analog_Input_1_Trip_Relays$ = "Trip"  'Analog Input 1 Trip Relays
Analog_Input_1_Trip_Level = 20  'Analog Input 1 Trip Level
Analog_Input_1_Trip_Pickup$ = "Over"  'Analog Input 1 Trip Pickup
Analog_Input_1_Trip_Delay = 0.1  'Analog Input 1 Trip Delay
Analog_Input_1_Name = 0  'Analog Input 1 Name
Analog_Input_2_Setup$ = "Disabled"  'Analog Input 2 Setup
Analog_Input_2_Units = 0  'Analog Input 2 Units
Analog_Input_2_Minimum_analog_in_2_ = 0  'Analog Input 2 Minimum (analog in 2)
Analog_Input_2_Maximum_analog_in_2_ = 100  'Analog Input 2 Maximum (analog in 2)
Block_Analog_Input_2_From_Start = 0  'Block Analog Input 2 From Start
Analog_Input_2_Alarm$ = "Off"  'Analog Input 2 Alarm
Analog_Input_2_Alarm_Relays$ = "Alarm"  'Analog Input 2 Alarm Relays
Analog_Input_2_Alarm_Level = 10  'Analog Input 2 Alarm Level
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Analog_Input_2_Alarm_Pickup$ = "Over"  'Analog Input 2 Alarm Pickup
Analog_Input_2_Alarm_Delay = 0.1  'Analog Input 2 Alarm Delay
Analog_Input_2_Alarm_Events$ = "Off/No"  'Analog Input 2 Alarm Events
Analog_Input_2_Trip$ = "Off"  'Analog Input 2 Trip
Analog_Input_2_Trip_Relays$ = "Trip"  'Analog Input 2 Trip Relays
Analog_Input_2_Trip_Level = 20  'Analog Input 2 Trip Level
Analog_Input_2_Trip_Pickup$ = "Over"  'Analog Input 2 Trip Pickup
Analog_Input_2_Trip_Delay = 0.1  'Analog Input 2 Trip Delay
Analog_Input_2_Name = 0  'Analog Input 2 Name
Analog_Input_3_Setup$ = "Disabled"  'Analog Input 3 Setup
Analog_Input_3_Units = 0  'Analog Input 3 Units
Analog_Input_3_Minimum_analog_in_3_ = 0  'Analog Input 3 Minimum (analog in 3)
Analog_Input_3_Maximum_analog_in_3_ = 100  'Analog Input 3 Maximum (analog in 3)
Block_Analog_Input_3_From_Start = 0  'Block Analog Input 3 From Start
Analog_Input_3_Alarm$ = "Off"  'Analog Input 3 Alarm
Analog_Input_3_Alarm_Relays$ = "Alarm"  'Analog Input 3 Alarm Relays
Analog_Input_3_Alarm_Level = 10  'Analog Input 3 Alarm Level
Analog_Input_3_Alarm_Pickup$ = "Over"  'Analog Input 3 Alarm Pickup
Analog_Input_3_Alarm_Delay = 0.1  'Analog Input 3 Alarm Delay
Analog_Input_3_Alarm_Events$ = "Off/No"  'Analog Input 3 Alarm Events
Analog_Input_3_Trip$ = "Off"  'Analog Input 3 Trip
Analog_Input_3_Trip_Relays$ = "Trip"  'Analog Input 3 Trip Relays
Analog_Input_3_Trip_Level = 20  'Analog Input 3 Trip Level
Analog_Input_3_Trip_Pickup$ = "Over"  'Analog Input 3 Trip Pickup
Analog_Input_3_Trip_Delay = 0.1  'Analog Input 3 Trip Delay
Analog_Input_3_Name = 0  'Analog Input 3 Name
Analog_Input_4_Setup$ = "Disabled"  'Analog Input 4 Setup
Analog_Input_4_Units = 0  'Analog Input 4 Units
Analog_Input_4_Minimum_analog_in_4_ = 0  'Analog Input 4 Minimum (analog in 4)
Analog_Input_4_Maximum_analog_in_4_ = 100  'Analog Input 4 Maximum (analog in 4)
Block_Analog_Input_4_From_Start = 0  'Block Analog Input 4 From Start
Analog_Input_4_Alarm$ = "Off"  'Analog Input 4 Alarm
Analog_Input_4_Alarm_Relays$ = "Alarm"  'Analog Input 4 Alarm Relays
Analog_Input_4_Alarm_Level = 10  'Analog Input 4 Alarm Level
Analog_Input_4_Alarm_Pickup$ = "Over"  'Analog Input 4 Alarm Pickup
Analog_Input_4_Alarm_Delay = 0.1  'Analog Input 4 Alarm Delay
Analog_Input_4_Alarm_Events$ = "Off/No"  'Analog Input 4 Alarm Events
Analog_Input_4_Trip$ = "Off"  'Analog Input 4 Trip
Analog_Input_4_Trip_Relays$ = "Trip"  'Analog Input 4 Trip Relays
Analog_Input_4_Trip_Level = 20  'Analog Input 4 Trip Level
Analog_Input_4_Trip_Pickup$ = "Over"  'Analog Input 4 Trip Pickup
Analog_Input_4_Trip_Delay = 0.1  'Analog Input 4 Trip Delay
Analog_Input_4_Name = 0  'Analog Input 4 Name
Speed2_Time_to_Trip_at_1_01_FLA = 17414.5  'Speed2 Time to Trip at 1.01 x FLA
Speed2_Time_to_Trip_at_1_05_FLA = 3414.9  'Speed2 Time to Trip at 1.05 x FLA
Speed2_Time_to_Trip_at_1_10_FLA = 1666.7  'Speed2 Time to Trip at 1.10 x FLA
Speed2_Time_to_Trip_at_1_20_FLA = 795.4  'Speed2 Time to Trip at 1.20 x FLA
Speed2_Time_to_Trip_at_1_30_FLA = 507.2  'Speed2 Time to Trip at 1.30 x FLA
Speed2_Time_to_Trip_at_1_40_FLA = 364.6  'Speed2 Time to Trip at 1.40 x FLA
Speed2_Time_to_Trip_at_1_50_FLA = 280.0  'Speed2 Time to Trip at 1.50 x FLA
Speed2_Time_to_Trip_at_1_75_FLA = 169.7  'Speed2 Time to Trip at 1.75 x FLA
Speed2_Time_to_Trip_at_2_00_FLA = 116.6  'Speed2 Time to Trip at 2.00 x FLA
Speed2_Time_to_Trip_at_2_25_FLA = 86.1  'Speed2 Time to Trip at 2.25 x FLA
Speed2_Time_to_Trip_at_2_50_FLA = 66.6  'Speed2 Time to Trip at 2.50 x FLA
Speed2_Time_to_Trip_at_2_75_FLA = 53.3  'Speed2 Time to Trip at 2.75 x FLA
Speed2_Time_to_Trip_at_3_00_FLA = 43.7  'Speed2 Time to Trip at 3.00 x FLA
Speed2_Time_to_Trip_at_3_25_FLA = 36.6  'Speed2 Time to Trip at 3.25 x FLA
Speed2_Time_to_Trip_at_3_50_FLA = 31.1  'Speed2 Time to Trip at 3.50 x FLA
Speed2_Time_to_Trip_at_3_75_FLA = 26.8  'Speed2 Time to Trip at 3.75 x FLA
Speed2_Time_to_Trip_at_4_00_FLA = 23.3  'Speed2 Time to Trip at 4.00 x FLA
Speed2_Time_to_Trip_at_4_25_FLA = 20.5  'Speed2 Time to Trip at 4.25 x FLA
Speed2_Time_to_Trip_at_4_50_FLA = 18.2  'Speed2 Time to Trip at 4.50 x FLA
Speed2_Time_to_Trip_at_4_75_FLA = 16.2  'Speed2 Time to Trip at 4.75 x FLA
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Speed2_Time_to_Trip_at_5_00_FLA = 14.6  'Speed2 Time to Trip at 5.00 x FLA
Speed2_Time_to_Trip_at_5_50_FLA = 12.0  'Speed2 Time to Trip at 5.50 x FLA
Speed2_Time_to_Trip_at_6_00_FLA = 10.0  'Speed2 Time to Trip at 6.00 x FLA
Speed2_Time_to_Trip_at_6_50_FLA = 8.5  'Speed2 Time to Trip at 6.50 x FLA
Speed2_Time_to_Trip_at_7_00_FLA = 7.3  'Speed2 Time to Trip at 7.00 x FLA
Speed2_Time_to_Trip_at_7_50_FLA = 6.3  'Speed2 Time to Trip at 7.50 x FLA
Speed2_Time_to_Trip_at_8_00_FLA = 5.6  'Speed2 Time to Trip at 8.00 x FLA
Speed2_Time_to_Trip_at_10_0_FLA = 5.6  'Speed2 Time to Trip at 10.0 x FLA
Speed2_Time_to_Trip_at_15_0_FLA = 5.6  'Speed2 Time to Trip at 15.0 x FLA
Speed2_Time_to_Trip_at_20_0_FLA = 5.6  'Speed2 Time to Trip at 20.0 x FLA
Speed2_Minimum_Allowable_Line_Voltage = 80  'Speed2 Minimum Allowable Line
Voltage
Speed2_Stall_Current_at_Min_Vline = 4.80  'Speed2 Stall Current at Min Vline
Speed2_Safe_Stall_Time_at_Min_Vline = 20.0  'Speed2 Safe Stall Time at Min Vline
Speed2_Accel_Intersect_at_Min_Vline = 3.80  'Speed2 Accel. Intersect at Min Vline
Speed2_Stall_Current_at_100_Vline = 6.00  'Speed2 Stall Current at 100% Vline
Speed2_Safe_Stall_Time_at_100_Vline = 10.0  'Speed2 Safe Stall Time at 100% Vline
Speed2_Accel_Intersect_at_100_Vline = 5.00  'Speed2 Accel. Intersect at 100%
Vline
Block_Speed2_Undercurrent_from_Start = 0  'Block Speed2 Undercurrent from Start
Speed_Switch_Trip_Speed2_Delay = 5.0  'Speed Switch Trip Speed2 Delay
Speed2_Rated_Speed = 3600  'Speed2 Rated Speed
Analog_In_Differential_1_2_Enable$ = "Disabled"  'Analog In Differential 1-2
Enable
Analog_In_Diff_1_2_Name = 0  'Analog In Diff 1-2 Name
Analog_In_Differential_1_2_Comparison$ = "% Difference"  'Analog In Differential
1-2 Comparison
Analog_In_Differential_1_2_Logic$ = "1>2 (or 3>4)"  'Analog In Differential 1-2
Logic
Analog_In_Differential_1_2_Active_When$ = "Always"  'Analog In Differential 1-2
Active When
Analog_In_Differential_1_2_Block_from_Start = 0  'Analog In Differential 1-2
Block from Start
Analog_In_Differential_1_2_Alarm$ = "Off"  'Analog In Differential 1-2 Alarm
Analog_In_Differential_1_2_Alarm_Relays$ = "Alarm"  'Analog In Differential 1-2
Alarm Relays
Analog_In_Differential_1_2_Percent_Alarm = 10  'Analog In Differential 1-2
Percent Alarm
Analog_In_Differential_1_2_Absolute_Alarm = 10  'Analog In Differential 1-2
Absolute Alarm
Analog_In_Differential_1_2_Alarm_Delay = 0.1  'Analog In Differential 1-2 Alarm
Delay
Analog_In_Differential_1_2_Alarm_Events$ = "Off/No"  'Analog In Differential 1-2
Alarm Events
Analog_In_Differential_1_2_Trip$ = "Off"  'Analog In Differential 1-2 Trip
Analog_In_Differential_1_2_Trip_Relays$ = "Trip"  'Analog In Differential 1-2
Trip Relays
Analog_In_Differential_1_2_Percent_Trip = 10  'Analog In Differential 1-2
Percent Trip
Analog_In_Differential_1_2_Absolute_Trip = 10  'Analog In Differential 1-2
Absolute Trip
Analog_In_Differential_1_2_Trip_Delay = 0.1  'Analog In Differential 1-2 Trip
Delay
Analog_In_Differential_3_4_Enable$ = "Disabled"  'Analog In Differential 3-4
Enable
Analog_In_Diff_3_4_Name = 0  'Analog In Diff. 3-4 Name
Analog_In_Differential_3_4_Comparison$ = "% Difference"  'Analog In Differential
3-4 Comparison
Analog_In_Differential_3_4_Logic$ = "1>2 (or 3>4)"  'Analog In Differential 3-4
Logic
Analog_In_Differential_3_4_Active_When$ = "Always"  'Analog In Differential 3-4
Active When
Analog_In_Differential_3_4_Block_from_Start = 0  'Analog In Differential 3-4
```

```
Block from Start
Analog_In_Differential_3_4_Alarm$ = "Off"  'Analog In Differential 3-4 Alarm
Analog_In_Differential_3_4_Alarm_Relays$ = "Alarm"  'Analog In Differential 3-4
Alarm Relays
Analog_In_Differential_3_4_Percent_Alarm = 10  'Analog In Differential 3-4
Percent Alarm
Analog_In_Differential_3_4_Absolute_Alarm = 10  'Analog In Differential 3-4
Absolute Alarm
Analog_In_Differential_3_4_Alarm_Delay = 0.1  'Analog In Differential 3-4 Alarm
Delay
Analog_In_Differential_3_4_Alarm_Events$ = "Off/No"  'Analog In Differential 3-4
Alarm Events
Analog_In_Differential_3_4_Trip$ = "Off"  'Analog In Differential 3-4 Trip
Analog_In_Differential_3_4_Trip_Relays$ = "Trip"  'Analog In Differential 3-4
Trip Relays
Analog_In_Differential_3_4_Percent_Trip = 10  'Analog In Differential 3-4
Percent Trip
Analog_In_Differential_3_4_Absolute_Trip = 10  'Analog In Differential 3-4
Absolute Trip
Analog_In_Differential_3_4_Trip_Delay = 0.1  'Analog In Differential 3-4 Trip
Delay
Ground_Fault_Overreach_Filter$ = "Off/No"  'Ground Fault Overreach Filter
User_Map_Address_1 = 512  'User Map Address #1
User_Map_Address_2 = 528  'User Map Address #2
User_Map_Address_3 = 529  'User Map Address #3
User_Map_Address_4 = 551  'User Map Address #4
User_Map_Address_5 = 552  'User Map Address #5
User_Map_Address_6 = 553  'User Map Address #6
User_Map_Address_7 = 554  'User Map Address #7
User_Map_Address_8 = 555  'User Map Address #8
User_Map_Address_9 = 556  'User Map Address #9
User_Map_Address_10 = 720  'User Map Address #10
User_Map_Address_11 = 721  'User Map Address #11
User_Map_Address_12 = 722  'User Map Address #12
User_Map_Address_13 = 723  'User Map Address #13
User_Map_Address_14 = 724  'User Map Address #14
User_Map_Address_15 = 729  'User Map Address #15
User_Map_Address_16 = 768  'User Map Address #16
User_Map_Address_17 = 769  'User Map Address #17
User_Map_Address_18 = 770  'User Map Address #18
User_Map_Address_19 = 771  'User Map Address #19
User_Map_Address_20 = 772  'User Map Address #20
User_Map_Address_21 = 773  'User Map Address #21
User_Map_Address_22 = 774  'User Map Address #22
User_Map_Address_23 = 775  'User Map Address #23
User_Map_Address_24 = 779  'User Map Address #24
User_Map_Address_25 = 780  'User Map Address #25
User_Map_Address_26 = 801  'User Map Address #26
User_Map_Address_27 = 802  'User Map Address #27
User_Map_Address_28 = 803  'User Map Address #28
User_Map_Address_29 = 804  'User Map Address #29
User_Map_Address_30 = 805  'User Map Address #30
User_Map_Address_31 = 806  'User Map Address #31
User_Map_Address_32 = 807  'User Map Address #32
User_Map_Address_33 = 808  'User Map Address #33
User_Map_Address_34 = 809  'User Map Address #34
User_Map_Address_35 = 810  'User Map Address #35
User_Map_Address_36 = 811  'User Map Address #36
User_Map_Address_37 = 812  'User Map Address #37
User_Map_Address_38 = 832  'User Map Address #38
User_Map_Address_39 = 833  'User Map Address #39
User_Map_Address_40 = 834  'User Map Address #40
User_Map_Address_41 = 835  'User Map Address #41
```

```
User_Map_Address_42 = 840  'User Map Address #42
User_Map_Address_43 = 880  'User Map Address #43
User_Map_Address_44 = 881  'User Map Address #44
User_Map_Address_45 = 882  'User Map Address #45
User_Map_Address_46 = 884  'User Map Address #46
User_Map_Address_47 = 885  'User Map Address #47
User_Map_Address_48 = 886  'User Map Address #48
User_Map_Address_49 = 781  'User Map Address #49
User_Map_Address_50 = 782  'User Map Address #50
User_Map_Address_51 = 783  'User Map Address #51
User_Map_Address_52 = 725  'User Map Address #52
User_Map_Address_53 = 726  'User Map Address #53
User_Map_Address_54 = 727  'User Map Address #54
User_Map_Address_55 = 728  'User Map Address #55
User_Map_Address_56 = 0  'User Map Address #56
User_Map_Address_57 = 0  'User Map Address #57
User_Map_Address_58 = 0  'User Map Address #58
User_Map_Address_59 = 0  'User Map Address #59
User_Map_Address_60 = 0  'User Map Address #60
User_Map_Address_61 = 0  'User Map Address #61
User_Map_Address_62 = 0  'User Map Address #62
User_Map_Address_63 = 0  'User Map Address #63
User_Map_Address_64 = 0  'User Map Address #64
User_Map_Address_65 = 0  'User Map Address #65
User_Map_Address_66 = 0  'User Map Address #66
User_Map_Address_67 = 0  'User Map Address #67
User_Map_Address_68 = 0  'User Map Address #68
User_Map_Address_69 = 0  'User Map Address #69
User_Map_Address_70 = 0  'User Map Address #70
User_Map_Address_71 = 0  'User Map Address #71
User_Map_Address_72 = 0  'User Map Address #72
User_Map_Address_73 = 0  'User Map Address #73
User_Map_Address_74 = 0  'User Map Address #74
User_Map_Address_75 = 0  'User Map Address #75
User_Map_Address_76 = 0  'User Map Address #76
User_Map_Address_77 = 0  'User Map Address #77
User_Map_Address_78 = 0  'User Map Address #78
User_Map_Address_79 = 0  'User Map Address #79
User_Map_Address_80 = 0  'User Map Address #80
User_Map_Address_81 = 0  'User Map Address #81
User_Map_Address_82 = 0  'User Map Address #82
User_Map_Address_83 = 0  'User Map Address #83
User_Map_Address_84 = 0  'User Map Address #84
User_Map_Address_85 = 0  'User Map Address #85
User_Map_Address_86 = 0  'User Map Address #86
User_Map_Address_87 = 0  'User Map Address #87
User_Map_Address_88 = 0  'User Map Address #88
User_Map_Address_89 = 0  'User Map Address #89
User_Map_Address_90 = 0  'User Map Address #90
User_Map_Address_91 = 0  'User Map Address #91
User_Map_Address_92 = 0  'User Map Address #92
User_Map_Address_93 = 0  'User Map Address #93
User_Map_Address_94 = 0  'User Map Address #94
User_Map_Address_95 = 0  'User Map Address #95
User_Map_Address_96 = 0  'User Map Address #96
User_Map_Address_97 = 0  'User Map Address #97
User_Map_Address_98 = 0  'User Map Address #98
User_Map_Address_99 = 0  'User Map Address #99
User_Map_Address_100 = 0  'User Map Address #100
User_Map_Address_101 = 0  'User Map Address #101
User_Map_Address_102 = 0  'User Map Address #102
User_Map_Address_103 = 0  'User Map Address #103
User_Map_Address_104 = 0  'User Map Address #104
```

```
User_Map_Address_105 = 0  'User Map Address #105
User_Map_Address_106 = 0  'User Map Address #106
User_Map_Address_107 = 0  'User Map Address #107
User_Map_Address_108 = 0  'User Map Address #108
User_Map_Address_109 = 0  'User Map Address #109
User_Map_Address_110 = 0  'User Map Address #110
User_Map_Address_111 = 0  'User Map Address #111
User_Map_Address_112 = 0  'User Map Address #112
User_Map_Address_113 = 0  'User Map Address #113
User_Map_Address_114 = 0  'User Map Address #114
User_Map_Address_115 = 0  'User Map Address #115
User_Map_Address_116 = 0  'User Map Address #116
User_Map_Address_117 = 0  'User Map Address #117
User_Map_Address_118 = 0  'User Map Address #118
User_Map_Address_119 = 0  'User Map Address #119
User_Map_Address_120 = 0  'User Map Address #120
User_Map_Address_121 = 0  'User Map Address #121
User_Map_Address_122 = 0  'User Map Address #122
User_Map_Address_123 = 0  'User Map Address #123
User_Map_Address_124 = 0  'User Map Address #124
User_Map_Address_125 = 0  'User Map Address #125
Motor_Load_Minimum = 0.00  'Motor Load Minimum
Motor_Load_Maximum = 1.25  'Motor Load Maximum
```

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: **READ TEST NOTES**

OK?
RAN

Relay Test Results for: **TURN ON BATTERY SIMULATOR**

OK?
RAN

Relay Test Results for: *** GET SETTINGS FILE FROM DEVICE ***

OK?
RAN

Relay Test Results for: ***RELAY SETTINGS TO SETTINGS TAB***

OK?
RAN

Relay Test Results for: MODIFY RELAY TRIP SETTINGS

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: ***CURRENT CONNECTIONS***

OK?
RAN

Relay Test Results for: CURRENT METER TEST

	EXPECTED CURRENT	CURRENT READ	RANGE	OK?
A PHASE	300.0	299.0	285.0 TO 315.0	PASS
B PHASE	300.0	300.0	285.0 TO 315.0	PASS
C PHASE	300.0	299.0	285.0 TO 315.0	PASS

Relay Test Results for: OVERLOAD PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	3.204	3.172	1.00	PASS

Relay Test Results for: OVERLOAD TIMING TEST

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
3.00	8.275	1316.63	21.944	21.864	0.36	PASS
4.00	11.033	701.86	11.698	11.660	0.33	PASS

Relay Test Results for: OVERLOAD TIMING TEST

5.00	13.792	438.37	7.306	7.287	0.27	PASS

Relay Test Results for: SHORT CIRCUIT TRIP PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	37.505	37.500	0.01	PASS

Relay Test Results for: SHORT CIRCUIT TRIP DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	45.000	14.12	0.235	0.160 TO 0.260	PASS

Relay Test Results for: UNDERCURRENT TRIP PICKUP

OK?
RAN

Relay Test Results for: MECHANICAL JAM PICKUP

OK?
RAN

Relay Test Results for: MECHANICAL JAM DELAY

OK?
RAN

Relay Test Results for: CURRENT UNBALANCE PICKUP

UNBALANCE% PU	RANGE	OK?
0.00	0.00 TO 0.00	RAN

Relay Test Results for: CURRENT UNBALANCE DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
0.34	13.517	75.22	1.254	0.500 TO 1.500	PASS

Relay Test Results for: ACCELERATION TIMER

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
1.20	3.806	600.51	10.008	10.000	0.08	PASS

Relay Test Results for: ***VOLTAGE INPUT TEST***

	EXPECTED VOLTAGE	VOLATGE READ	RANGE	OK?
APH-BPH	460.0	460.0	450.8 TO 469.2	PASS
BPH-CPH	460.0	460.0	450.8 TO 469.2	PASS
CPH-APH	460.0	460.0	450.8 TO 469.2	PASS

Relay Test Results for: UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: UNDERVOLTAGE DELAY

OK?
RAN

Relay Test Results for: OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: OVERVOLTAGE DELAY

OK?
RAN

Relay Test Results for: VOLTAGE PHASE REVERSAL

OK?
RAN

Relay Test Results for: UNDERFREQUENCY PICKUP

OK?
RAN

Relay Test Results for: UNDERFREQUENCY DELAY

OK?
RAN

Relay Test Results for: OVERFREQUENCY PICKUP

OK?
RAN

Relay Test Results for: OVERFREQUENCY DELAY

OK?
RAN

Relay Test Results for: ***POWER INPUT TEST***

EXPECTED POWER FACTOR	POWER FACTOR READ	EXPECTED KILOWATTS	KILOWATTS READ	RANGE	OK?
0.951	0.950	434.4	434.0	425.3 TO 443.6	PASS

Relay Test Results for: POWER FACTOR LEAD PICKUP

ANG(LAG)	VOLTAGE	CURRENT	POWER FACTOR	RANGE	OK?
0.00	0.00	0.000	0.000	0.000 TO 0.000	RAN

Relay Test Results for: POWER FACTOR LAG PICKUP

ANG(LAG)	VOLTAGE	CURRENT	POWER FACTOR	RANGE	OK?
0.00	0.00	0.000	0.000	0.000 TO 0.000	RAN

Relay Test Results for: REACTIVE POS KVAR TRIP PU

OK?
RAN

Relay Test Results for: REACTIVE NEG KVAR TRIP PU

OK?
RAN

Relay Test Results for: REACTIVE KVAR TRIP DELAY

OK?
RAN

Relay Test Results for: REVERSE POWER TRIP PU

OK?
RAN

Relay Test Results for: REVERSE POWER TRIP DELAY

OK?
RAN

Relay Test Results for: UNDERPOWER TRIP PU

OK?
RAN

Relay Test Results for: UNDERPOWER TRIP DELAY

OK?
RAN

Relay Test Results for: ***GROUND(1A/5A) INPUT TEST***

0.0	0.0	0.0 TO 0.0	RAN

Relay Test Results for: ***GROUND(50/025) INPUT TEST***

EXPECTED CURRENT	CURRENT READ	RANGE	OK?
30.0	30.1	27.0 TO 33.0	PASS

Relay Test Results for: GROUND(50/025) FAULT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.0005	0.0005	0.0000	PASS

Relay Test Results for: GROUND(50/025) FAULT DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.10	0.001	10.88	0.181	0.000 TO 0.700	PASS

Relay Test Results for: ***DIFFERENTIAL INPUT TEST***

0.0	0.0	0.0 TO 0.0	RAN

Relay Test Results for: DIFFERENTIAL PICKUP PH A

OK?
RAN

Relay Test Results for: DIFFERENTIAL PICKUP PH B

Relay Test Results for:	DIFFERENTIAL PICKUP PH B	OK? RAN
Relay Test Results for:	DIFFERENTIAL PICKUP PH C	OK? RAN
Relay Test Results for:	DIFFERENTIAL FAULT DELAY	OK? RAN
Relay Test Results for:	RETURN RELAY SETTING	OK? RAN
Relay Test Results for:	**TURN OFF BATTERY SIMULATOR**	OK? RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SR-469.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 2.7 **Test Date:** 02/26/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	3 - MCC-WBB-A	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	WEST BLOWER BLDG
POSITION:	PAB-W3	RELAY_MANF:	GE MULTILIN
RELAY_TYPE:	SR-469	MODEL_STYLE:	469-P5-HI-A20-T
IEEE_DEVICE:	MF	IL_IB:	SR469-RELAY
SERIAL_NUMBER:	B3041647	FIRMWARE:	30I520A8.000
RELAY_ID:	AACI207024	CURRENT_TESTDATE:	2/26/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
RELAY_ADDRESS=1                              'SPECIFIC RELAY ADDRESS USED FOR
MODBUS COMMUNICATIONS (DEFAULT=1)
TRIP_OUTPUT$="F1-E2"                         'OUTPUT CONTACT TO SENSE A TRIP
AUTO_MASK=1                                  'SET TO 2 TO DISPLAY FLEX PROGRAMMING
SKIP_TST=1                                   'SET TO 1 TO SKIP MESSAGES FOR TESTS
SKIPPED
PRINT_RAN_TESTS=1                            'MARKS TESTS IF THEY WERE ATTEMPTED
BUT NOT APPLICABLE
Phase_CT_Secondary=5                         'THIS IS THE RELAYS PHASE NOMINAL CT
INPUT
VTR=Voltage_Transformer_Ratio                'VT RATIO
CTR=Phase_CT_Primary/Phase_CT_Secondary      'CALCULATED CT RATIO
FLA=(MOTOR_Full_load_Amps)/CTR               'SECONDARY FULL LOAD CURRENT
MTR_START_MULT=0.5                           'MULT OF FULL LOAD AMPS
MTR_START_DELAY=120                          'WAIT TIME IN CYCLES FOR START
```

Routine Notes:

Relay Settings Used for Testing:

```
SR_PART_NUM$ = "469-P5-HI-A20-T"  'Information acquired from Settings file
SR_FIRMWARE$ = "5200"  'Information acquired from Settings file
Default_Message_Cycle_Time = 2.0  'Default Message Cycle Time
Default_Message_Timeout = 300  'Default Message Timeout
Average_Motor_Load_Calculation_Period = 15  'Average Motor Load Calculation
Period
Temperature_Display_Units$ = "Celsius"  'Temperature Display Units
Trace_Memory_Trigger_Position = 25  'Trace Memory Trigger Position
Trace_Memory_Buffers$ = "8 x 28 cycles"  'Trace Memory Buffers
Display_Update_Interval = 0.4  'Display Update Interval
Motor_Load_Filter_Interval = 0  'Motor Load Filter Interval
Communication_Port_Passcode = 0  'Communication Port Passcode
Passcode_write_Only_ = 0  'Passcode (write Only)
First_Scratchpad_Message$ = "PAB-W3"  'First Scratchpad Message
Second_Scratchpad_Message$ = ""  'Second Scratchpad Message
Third_Scratchpad_Message$ = ""  'Third Scratchpad Message
Fourth_Scratchpad_Message$ = ""  'Fourth Scratchpad Message
Fifth_Scratchpad_Message$ = ""  'Fifth Scratchpad Message
Phase_CT_Primary = 600  'Phase CT Primary
Motor_Full_Load_Amps = 331  'Motor Full Load Amps
Ethernet_IP_Address = 0  'Ethernet IP Address
Ethernet_Subnet_Mask = 4294966272  'Ethernet Subnet Mask
Ethernet_Gateway_Address = 0  'Ethernet Gateway Address
```

```
DeviceNet_MAC_ID = 1  'DeviceNet MAC ID
DeviceNet_Baud_Rate$ = "125 kbps"  'DeviceNet Baud Rate
Front_RS232_baud_rate$ = "19200 baud"  'Front RS232 baud rate
Slave_Address = 254  'Slave Address
Computer_RS485_Baud_Rate$ = "9600 baud"  'Computer RS485 Baud Rate
Computer_RS485_Parity$ = "None"  'Computer RS485 Parity
Auxiliary_RS485_Baud_Rate$ = "9600 baud"  'Auxiliary RS485 Baud Rate
Auxiliary_RS485_Parity$ = "None"  'Auxiliary RS485 Parity
Ground_CT_Type$ = "Multlin CT 50/0.025"  'Ground CT Type
Phase_Differential_CT_Type$ = "None"  'Phase Differential CT Type
Enable_Two_Speed_Motor_Option$ = "Off/No"  'Enable Two Speed Motor Option
Speed_Two_Phase_CT_Primary = 100  'Speed Two Phase CT Primary
Speed_Two_Motor_Full_Load_Amps = 1  'Speed Two Motor Full Load Amps
VoltageTransformer_Connection_Type$ = "Open Delta"  'VoltageTransformer
Connection Type
Enable_Single_VT_Connection$ = "Off"  'Enable Single VT Connection
Voltage_Transformer_Ratio = 4.00  'Voltage Transformer Ratio
Motor_Nameplate_Voltage = 460  'Motor Nameplate Voltage
Nominal_System_Frequency$ = "60 Hz"  'Nominal System Frequency
System_Phase_Sequence$ = "ABC"  'System Phase Sequence
Serial_Communication_Control$ = "Off/No"  'Serial Communication Control
Assign_Start_Control_Relays$ = "Auxiliary 2"  'Assign Start Control Relays
Reduced_Voltage_Starting$ = "Off/No"  'Reduced Voltage Starting
Control_Relays_for_Reduced_Voltage_Starting$ = "Auxiliary 3"  'Control Relays
for Reduced Voltage Starting
Transition_On$ = "Current Only"  'Transition On
Reduced_Voltage_Start_Level = 100  'Reduced Voltage Start Level
Reduced_Voltage_Start_Timer = 200  'Reduced Voltage Start Timer
Incomplete_Sequence_Trip_Relays$ = "Trip"  'Incomplete Sequence Trip Relays
Starter_Status_Switch$ = "Start Aux a"  'Starter Status Switch
Assignable_Input_1_Function$ = "Off"  'Assignable Input 1 Function
Counter_Alarm_Events$ = "Off/No"  'Counter Alarm Events
Rated_Speed = 3600  'Rated Speed
Tachometer_Alarm$ = "Off"  'Tachometer Alarm
Tachometer_Alarm_Relays$ = "Alarm"  'Tachometer Alarm Relays
Tachometer_Alarm_Speed = 10  'Tachometer Alarm Speed
Tachometer_Alarm_Delay = 1  'Tachometer Alarm Delay
Tachometer_Alarm_Events$ = "Off/No"  'Tachometer Alarm Events
Tachometer_Trip$ = "Off"  'Tachometer Trip
Tachometer_Trip_Relays$ = "Trip"  'Tachometer Trip Relays
Tachometer_Trip_Speed = 10  'Tachometer Trip Speed
Tachometer_Trip_Delay = 1  'Tachometer Trip Delay
General_Switch_A_Name = 0  'General Switch A Name
General_Switch_A_Normal_State$ = "Normally Open"  'General Switch A Normal State
General_Switch_A_Block_Input_From_Start = 0  'General Switch A Block Input From
Start
General_Switch_A_Alarm$ = "Off"  'General Switch A Alarm
General_Switch_A_Alarm_Relays$ = "Alarm"  'General Switch A Alarm Relays
General_Switch_A_Alarm_Delay = 5.0  'General Switch A Alarm Delay
General_Switch_A_Alarm_Events$ = "Off/No"  'General Switch A Alarm Events
General_Switch_A_Trip$ = "Off"  'General Switch A Trip
General_Switch_A_Trip_Relays$ = "Trip"  'General Switch A Trip Relays
General_Switch_A_Trip_Delay = 5.0  'General Switch A Trip Delay
General_Switch_B_Name = 0  'General Switch B Name
General_Switch_B_Normal_State$ = "Normally Open"  'General Switch B Normal State
General_Switch_B_Block_Input_From_Start = 0  'General Switch B Block Input From
Start
General_Switch_B_Alarm$ = "Off"  'General Switch B Alarm
General_Switch_B_Alarm_Relays$ = "Alarm"  'General Switch B Alarm Relays
General_Switch_B_Alarm_Delay = 5.0  'General Switch B Alarm Delay
General_Switch_B_Alarm_Events$ = "Off/No"  'General Switch B Alarm Events
General_Switch_B_Trip$ = "Off"  'General Switch B Trip
General_Switch_B_Trip_Relays$ = "Trip"  'General Switch B Trip Relays
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General_Switch_B_Trip_Delay = 5.0  'General Switch B Trip Delay
General_Switch_C_Name = 0  'General Switch C Name
General_Switch_C_Normal_State$ = "Normally Open"  'General Switch C Normal State
General_Switch_C_Block_Input_From_Start = 0  'General Switch C Block Input From
Start
General_Switch_C_Alarm$ = "Off"  'General Switch C Alarm
General_Switch_C_Alarm_Relays$ = "Alarm"  'General Switch C Alarm Relays
General_Switch_C_Alarm_Delay = 5.0  'General Switch C Alarm Delay
General_Switch_C_Alarm_Events$ = "Off/No"  'General Switch C Alarm Events
General_Switch_C_Trip$ = "Off"  'General Switch C Trip
General_Switch_C_Trip_Relays$ = "Trip"  'General Switch C Trip Relays
General_Switch_C_Trip_Delay = 5.0  'General Switch C Trip Delay
General_Switch_D_Name = 0  'General Switch D Name
General_Switch_D_Normal_State$ = "Normally Open"  'General Switch D Normal State
General_Switch_D_Block_Input_From_Start = 0  'General Switch D Block Input From
Start
General_Switch_D_Alarm$ = "Off"  'General Switch D Alarm
General_Switch_D_Alarm_Relays$ = "Alarm"  'General Switch D Alarm Relays
General_Switch_D_Alarm_Delay = 5.0  'General Switch D Alarm Delay
General_Switch_D_Alarm_Events$ = "Off/No"  'General Switch D Alarm Events
General_Switch_D_Trip$ = "Off"  'General Switch D Trip
General_Switch_D_Trip_Relays$ = "Trip"  'General Switch D Trip Relays
General_Switch_D_Trip_Delay = 5.0  'General Switch D Trip Delay
Assignable_Input_2_Function$ = "Off"  'Assignable Input 2 Function
Assignable_Input_3_Function$ = "Off"  'Assignable Input 3 Function
Assignable_Input_4_Function$ = "Off"  'Assignable Input 4 Function
Reset_Mode_R1_Trip$ = "All Resets"  'Reset Mode R1 Trip
Force_R1_Output_Relay$ = "Disabled"  'Force R1 Output Relay
Force_R1_Operate_Time = 0  'Force R1 Operate Time
Reset_Mode_R4_Auxiliary$ = "All Resets"  'Reset Mode R4 Auxiliary
Force_R4_Output_Relay$ = "Disabled"  'Force R4 Output Relay
Force_R4_Operate_Time = 0  'Force R4 Operate Time
Reset_Mode_R2_Auxiliary$ = "All Resets"  'Reset Mode R2 Auxiliary
Force_R2_Output_Relay$ = "Disabled"  'Force R2 Output Relay
Force_R2_Output_Operate_Time = 0  'Force R2 Output Operate Time
Reset_Mode_R3_Auxiliary$ = "All Resets"  'Reset Mode R3 Auxiliary
Force_R3_Output_Relay$ = "Disabled"  'Force R3 Output Relay
Force_R3_Operate_Time = 0  'Force R3 Operate Time
Force_R5_Output_Relay$ = "Disabled"  'Force R5 Output Relay
Force_R5_Operate_Time = 0  'Force R5 Operate Time
Reset_Mode_R6_Service$ = "All Resets"  'Reset Mode R6 Service
Curve_Style$ = "Standard"  'Curve Style
Overload_Pickup_Level = 1.15  'Overload Pickup Level
Unbalance_k_Factor = 0  'Unbalance k Factor
Cool_Time_Constant_Running = 15  'Cool Time Constant Running
Cool_Time_Constant_Stopped = 30  'Cool Time Constant Stopped
Hot_Cold_Safe_Stall_Ratio = 0.89  'Hot/Cold Safe Stall Ratio
RTD_Blasing$ = "Off/No"  'RTD Blasing
RTD_Blas_Minimum = 40  'RTD Blas Minimum
RTD_Blas_Center_Point = 130  'RTD Blas Center Point
RTD_Blas_Maximum = 155  'RTD Blas Maximum
Thermal_Capacity_Alarm$ = "Off"  'Thermal Capacity Alarm
Thermal_Capacity_Alarm_Relays$ = "Alarm"  'Thermal Capacity Alarm Relays
Thermal_Capacity_Alarm_Level = 75  'Thermal Capacity Alarm Level
Thermal_Capacity_Alarm_Events$ = "Off/No"  'Thermal Capacity Alarm Events
Overload_Trip_Relays$ = "Trip"  'Overload Trip Relays
Standard_Overload_Curve_Number = 2  'Standard Overload Curve Number
Minimum_Allowable_Line_Voltage = 80  'Minimum Allowable Line Voltage
Stall_Current_at_Min_Vline = 4.80  'Stall Current at Min Vline
Safe_Stall_Time_at_Min_Vline = 20.0  'Safe Stall Time at Min Vline
Accel_Intersect_at_Min_Vline = 3.80  'Accel. Intersect at Min Vline
Stall_Current_at_100_Vline = 6.00  'Stall Current at 100% Vline
Safe_Stall_Time_at_100_Vline = 10.0  'Safe Stall Time at 100% Vline
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Accel_Intersect_at_100_Vline = 5.00  'Accel. Intersect at 100% Vline
Short_Circuit_Trip$ = "Latched"  'Short Circuit Trip
Short_Circuit_Trip_Backup$ = "Off/No"  'Short Circuit Trip Backup
Short_Circuit_Backup_Relays$ = "Aux2"  'Short Circuit Backup Relays
Short_Circuit_Trip_Backup_Delay = 200  'Short Circuit Trip Backup Delay
Overload_Alarm$ = "Off"  'Overload Alarm
Overload_Alarm_Relays$ = "Alarm"  'Overload Alarm Relays
Overload_Alarm_Events$ = "Off/No"  'Overload Alarm Events
Overload_Alarm_Delay = 0.1  'Overload Alarm Delay
Mechanical_Jam_Trip$ = "Off"  'Mechanical Jam Trip
Mechanical_Jam_Trip_Relays$ = "Trip"  'Mechanical Jam Trip Relays
Mechanical_Jam_Pickup = 1.50  'Mechanical Jam Pickup
Mechanical_Jam_Delay = 1  'Mechanical Jam Delay
Block_Undercurrent_from_Start = 0  'Block Undercurrent from Start
Undercurrent_Alarm$ = "Off"  'Undercurrent Alarm
Undercurrent_Alarm_Relays$ = "Alarm"  'Undercurrent Alarm Relays
Undercurrent_Alarm_Pickup = 0.70  'Undercurrent Alarm Pickup
Undercurrent_Alarm_Delay = 1  'Undercurrent Alarm Delay
Undercurrent_Alarm_Events$ = "Off/No"  'Undercurrent Alarm Events
Undercurrent_Trip$ = "Off"  'Undercurrent Trip
Undercurrent_Trip_Relays$ = "Trip"  'Undercurrent Trip Relays
Undercurrent_Trip_Pickup = 0.70  'Undercurrent Trip Pickup
Undercurrent_Trip_Delay = 1  'Undercurrent Trip Delay
Current_Unbalance_Alarm$ = "Off"  'Current Unbalance Alarm
Current_Unbalance_Alarm_Relays$ = "Alarm"  'Current Unbalance Alarm Relays
Current_Unbalance_Alarm_Pickup = 15  'Current Unbalance Alarm Pickup
Current_Unbalance_Alarm_Delay = 1  'Current Unbalance Alarm Delay
Current_Unbalance_Alarm_Events$ = "Off/No"  'Current Unbalance Alarm Events
Current_Unbalance_Trip$ = "Off"  'Current Unbalance Trip
Current_Unbalance_Trip_Relays$ = "Trip"  'Current Unbalance Trip Relays
Current_Unbalance_Trip_Pickup = 20  'Current Unbalance Trip Pickup
Current_Unbalance_Trip_Delay = 1  'Current Unbalance Trip Delay
Ground_Fault_Alarm$ = "Off"  'Ground Fault Alarm
Ground_Fault_Alarm_Relays$ = "Alarm"  'Ground Fault Alarm Relays
Ground_Fault_Alarm_Pickup = 0.10  'Ground Fault Alarm Pickup
Alarm_Pickup_for_Multlin_CT_50_025 = 1.00  'Alarm Pickup for Multlin CT 50/.025
Intentional_GF_Alarm_Delay = 0  'Intentional GF Alarm Delay
Ground_Fault_Alarm_Events$ = "Off/No"  'Ground Fault Alarm Events
Ground_Fault_Trip$ = "Latched"  'Ground Fault Trip
Ground_Fault_Trip_Relays$ = "Trip"  'Ground Fault Trip Relays
Ground_Fault_Trip_Pickup = 0.20  'Ground Fault Trip Pickup
Trip_Pickup_for_Multlin_CT_50_025 = 1.00  'Trip Pickup for Multlin CT 50/.025
Intentional_GF_Trip_Delay = 200  'Intentional GF Trip Delay
Ground_Fault_Trip_Backup$ = "Off/No"  'Ground Fault Trip Backup
Phase_Differential_Trip$ = "Off"  'Phase Differential Trip
Phase_Differential_Trip_Relays$ = "Trip"  'Phase Differential Trip Relays
Differential_Trip_Pickup_While_Starting = 0.10  'Differential Trip Pickup While
Starting
Differential_Trip_Delay_While_Starting = 0  'Differential Trip Delay While
Starting
Differential_Trip_Pickup_While_Running = 0.10  'Differential Trip Pickup While
Running
Differential_Trip_Delay_While_Running = 0  'Differential Trip Delay While Running
Accleration_Timer_Trip$ = "Off"  'Accleration Timer Trip
Acceleration_Timer_Trip_Relays$ = "Trip"  'Acceleration Timer Trip Relays
Acceleration_Timer_from_Start = 10.0  'Acceleration Timer from Start
Start_Inhibit_Block$ = "Off/No"  'Start Inhibit Block
Thermal_Capacity_Used_Margin = 25  'Thermal Capacity Used Margin
Jogging_Block$ = "Off/No"  'Jogging Block
Maximum_Starts_Hour_Permissible = 3  'Maximum Starts/Hour Permissible
Time_Between_Starts = 10  'Time Between Starts
Restart_Block$ = "Off/No"  'Restart Block
Restart_Block_Time = 1  'Restart Block Time
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Stator_RTD_Type$ = "100 Ohm Platinum"  'Stator RTD Type
Bearing_RTD_Type$ = "100 Ohm Platinum"  'Bearing RTD Type
Ambient_RTD_Type$ = "100 Ohm Platinum"  'Ambient RTD Type
Other_RTD_Type$ = "100 Ohm Platinum"  'Other RTD Type
RTD_1_Application$ = "None"  'RTD #1 Application
RTD_1_Name = 0  'RTD #1 Name
RTD_1_Alarm$ = "Off"  'RTD #1 Alarm
RTD_1_Alarm_Relays$ = "Alarm"  'RTD #1 Alarm Relays
RTD_1_Alarm_Temperature = 130  'RTD #1 Alarm Temperature
RTD_1_Alarm_Events$ = "Off/No"  'RTD #1 Alarm Events
RTD_1_Trip$ = "Off"  'RTD #1 Trip
RTD_1_Trip_Voting$ = "RTD #1"  'RTD #1 Trip Voting
RTD_1_Trip_Relays$ = "Trip"  'RTD #1 Trip Relays
RTD_1_Trip_Temperature = 155  'RTD #1 Trip Temperature
RTD_1_Hi_Alarm$ = "Off"  'RTD #1 Hi Alarm
RTD_1_Hi_Alarm_Relays$ = "Alarm"  'RTD #1 Hi Alarm Relays
RTD_1_Hi_Alarm_Level = 130  'RTD #1 Hi Alarm Level
RTD_2_Application$ = "None"  'RTD #2 Application
RTD_2_Name = 0  'RTD #2 Name
RTD_2_Alarm$ = "Off"  'RTD #2 Alarm
RTD_2_Alarm_Relays$ = "Alarm"  'RTD #2 Alarm Relays
RTD_2_Alarm_Temperature = 130  'RTD #2 Alarm Temperature
RTD_2_Alarm_Events$ = "Off/No"  'RTD #2 Alarm Events
RTD_2_Trip$ = "Off"  'RTD #2 Trip
RTD_2_Trip_Voting$ = "RTD #2"  'RTD #2 Trip Voting
RTD_2_Trip_Relays$ = "Trip"  'RTD #2 Trip Relays
RTD_2_Trip_Temperature = 155  'RTD #2 Trip Temperature
RTD_2_Hi_Alarm$ = "Off"  'RTD #2 Hi Alarm
RTD_2_Hi_Alarm_Relays$ = "Alarm"  'RTD #2 Hi Alarm Relays
RTD_2_Hi_Alarm_Level = 130  'RTD #2 Hi Alarm Level
RTD_3_Application$ = "None"  'RTD #3 Application
RTD_3_Name = 0  'RTD #3 Name
RTD_3_Alarm$ = "Off"  'RTD #3 Alarm
RTD_3_Alarm_Relays$ = "Alarm"  'RTD #3 Alarm Relays
RTD_3_Alarm_Temperature = 130  'RTD #3 Alarm Temperature
RTD_3_Alarm_Events$ = "Off/No"  'RTD #3 Alarm Events
RTD_3_Trip$ = "Off"  'RTD #3 Trip
RTD_3_Trip_Voting$ = "RTD #3"  'RTD #3 Trip Voting
RTD_3_Trip_Relays$ = "Trip"  'RTD #3 Trip Relays
RTD_3_Trip_Temperature = 155  'RTD #3 Trip Temperature
RTD_3_Hi_Alarm$ = "Off"  'RTD #3 Hi Alarm
RTD_3_Hi_Alarm_Relays$ = "Alarm"  'RTD #3 Hi Alarm Relays
RTD_3_Hi_Alarm_Level = 130  'RTD #3 Hi Alarm Level
RTD_4_Application$ = "None"  'RTD #4 Application
RTD_4_Name = 0  'RTD #4 Name
RTD_4_Alarm$ = "Off"  'RTD #4 Alarm
RTD_4_Alarm_Relays$ = "Alarm"  'RTD #4 Alarm Relays
RTD_4_Alarm_Temperature = 130  'RTD #4 Alarm Temperature
RTD_4_Alarm_Events$ = "Off/No"  'RTD #4 Alarm Events
RTD_4_Trip$ = "Off"  'RTD #4 Trip
RTD_4_Trip_Voting$ = "RTD #4"  'RTD #4 Trip Voting
RTD_4_Trip_Relays$ = "Trip"  'RTD #4 Trip Relays
RTD_4_Trip_Temperature = 155  'RTD #4 Trip Temperature
RTD_4_Hi_Alarm$ = "Off"  'RTD #4 Hi Alarm
RTD_4_Hi_Alarm_Relays$ = "Alarm"  'RTD #4 Hi Alarm Relays
RTD_4_Hi_Alarm_Level = 130  'RTD #4 Hi Alarm Level
RTD_5_Application$ = "None"  'RTD #5 Application
RTD_5_Name = 0  'RTD #5 Name
RTD_5_Alarm$ = "Off"  'RTD #5 Alarm
RTD_5_Alarm_Relays$ = "Alarm"  'RTD #5 Alarm Relays
RTD_5_Alarm_Temperature = 130  'RTD #5 Alarm Temperature
RTD_5_Alarm_Events$ = "Off/No"  'RTD #5 Alarm Events
RTD_5_Trip$ = "Off"  'RTD #5 Trip
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RTD_5_Trip_Voting$ = "RTD #5"  'RTD #5 Trip Voting
RTD_5_Trip_Relays$ = "Trip"  'RTD #5 Trip Relays
RTD_5_Trip_Temperature = 155  'RTD #5 Trip Temperature
RTD_5_Hi_Alarm$ = "Off"  'RTD #5 Hi Alarm
RTD_5_Hi_Alarm_Relays$ = "Alarm"  'RTD #5 Hi Alarm Relays
RTD_5_Hi_Alarm_Level = 130  'RTD #5 Hi Alarm Level
RTD_6_Application$ = "None"  'RTD #6 Application
RTD_6_Name = 0  'RTD #6 Name
RTD_6_Alarm$ = "Off"  'RTD #6 Alarm
RTD_6_Alarm_Relays$ = "Alarm"  'RTD #6 Alarm Relays
RTD_6_Alarm_Temperature = 130  'RTD #6 Alarm Temperature
RTD_6_Alarm_Events$ = "Off/No"  'RTD #6 Alarm Events
RTD_6_Trip$ = "Off"  'RTD #6 Trip
RTD_6_Trip_Voting$ = "RTD #6"  'RTD #6 Trip Voting
RTD_6_Trip_Relays$ = "Trip"  'RTD #6 Trip Relays
RTD_6_Trip_Temperature = 155  'RTD #6 Trip Temperature
RTD_6_Hi_Alarm$ = "Off"  'RTD #6 Hi Alarm
RTD_6_Hi_Alarm_Relays$ = "Alarm"  'RTD #6 Hi Alarm Relays
RTD_6_Hi_Alarm_Level = 130  'RTD #6 Hi Alarm Level
RTD_7_Application$ = "None"  'RTD #7 Application
RTD_7_Name = 0  'RTD #7 Name
RTD_7_Alarm$ = "Off"  'RTD #7 Alarm
RTD_7_Alarm_Relays$ = "Alarm"  'RTD #7 Alarm Relays
RTD_7_Alarm_Temperature = 80  'RTD #7 Alarm Temperature
RTD_7_Alarm_Events$ = "Off/No"  'RTD #7 Alarm Events
RTD_7_Trip$ = "Off"  'RTD #7 Trip
RTD_7_Trip_Voting$ = "RTD #7"  'RTD #7 Trip Voting
RTD_7_Trip_Relays$ = "Trip"  'RTD #7 Trip Relays
RTD_7_Trip_Temperature = 90  'RTD #7 Trip Temperature
RTD_7_Hi_Alarm$ = "Off"  'RTD #7 Hi Alarm
RTD_7_Hi_Alarm_Relays$ = "Alarm"  'RTD #7 Hi Alarm Relays
RTD_7_Hi_Alarm_Level = 80  'RTD #7 Hi Alarm Level
RTD_8_Application$ = "None"  'RTD #8 Application
RTD_8_Name = 0  'RTD #8 Name
RTD_8_Alarm$ = "Off"  'RTD #8 Alarm
RTD_8_Alarm_Relays$ = "Alarm"  'RTD #8 Alarm Relays
RTD_8_Alarm_Temperature = 80  'RTD #8 Alarm Temperature
RTD_8_Alarm_Events$ = "Off/No"  'RTD #8 Alarm Events
RTD_8_Trip$ = "Off"  'RTD #8 Trip
RTD_8_Trip_Voting$ = "RTD #8"  'RTD #8 Trip Voting
RTD_8_Trip_Relays$ = "Trip"  'RTD #8 Trip Relays
RTD_8_Trip_Temperature = 90  'RTD #8 Trip Temperature
RTD_8_Hi_Alarm$ = "Off"  'RTD #8 Hi Alarm
RTD_8_Hi_Alarm_Relays$ = "Alarm"  'RTD #8 Hi Alarm Relays
RTD_8_Hi_Alarm_Level = 80  'RTD #8 Hi Alarm Level
RTD_9_Application$ = "None"  'RTD #9 Application
RTD_9_Name = 0  'RTD #9 Name
RTD_9_Alarm$ = "Off"  'RTD #9 Alarm
RTD_9_Alarm_Relays$ = "Alarm"  'RTD #9 Alarm Relays
RTD_9_Alarm_Temperature = 80  'RTD #9 Alarm Temperature
RTD_9_Alarm_Events$ = "Off/No"  'RTD #9 Alarm Events
RTD_9_Trip$ = "Off"  'RTD #9 Trip
RTD_9_Trip_Voting$ = "RTD #9"  'RTD #9 Trip Voting
RTD_9_Trip_Relays$ = "Trip"  'RTD #9 Trip Relays
RTD_9_Trip_Temperature = 90  'RTD #9 Trip Temperature
RTD_9_Hi_Alarm$ = "Off"  'RTD #9 Hi Alarm
RTD_9_Hi_Alarm_Relays$ = "Alarm"  'RTD #9 Hi Alarm Relays
RTD_9_Hi_Alarm_Level = 80  'RTD #9 Hi Alarm Level
RTD_10_Application$ = "None"  'RTD #10 Application
RTD_10_Name = 0  'RTD #10 Name
RTD_10_Alarm$ = "Off"  'RTD #10 Alarm
RTD_10_Alarm_Relays$ = "Alarm"  'RTD #10 Alarm Relays
RTD_10_Alarm_Temperature = 80  'RTD #10 Alarm Temperature
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RTD_10_Alarm_Events$ = "Off/No"  'RTD #10 Alarm Events
RTD_10_Trip$ = "Off"  'RTD #10 Trip
RTD_10_Trip_Voting$ = "RTD #10"  'RTD #10 Trip Voting
RTD_10_Trip_Relays$ = "Trip"  'RTD #10 Trip Relays
RTD_10_Trip_Temperature = 90  'RTD #10 Trip Temperature
RTD_10_Hi_Alarm$ = "Off"  'RTD #10 Hi Alarm
RTD_10_Hi_Alarm_Relays$ = "Alarm"  'RTD #10 Hi Alarm Relays
RTD_10_Hi_Alarm_Level = 80  'RTD #10 Hi Alarm Level
RTD_11_Application$ = "None"  'RTD #11 Application
RTD_11_Name = 0  'RTD #11 Name
RTD_11_Alarm$ = "Off"  'RTD #11 Alarm
RTD_11_Alarm_Relays$ = "Alarm"  'RTD #11 Alarm Relays
RTD_11_Alarm_Temperature = 80  'RTD #11 Alarm Temperature
RTD_11_Alarm_Events$ = "Off/No"  'RTD #11 Alarm Events
RTD_11_Trip$ = "Off"  'RTD #11 Trip
RTD_11_Trip_Voting$ = "RTD #11"  'RTD #11 Trip Voting
RTD_11_Trip_Relays$ = "Trip"  'RTD #11 Trip Relays
RTD_11_Trip_Temperature = 90  'RTD #11 Trip Temperature
RTD_11_Hi_Alarm$ = "Off"  'RTD #11 Hi Alarm
RTD_11_Hi_Alarm_Relays$ = "Alarm"  'RTD #11 Hi Alarm Relays
RTD_11_Hi_Alarm_Level = 80  'RTD #11 Hi Alarm Level
RTD_12_Application$ = "None"  'RTD #12 Application
RTD_12_Name = 0  'RTD #12  Name
RTD_12_Alarm$ = "Off"  'RTD #12 Alarm
RTD_12_Alarm_Relays$ = "Alarm"  'RTD #12 Alarm Relays
RTD_12_Alarm_Temperature = 60  'RTD #12 Alarm Temperature
RTD_12_Alarm_Events$ = "Off/No"  'RTD #12 Alarm Events
RTD_12_Trip$ = "Off"  'RTD #12 Trip
RTD_12_Trip_Voting$ = "RTD #12"  'RTD #12 Trip Voting
RTD_12_Trip_Relays$ = "Trip"  'RTD #12 Trip Relays
RTD_12_Trip_Temperature = 80  'RTD #12 Trip Temperature
RTD_12_Hi_Alarm$ = "Off"  'RTD #12 Hi Alarm
RTD_12_Hi_Alarm_Relays$ = "Alarm"  'RTD #12 Hi Alarm Relays
RTD_12_Hi_Alarm_Level = 60  'RTD #12 Hi Alarm Level
Open_RTD_Sensor_Alarm$ = "Off"  'Open RTD Sensor Alarm
Open_RTD_Sensor_Alarm_Relays$ = "Alarm"  'Open RTD Sensor Alarm Relays
Open_RTD_Sensor_Alarm_Events$ = "Off/No"  'Open RTD Sensor Alarm Events
RTD_Short_Low_Temp_Alarm$ = "Off"  'RTD Short/Low Temp Alarm
RTD_Short_Low_Temp_Alarm_Relays$ = "Alarm"  'RTD Short/Low Temp. Alarm Relays
RTD_Short_Low_Temp_Alarm_Events$ = "Off/No"  'RTD Short/Low Temp. Alarm Events
Undervoltage_Active_Only_If_Bus_Energized$ = "Off/No"  'Undervoltage Active Only
If Bus Energized
Undervoltage_Alarm$ = "Off"  'Undervoltage Alarm
Undervoltage_Alarm_Relays$ = "Alarm"  'Undervoltage Alarm Relays
Undervoltage_Alarm_Pickup = 0.85  'Undervoltage Alarm Pickup
Starting_Undervoltage_Alarm_Pickup = 0.85  'Starting Undervoltage Alarm Pickup
Undervoltage_Alarm_Delay = 3.0  'Undervoltage Alarm Delay
Undervoltage_Alarm_Events$ = "Off/No"  'Undervoltage Alarm Events
Undervoltage_Trip$ = "Off"  'Undervoltage Trip
Undervoltage_Trip_Mode$ = "1-Phase"  'Undervoltage Trip Mode
Undervoltage_Trip_Relays$ = "Trip"  'Undervoltage Trip Relays
Undervoltage_Trip_Pickup = 0.80  'Undervoltage Trip Pickup
Starting_Undervoltage_Trip_Pickup = 0.80  'Starting Undervoltage Trip Pickup
Undervoltage_Trip_Delay = 3.0  'Undervoltage Trip Delay
Overvoltage_Alarm$ = "Off"  'Overvoltage Alarm
Overvoltage_Relays$ = "Alarm"  'Overvoltage Relays
Overvoltage_Alarm_Pickup = 1.05  'Overvoltage Alarm Pickup
Overvoltage_Alarm_Delay = 3.0  'Overvoltage Alarm Delay
Overvoltage_Alarm_Events$ = "Off/No"  'Overvoltage Alarm Events
Overvoltage_Trip$ = "Off"  'Overvoltage Trip
Overvoltage_Trip_Relays$ = "Trip"  'Overvoltage Trip Relays
Overvoltage_Trip_Pickup = 1.10  'Overvoltage Trip Pickup
Overvoltage_Trip_Delay = 3.0  'Overvoltage Trip Delay
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Voltage_Phase_Reversal_Trip$ = "Off"  'Voltage Phase Reversal Trip
Voltage_Phase_Reversal_Trip_Relays$ = "Trip"  'Voltage Phase Reversal Trip Relays
Voltage_Frequency_Alarm$ = "Off"  'Voltage Frequency Alarm
Voltage_Frequency_Alarm_Relays$ = "Alarm"  'Voltage Frequency Alarm Relays
Overfrequency_Alarm_Level = 60.50  'Overfrequency Alarm Level
Underfrequency_Alarm_Level = 59.50  'Underfrequency Alarm Level
Voltage_Frequency_Alarm_Delay = 1.0  'Voltage Frequency Alarm Delay
Voltage_Frequency_Alarm_Events$ = "Off/No"  'Voltage Frequency Alarm Events
Voltage_Frequency_Trip$ = "Off"  'Voltage Frequency Trip
Voltage_Frequency_Trip_Relays$ = "Trip"  'Voltage Frequency Trip Relays
Overfrequency_Trip_Level = 60.50  'Overfrequency Trip Level
Underfrequency_Trip_Level = 59.50  'Underfrequency Trip Level
Voltage_Frequency_Trip_Delay = 1.0  'Voltage Frequency Trip Delay
Block_Power_Factor_Element_from_Start = 1  'Block Power Factor Element from Start
Power_Factor_Alarm$ = "Off"  'Power Factor Alarm
Power_Factor_Alarm_Relays$ = "Alarm"  'Power Factor Alarm Relays
Power_Factor_Lead_Alarm_Level = 1.00  'Power Factor Lead Alarm Level
Power_Factor_Lag_Alarm_Level = 1.00  'Power Factor Lag Alarm Level
Power_Factor_Alarm_Delay = 1.0  'Power Factor Alarm Delay
Power_Factor_Alarm_Events$ = "Off/No"  'Power Factor Alarm Events
Power_Factor_Trip$ = "Off"  'Power Factor Trip
Power_Factor_Trip_Relays$ = "Trip"  'Power Factor Trip Relays
Power_Factor_Lead_Trip_Level = 1.00  'Power Factor Lead Trip Level
Power_Factor_Lag_Trip_Level = 1.00  'Power Factor Lag Trip Level
Power_Factor_Trip_Delay = 1.0  'Power Factor Trip Delay
Block_kvar_Element_from_Start = 1  'Block kvar Element from Start
Reactive_Power_Alarm$ = "Off"  'Reactive Power Alarm
Reactive_Power_Alarm_Relays$ = "Alarm"  'Reactive Power Alarm Relays
Positive_Reactive_Power_Alarm_Level = 10  'Positive Reactive Power Alarm Level
Negative_Reactive_Power_Alarm_Level = 10  'Negative Reactive Power Alarm Level
Reactive_Power_Alarm_Delay = 1.0  'Reactive Power Alarm Delay
Reactive_Power_Alarm_Events$ = "Off/No"  'Reactive Power Alarm Events
Reactive_Power_Trip$ = "Off"  'Reactive Power Trip
Reactive_Power_Trip_Relays$ = "Trip"  'Reactive Power Trip Relays
Positive_Reactive_Power_Trip_Level = 25  'Positive Reactive Power Trip Level
Negative_Reactive_Power_Trip_Level = 25  'Negative Reactive Power Trip Level
Reactive_Power_Trip_Delay = 1.0  'Reactive Power Trip Delay
Block_Underpower_From_Start = 0  'Block Underpower From Start
Underpower_Alarm$ = "Off"  'Underpower Alarm
Underpower_Alarm_Relays$ = "Alarm"  'Underpower Alarm Relays
Underpower_Alarm_Level = 2  'Underpower Alarm Level
Underpower_Alarm_Delay = 1  'Underpower Alarm Delay
Underpower_Alarm_Events$ = "Off/No"  'Underpower Alarm Events
Underpower_Trip$ = "Off"  'Underpower Trip
Underpower_Trip_Relays$ = "Trip"  'Underpower Trip Relays
Underpower_Trip_Level = 1  'Underpower Trip Level
Underpower_Trip_Delay = 1  'Underpower Trip Delay
Block_Reverse_Power_From_Start = 0  'Block Reverse Power From Start
Reverse_Power_Alarm$ = "Off"  'Reverse Power Alarm
Reverse_Power_Alarm_Relays$ = "Alarm"  'Reverse Power Alarm Relays
Reverse_Power_Alarm_Level = 1  'Reverse Power Alarm Level
Reverse_Power_Alarm_Delay = 1.0  'Reverse Power Alarm Delay
Reverse_Power_Alarm_Events$ = "Off/No"  'Reverse Power Alarm Events
Reverse_Power_Trip$ = "Off"  'Reverse Power Trip
Reverse_Power_Trip_Relays$ = "Trip"  'Reverse Power Trip Relays
Reverse_Power_Trip_Level = 1  'Reverse Power Trip Level
Reverse_Power_Trip_Delay = 1.0  'Reverse Power Trip Delay
Torque_Metering$ = "Disabled"  'Torque Metering
Stator_Resistance = 0.004  'Stator Resistance
Pole_Pairs = 2  'Pole Pairs
Torque_Unit$ = "Newton-meter"  'Torque Unit
Overtorque_Alarm$ = "Off"  'Overtorque Alarm
Overtorque_Alarm_Relays$ = "Alarm"  'Overtorque Alarm Relays
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Overtorque_Alarm_Level = 4000.0  'Overtorque Alarm Level
Overtorque_Alarm_Delay = 1.0  'Overtorque Alarm Delay
Overtorque_Alarm_Events$ = "Off/No"  'Overtorque Alarm Events
Trip_Counter_Alarm$ = "Off"  'Trip Counter Alarm
Trip_Counter_Alarm_Relays$ = "Alarm"  'Trip Counter Alarm Relays
Trip_Counter_Alarm_Level = 25  'Trip Counter Alarm Level
Trip_Counter_Alarm_Events$ = "Off/No"  'Trip Counter Alarm Events
Starter_Failure_Alarm_Starter_Failure_$ = "Off"  'Starter Failure Alarm (Starter
Failure)
Starter_Type$ = "Breaker"  'Starter Type
Starter_Failure_Alarm_Relays$ = "Alarm"  'Starter Failure Alarm Relays
Starter_Failure_Alarm_Delay = 100  'Starter Failure Alarm Delay
Supervision_of_Trip_Coil$ = "Disabled"  'Supervision of Trip Coil
Starter_Failure_Alarm_Events$ = "Off/No"  'Starter Failure Alarm Events
Current_Demand_Period = 15  'Current Demand Period
Current_Demand_Alarm$ = "Off"  'Current Demand Alarm
Current_Demand_Alarm_Relays$ = "Alarm"  'Current Demand Alarm Relays
Current_Demand_Alarm_Level = 100  'Current Demand Alarm Level
Current_Demand_Alarm_Events$ = "Off/No"  'Current Demand Alarm Events
kW_Demand_Period = 15  'kW Demand Period
kW_Demand_Alarm$ = "Off"  'kW Demand Alarm
kW_Demand_Alarm_Relays$ = "Alarm"  'kW Demand Alarm Relays
kW_Demand_Alarm_Level = 100  'kW Demand Alarm Level
kW_Demand_Alarm_Events$ = "Off/No"  'kW Demand Alarm Events
kvar_Demand_Period = 15  'kvar Demand Period
kvar_Demand_Alarm$ = "Off"  'kvar Demand Alarm
kvar_Demand_Alarm_Relays$ = "Alarm"  'kvar Demand Alarm Relays
kvar_Demand_Alarm_Level = 100  'kvar Demand Alarm Level
kvar_Demand_Alarm_Events$ = "Off/No"  'kvar Demand Alarm Events
kVA_Demand_Period = 15  'kVA Demand Period
kVA_Demand_Alarm$ = "Off"  'kVA Demand Alarm
kVA_Demand_Alarm_Relays$ = "Alarm"  'kVA Demand Alarm Relays
kVA_Demand_Alarm_Level = 100  'kVA Demand Alarm Level
kVA_Demand_Alarm_Events$ = "Off/No"  'kVA Demand Alarm Events
Positive_kWh_Pulse_Output_Relay$ = "Off"  'Positive kWh Pulse Output Relay
Positive_kWh_Pulse_Output_Interval = 1  'Positive kWh Pulse Output Interval
Positive_kvarh_Pulse_Output_Relay$ = "Off"  'Positive kvarh Pulse Output Relay
Positive_kvarh_Pulse_Output_Interval = 1  'Positive kvarh Pulse Output Interval
Negative_kvarh_Pulse_Output_Relay$ = "Off"  'Negative kvarh Pulse Output Relay
Negative_kvarh_Pulse_Output_Interval = 1  'Negative kvarh Pulse Output Interval
Analog_Output_1_Selection$ = "Average Phase Current"  'Analog Output 1 Selection
Analog_Output_2_Selection$ = "None"  'Analog Output 2 Selection
Analog_Output_3_Selection$ = "None"  'Analog Output 3 Selection
Analog_Output_4_Selection$ = "None"  'Analog Output 4 Selection
RTD_1_Minimum = -50  'RTD #1 Minimum
RTD_1_Maximum = 250  'RTD #1 Maximum
RTD_2_Minimum = -50  'RTD #2 Minimum
RTD_2_Maximum = 250  'RTD #2 Maximum
RTD_3_Minimum = -50  'RTD #3 Minimum
RTD_3_Maximum = 250  'RTD #3 Maximum
RTD_4_Minimum = -50  'RTD #4 Minimum
RTD_4_Maximum = 250  'RTD #4 Maximum
RTD_5_Minimum = -50  'RTD #5 Minimum
RTD_5_Maximum = 250  'RTD #5 Maximum
RTD_6_Minimum = -50  'RTD #6 Minimum
RTD_6_Maximum = 250  'RTD #6 Maximum
RTD_7_Minimum = -50  'RTD #7 Minimum
RTD_7_Maximum = 250  'RTD #7 Maximum
RTD_8_Minimum = -50  'RTD #8 Minimum
RTD_8_Maximum = 250  'RTD #8 Maximum
RTD_9_Minimum = -50  'RTD #9 Minimum
RTD_9_Maximum = 250  'RTD #9 Maximum
RTD_10_Minimum = -50  'RTD #10 Minimum
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RTD_10_Maximum = 250  'RTD #10 Maximum
RTD_11_Minimum = -50  'RTD #11 Minimum
RTD_11_Maximum = 250  'RTD #11 Maximum
RTD_12_Minimum = -50  'RTD #12 Minimum
RTD_12_Maximum = 250  'RTD #12 Maximum
Power_Factor_Minimum = -0.80  'Power Factor Minimum
Power_Factor_Maximum = 0.80  'Power Factor Maximum
Reactive_Power_Minimum = 0  'Reactive Power Minimum
Reactive_Power_Maximum = 750  'Reactive Power Maximum
Real_Power_Minimum = 0  'Real Power Minimum
Real_Power_Maximum = 1000  'Real Power Maximum
Apparent_Power_Minimum = 0  'Apparent Power Minimum
Apparent_Power_Maximum = 1250  'Apparent Power Maximum
Thermal_Capacity_Used_Minimum = 0  'Thermal Capacity Used Minimum
Thermal_Capacity_Used_Maximum = 100  'Thermal Capacity Used Maximum
Relay_Lockout_Time_Minimum = 0  'Relay Lockout Time Minimum
Relay_Lockout_Time_Maximum = 150  'Relay Lockout Time Maximum
Current_Demand_Minimum = 0  'Current Demand Minimum
Current_Demand_Maximum = 700  'Current Demand Maximum
kvar_Demand_Minimum = 0  'kvar Demand Minimum
kvar_Demand_Maximum = 1000  'kvar Demand Maximum
kW_Demand_Minimum = 0  'kW Demand Minimum
kW_Demand_Maximum = 1250  'kW Demand Maximum
kVA_Demand_Minimum = 0  'kVA Demand Minimum
kVA_Demand_Maximum = 1500  'kVA Demand Maximum
Speed2_Standard_Overload_Curve_Number = 4  'Speed2 Standard Overload Curve Number
Speed2_Undercurrent_Alarm$ = "Off"  'Speed2 Undercurrent Alarm
Speed2_Undercurrent_Alarm_Pickup = 0.70  'Speed2 Undercurrent Alarm Pickup
Speed2_Undercurrent_Alarm_Delay = 1  'Speed2 Undercurrent Alarm Delay
Speed2_Undercurrent_Alarm_Events$ = "Off/No"  'Speed2 Undercurrent Alarm Events
Speed2_Undercurrent_Trip$ = "Off"  'Speed2 Undercurrent Trip
Speed2_Undercurrent_Trip_Pickup = 0.70  'Speed2 Undercurrent Trip Pickup
Speed2_Undercurrent_Trip_Delay = 1  'Speed2 Undercurrent Trip Delay
Speed2_Acceleration_Timer_From_Start = 10.0  'Speed2 Acceleration Timer From
Start
Acceleration_Timer_From_Speed_One_to_Two = 10.0  'Acceleration Timer From Speed
One to Two
Ground_CT_Primary = 100  'Ground CT Primary
Phase_Differential_CT_Primary = 100  'Phase Differential CT Primary
Speed_2_Phase_Sequence$ = "ABC"  'Speed 2 Phase Sequence
Remote_Alarm_Name = 0  'Remote Alarm Name
Remote_Alarm_Function$ = "Unlatched"  'Remote Alarm Function
Remote_Alarm_Relays$ = "Alarm"  'Remote Alarm Relays
Remote_Alarm_Events$ = "Off/No"  'Remote Alarm Events
Remote_Trip_Name = 0  'Remote Trip Name
Remote_Trip_Relays$ = "Trip"  'Remote Trip Relays
Speed_Switch_Trip_Relays$ = "Trip"  'Speed Switch Trip Relays
Speed_Switch_Trip_Delays = 5.0  'Speed Switch Trip Delays
Load_Shed_Trip_Relays$ = "Trip"  'Load Shed Trip Relays
Block_Pressure_Switch_Alarm_from_Start = 0  'Block Pressure Switch Alarm from
Start
Pressure_Switch_Alarm_Function$ = "Unlatched"  'Pressure Switch Alarm Function
Pressure_Switch_Alarm_Relays$ = "Alarm"  'Pressure Switch Alarm Relays
Pressure_Switch_Alarm_Delay = 5.0  'Pressure Switch Alarm Delay
Pressure_Switch_Alarm_Events$ = "Off/No"  'Pressure Switch Alarm Events
Block_Pressure_Switch_Trip_from_Start = 0  'Block Pressure Switch Trip from Start
Pressure_Switch_Trip_Relays$ = "Trip"  'Pressure Switch Trip Relays
Pressure_Switch_Trip_Delay = 5.0  'Pressure Switch Trip Delay
Vibration_Switch_Alarm_Function$ = "Unlatched"  'Vibration Switch Alarm Function
Vibration_Switch_Alarm_Relays$ = "Alarm"  'Vibration Switch Alarm Relays
Vibration_Switch_Alarm_Delay = 5.0  'Vibration Switch Alarm Delay
Vibration_Switch_Alarm_Events$ = "Off/No"  'Vibration Switch Alarm Events
Vibration_Switch_Trip_Relays$ = "Trip"  'Vibration Switch Trip Relays
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Vibration_Switch_Trip_Delay = 5.0  'Vibration Switch Trip Delay
Counter_Units_Name = 0  'Counter Units Name
Counter_Preset_Value = 0  'Counter Preset Value
Counter_Type$ = "Increment"  'Counter Type
Counter_Alarm$ = "Off"  'Counter Alarm
Counter_Alarm_Relays$ = "Alarm"  'Counter Alarm Relays
Counter_Alarm_Level = 100  'Counter Alarm Level
Counter_Alarm_Pickup$ = "Over"  'Counter Alarm Pickup
Time_to_Trip_at_1_01_FLA = 17414.5  'Time to Trip at 1.01 x FLA
Time_to_Trip_at_1_05_FLA = 3414.9  'Time to Trip at 1.05 x FLA
Time_to_Trip_at_1_10_FLA = 1666.7  'Time to Trip at 1.10 x FLA
Time_to_Trip_at_1_20_FLA = 795.4  'Time to Trip at 1.20 x FLA
Time_to_Trip_at_1_30_FLA = 507.2  'Time to Trip at 1.30 x FLA
Time_to_Trip_at_1_40_FLA = 364.6  'Time to Trip at 1.40 x FLA
Time_to_Trip_at_1_50_FLA = 280.0  'Time to Trip at 1.50 x FLA
Time_to_Trip_at_1_75_FLA = 169.7  'Time to Trip at 1.75 x FLA
Time_to_Trip_at_2_00_FLA = 116.6  'Time to Trip at 2.00 x FLA
Time_to_Trip_at_2_25_FLA = 86.1  'Time to Trip at 2.25 x FLA
Time_to_Trip_at_2_50_FLA = 66.6  'Time to Trip at 2.50 x FLA
Time_to_Trip_at_2_75_FLA = 53.3  'Time to Trip at 2.75 x FLA
Time_to_Trip_at_3_00_FLA = 43.7  'Time to Trip at 3.00 x FLA
Time_to_Trip_at_3_25_FLA = 36.6  'Time to Trip at 3.25 x FLA
Time_to_Trip_at_3_50_FLA = 31.1  'Time to Trip at 3.50 x FLA
Time_to_Trip_at_3_75_FLA = 26.8  'Time to Trip at 3.75 x FLA
TIme_to_Trip_at_4_00_FLA = 23.3  'TIme to Trip at 4.00 x FLA
Time_to_Trip_at_4_25_FLA = 20.5  'Time to Trip at 4.25 x FLA
Time_to_Trip_at_4_50_FLA = 18.2  'Time to Trip at 4.50 x FLA
Time_to_Trip_at_4_75_FLA = 16.2  'Time to Trip at 4.75 x FLA
Time_to_Trip_at_5_00_FLA = 14.6  'Time to Trip at 5.00 x FLA
Time_to_Trip_at_5_50_FLA = 12.0  'Time to Trip at 5.50 x FLA
Time_to_Trip_at_6_00_FLA = 10.0  'Time to Trip at 6.00 x FLA
Time_to_Trip_at_6_50_FLA = 8.5  'Time to Trip at 6.50 x FLA
Time_to_Trip_at_7_00_FLA = 7.3  'Time to Trip at 7.00 x FLA
Time_to_Trip_at_7_50_FLA = 6.3  'Time to Trip at 7.50 x FLA
Time_to_Trip_at_8_00_FLA = 5.6  'Time to Trip at 8.00 x FLA
Time_to_Trip_at_10_0_FLA = 5.6  'Time to Trip at 10.0 x FLA
Time_to_Trip_at_15_0_FLA = 5.6  'Time to Trip at 15.0 x FLA
Time_to_Trip_at_20_0_FLA = 5.6  'Time to Trip at 20.0 x FLA
Overreach_Filter$ = "Off/No"  'Overreach Filter
Short_Circuit_Trip_Relays$ = "Trip"  'Short Circuit Trip Relays
Short_Circuit_Trip_Pickup = 7.5  'Short Circuit Trip Pickup
Intentional_Short_Circuit_Trip_Delay = 210  'Intentional Short Circuit Trip Delay
Ground_Fault_Trip_Backup_Relays$ = "Aux2"  'Ground Fault Trip Backup Relays
Ground_FaultTrip_Backup_Delay = 200  'Ground FaultTrip Backup Delay
Running_Time_Pulse_Relay$ = "Off"  'Running Time Pulse Relay
Running_Time_Pulse_Interval = 1  'Running Time Pulse Interval
Loss_Of_Comms_Function$ = "Off"  'Loss Of Comms Function
Loss_Of_Comms_Function_Type$ = "Alarm"  'Loss Of Comms Function Type
Loss_Of_Comms_Port$ = "COMP_RS485"  'Loss Of Comms Port
Assign_Loss_Of_Comms_Alarm_Relay$ = "Alarm"  'Assign Loss Of Comms Alarm Relay
Assign_Loss_Of_Comms_Trip_Relay$ = "Trip"  'Assign Loss Of Comms Trip Relay
Loss_Of_Comms_Delay = 1  'Loss Of Comms Delay
Loss_Of_Comms_Alarm_Event$ = "Off/No"  'Loss Of Comms Alarm Event
Phase_A_Current_Minimum = 0  'Phase A Current Minimum
Phase_A_Current_Maximum = 100  'Phase A Current Maximum
Phase_B_Current_Minimum = 0  'Phase B Current Minimum
Phase_B_Current_Maximum = 100  'Phase B Current Maximum
Phase_C_Current_Minimum = 0  'Phase C Current Minimum
Phase_C_Current_Maximum = 100  'Phase C Current Maximum
Average_Phase_Current_Minimum = 0  'Average Phase Current Minimum
Average_Phase_Current_Maximum = 496  'Average Phase Current Maximum
AB_Line_Voltage_Minimum = 3200  'AB Line Voltage Minimum
AB_Line_Voltage_Maximum = 4500  'AB Line Voltage Maximum
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BC_Line_Voltage_Minimum = 3200  'BC Line Voltage Minimum
BC_Line_Voltage_Maximum = 4500  'BC Line Voltage Maximum
CA_Line_Voltage_Minimum = 3200  'CA Line Voltage Minimum
CA_Line_Voltage_Maximum = 4500  'CA Line Voltage Maximum
Average_Line_Voltage_Minimum = 3200  'Average Line Voltage Minimum
Average_Line_Voltage_Maximum = 4500  'Average Line Voltage Maximum
Phase_AN_Voltage_Minimum = 1900  'Phase AN Voltage Minimum
Phase_AN_Voltage_Maximum = 2500  'Phase AN Voltage Maximum
Phase_BN_Voltage_Minimum = 1900  'Phase BN Voltage Minimum
Phase_BN_Voltage_Maximum = 2500  'Phase BN Voltage Maximum
Phase_CN_Voltage_Minimum = 1900  'Phase CN Voltage Minimum
Phase_CN_Voltage_Maximum = 2500  'Phase CN Voltage Maximum
Average_Phase_Voltage_Minimum = 1900  'Average Phase Voltage Minimum
Average_Phase_Voltage_Maximum = 2500  'Average Phase Voltage Maximum
Hottest_Stator_RTD_Minimum = 0  'Hottest Stator RTD Minimum
Hottest_Stator_RTD_Maximum = 200  'Hottest Stator RTD Maximum
Hottest_Bearing_RTD_Minimum = 0  'Hottest Bearing RTD Minimum
Hottest_Bearing_RTD_Maximum = 200  'Hottest Bearing RTD Maximum
Hottest_Ambient_RTD_Minimum = -50  'Hottest Ambient RTD Minimum
Hottest_Ambient_RTD_Maximum = 60  'Hottest Ambient RTD Maximum
Analog_Input_1_Minimum = 0  'Analog Input 1 Minimum
Analog_Input_1_Maximum = 50000  'Analog Input 1 Maximum
Analog_Input_2_Minimum = 0  'Analog Input 2 Minimum
Analog_Input_2_Maximum = 50000  'Analog Input 2 Maximum
Analog_Input_3_Minimum = 0  'Analog Input 3 Minimum
Analog_Input_3_Maximum = 50000  'Analog Input 3 Maximum
Analog_Input_4_Minimum = 0  'Analog Input 4 Minimum
Analog_Input_4_Maximum = 50000  'Analog Input 4 Maximum
Tachometer_Min = 3500  'Tachometer Min
Tachometer_Max = 3700  'Tachometer Max
MWh_Minimum = 50.000  'MWh Minimum
MWh_Maximum = 100.000  'MWh Maximum
Torque_Minimum = 0.0  'Torque Minimum
Torque_Maximum = 0.0  'Torque Maximum
Analog_Input_Diff_1_2_Minimum = 0  'Analog Input Diff 1-2 Minimum
Analog_Input_Diff_1_2_Maximum = 100  'Analog Input Diff 1-2 Maximum
Analog_Input_Diff_3_4_Minimum = 0  'Analog Input Diff 3-4 Minimum
Analog_Input_Diff_3_4_Maximum = 100  'Analog Input Diff 3-4 Maximum
Analog_Input_1_Setup$ = "Disabled"  'Analog Input 1 Setup
Analog_Input_1_Units = 0  'Analog Input 1 Units
Analog_Input_1_Minimum_analog_in_1_ = 0  'Analog Input 1 Minimum (analog in 1)
Analog_Input_1_Maximum_analog_in_1_ = 100  'Analog Input 1 Maximum (analog in 1)
Block_Analog_Input_1_From_Start = 0  'Block Analog Input 1 From Start
Analog_Input_1_Alarm$ = "Off"  'Analog Input 1 Alarm
Analog_Input_1_Alarm_Relays$ = "Alarm"  'Analog Input 1 Alarm Relays
Analog_Input_1_Alarm_Level = 10  'Analog Input 1 Alarm Level
Analog_Input_1_Alarm_Pickup$ = "Over"  'Analog Input 1 Alarm Pickup
Analog_Input_1_Alarm_Delay = 0.1  'Analog Input 1 Alarm Delay
Analog_Input_1_Alarm_Events$ = "Off/No"  'Analog Input 1 Alarm Events
Analog_Input_1_Trip$ = "Off"  'Analog Input 1 Trip
Analog_Input_1_Trip_Relays$ = "Trip"  'Analog Input 1 Trip Relays
Analog_Input_1_Trip_Level = 20  'Analog Input 1 Trip Level
Analog_Input_1_Trip_Pickup$ = "Over"  'Analog Input 1 Trip Pickup
Analog_Input_1_Trip_Delay = 0.1  'Analog Input 1 Trip Delay
Analog_Input_1_Name = 0  'Analog Input 1 Name
Analog_Input_2_Setup$ = "Disabled"  'Analog Input 2 Setup
Analog_Input_2_Units = 0  'Analog Input 2 Units
Analog_Input_2_Minimum_analog_in_2_ = 0  'Analog Input 2 Minimum (analog in 2)
Analog_Input_2_Maximum_analog_in_2_ = 100  'Analog Input 2 Maximum (analog in 2)
Block_Analog_Input_2_From_Start = 0  'Block Analog Input 2 From Start
Analog_Input_2_Alarm$ = "Off"  'Analog Input 2 Alarm
Analog_Input_2_Alarm_Relays$ = "Alarm"  'Analog Input 2 Alarm Relays
Analog_Input_2_Alarm_Level = 10  'Analog Input 2 Alarm Level
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Analog_Input_2_Alarm_Pickup$ = "Over"  'Analog Input 2 Alarm Pickup
Analog_Input_2_Alarm_Delay = 0.1  'Analog Input 2 Alarm Delay
Analog_Input_2_Alarm_Events$ = "Off/No"  'Analog Input 2 Alarm Events
Analog_Input_2_Trip$ = "Off"  'Analog Input 2 Trip
Analog_Input_2_Trip_Relays$ = "Trip"  'Analog Input 2 Trip Relays
Analog_Input_2_Trip_Level = 20  'Analog Input 2 Trip Level
Analog_Input_2_Trip_Pickup$ = "Over"  'Analog Input 2 Trip Pickup
Analog_Input_2_Trip_Delay = 0.1  'Analog Input 2 Trip Delay
Analog_Input_2_Name = 0  'Analog Input 2 Name
Analog_Input_3_Setup$ = "Disabled"  'Analog Input 3 Setup
Analog_Input_3_Units = 0  'Analog Input 3 Units
Analog_Input_3_Minimum_analog_in_3_ = 0  'Analog Input 3 Minimum (analog in 3)
Analog_Input_3_Maximum_analog_in_3_ = 100  'Analog Input 3 Maximum (analog in 3)
Block_Analog_Input_3_From_Start = 0  'Block Analog Input 3 From Start
Analog_Input_3_Alarm$ = "Off"  'Analog Input 3 Alarm
Analog_Input_3_Alarm_Relays$ = "Alarm"  'Analog Input 3 Alarm Relays
Analog_Input_3_Alarm_Level = 10  'Analog Input 3 Alarm Level
Analog_Input_3_Alarm_Pickup$ = "Over"  'Analog Input 3 Alarm Pickup
Analog_Input_3_Alarm_Delay = 0.1  'Analog Input 3 Alarm Delay
Analog_Input_3_Alarm_Events$ = "Off/No"  'Analog Input 3 Alarm Events
Analog_Input_3_Trip$ = "Off"  'Analog Input 3 Trip
Analog_Input_3_Trip_Relays$ = "Trip"  'Analog Input 3 Trip Relays
Analog_Input_3_Trip_Level = 20  'Analog Input 3 Trip Level
Analog_Input_3_Trip_Pickup$ = "Over"  'Analog Input 3 Trip Pickup
Analog_Input_3_Trip_Delay = 0.1  'Analog Input 3 Trip Delay
Analog_Input_3_Name = 0  'Analog Input 3 Name
Analog_Input_4_Setup$ = "Disabled"  'Analog Input 4 Setup
Analog_Input_4_Units = 0  'Analog Input 4 Units
Analog_Input_4_Minimum_analog_in_4_ = 0  'Analog Input 4 Minimum (analog in 4)
Analog_Input_4_Maximum_analog_in_4_ = 100  'Analog Input 4 Maximum (analog in 4)
Block_Analog_Input_4_From_Start = 0  'Block Analog Input 4 From Start
Analog_Input_4_Alarm$ = "Off"  'Analog Input 4 Alarm
Analog_Input_4_Alarm_Relays$ = "Alarm"  'Analog Input 4 Alarm Relays
Analog_Input_4_Alarm_Level = 10  'Analog Input 4 Alarm Level
Analog_Input_4_Alarm_Pickup$ = "Over"  'Analog Input 4 Alarm Pickup
Analog_Input_4_Alarm_Delay = 0.1  'Analog Input 4 Alarm Delay
Analog_Input_4_Alarm_Events$ = "Off/No"  'Analog Input 4 Alarm Events
Analog_Input_4_Trip$ = "Off"  'Analog Input 4 Trip
Analog_Input_4_Trip_Relays$ = "Trip"  'Analog Input 4 Trip Relays
Analog_Input_4_Trip_Level = 20  'Analog Input 4 Trip Level
Analog_Input_4_Trip_Pickup$ = "Over"  'Analog Input 4 Trip Pickup
Analog_Input_4_Trip_Delay = 0.1  'Analog Input 4 Trip Delay
Analog_Input_4_Name = 0  'Analog Input 4 Name
Speed2_Time_to_Trip_at_1_01_FLA = 17414.5  'Speed2 Time to Trip at 1.01 x FLA
Speed2_Time_to_Trip_at_1_05_FLA = 3414.9  'Speed2 Time to Trip at 1.05 x FLA
Speed2_Time_to_Trip_at_1_10_FLA = 1666.7  'Speed2 Time to Trip at 1.10 x FLA
Speed2_Time_to_Trip_at_1_20_FLA = 795.4  'Speed2 Time to Trip at 1.20 x FLA
Speed2_Time_to_Trip_at_1_30_FLA = 507.2  'Speed2 Time to Trip at 1.30 x FLA
Speed2_Time_to_Trip_at_1_40_FLA = 364.6  'Speed2 Time to Trip at 1.40 x FLA
Speed2_Time_to_Trip_at_1_50_FLA = 280.0  'Speed2 Time to Trip at 1.50 x FLA
Speed2_Time_to_Trip_at_1_75_FLA = 169.7  'Speed2 Time to Trip at 1.75 x FLA
Speed2_Time_to_Trip_at_2_00_FLA = 116.6  'Speed2 Time to Trip at 2.00 x FLA
Speed2_Time_to_Trip_at_2_25_FLA = 86.1  'Speed2 Time to Trip at 2.25 x FLA
Speed2_Time_to_Trip_at_2_50_FLA = 66.6  'Speed2 Time to Trip at 2.50 x FLA
Speed2_Time_to_Trip_at_2_75_FLA = 53.3  'Speed2 Time to Trip at 2.75 x FLA
Speed2_Time_to_Trip_at_3_00_FLA = 43.7  'Speed2 Time to Trip at 3.00 x FLA
Speed2_Time_to_Trip_at_3_25_FLA = 36.6  'Speed2 Time to Trip at 3.25 x FLA
Speed2_Time_to_Trip_at_3_50_FLA = 31.1  'Speed2 Time to Trip at 3.50 x FLA
Speed2_Time_to_Trip_at_3_75_FLA = 26.8  'Speed2 Time to Trip at 3.75 x FLA
Speed2_Time_to_Trip_at_4_00_FLA = 23.3  'Speed2 Time to Trip at 4.00 x FLA
Speed2_Time_to_Trip_at_4_25_FLA = 20.5  'Speed2 Time to Trip at 4.25 x FLA
Speed2_Time_to_Trip_at_4_50_FLA = 18.2  'Speed2 Time to Trip at 4.50 x FLA
Speed2_Time_to_Trip_at_4_75_FLA = 16.2  'Speed2 Time to Trip at 4.75 x FLA
```

```
Speed2_Time_to_Trip_at_5_00_FLA = 14.6  'Speed2 Time to Trip at 5.00 x FLA
Speed2_Time_to_Trip_at_5_50_FLA = 12.0  'Speed2 Time to Trip at 5.50 x FLA
Speed2_Time_to_Trip_at_6_00_FLA = 10.0  'Speed2 Time to Trip at 6.00 x FLA
Speed2_Time_to_Trip_at_6_50_FLA = 8.5  'Speed2 Time to Trip at 6.50 x FLA
Speed2_Time_to_Trip_at_7_00_FLA = 7.3  'Speed2 Time to Trip at 7.00 x FLA
Speed2_Time_to_Trip_at_7_50_FLA = 6.3  'Speed2 Time to Trip at 7.50 x FLA
Speed2_Time_to_Trip_at_8_00_FLA = 5.6  'Speed2 Time to Trip at 8.00 x FLA
Speed2_Time_to_Trip_at_10_0_FLA = 5.6  'Speed2 Time to Trip at 10.0 x FLA
Speed2_Time_to_Trip_at_15_0_FLA = 5.6  'Speed2 Time to Trip at 15.0 x FLA
Speed2_Time_to_Trip_at_20_0_FLA = 5.6  'Speed2 Time to Trip at 20.0 x FLA
Speed2_Minimum_Allowable_Line_Voltage = 80  'Speed2 Minimum Allowable Line
Voltage
Speed2_Stall_Current_at_Min_Vline = 4.80  'Speed2 Stall Current at Min Vline
Speed2_Safe_Stall_Time_at_Min_Vline = 20.0  'Speed2 Safe Stall Time at Min Vline
Speed2_Accel_Intersect_at_Min_Vline = 3.80  'Speed2 Accel. Intersect at Min Vline
Speed2_Stall_Current_at_100_Vline = 6.00  'Speed2 Stall Current at 100% Vline
Speed2_Safe_Stall_Time_at_100_Vline = 10.0  'Speed2 Safe Stall Time at 100% Vline
Speed2_Accel_Intersect_at_100_Vline = 5.00  'Speed2 Accel. Intersect at 100%
Vline
Block_Speed2_Undercurrent_from_Start = 0  'Block Speed2 Undercurrent from Start
Speed_Switch_Trip_Speed2_Delay = 5.0  'Speed Switch Trip Speed2 Delay
Speed2_Rated_Speed = 3600  'Speed2 Rated Speed
Analog_In_Differential_1_2_Enable$ = "Disabled"  'Analog In Differential 1-2
Enable
Analog_In_Diff_1_2_Name = 0  'Analog In Diff 1-2 Name
Analog_In_Differential_1_2_Comparison$ = "% Difference"  'Analog In Differential
1-2 Comparison
Analog_In_Differential_1_2_Logic$ = "1>2 (or 3>4)"  'Analog In Differential 1-2
Logic
Analog_In_Differential_1_2_Active_When$ = "Always"  'Analog In Differential 1-2
Active When
Analog_In_Differential_1_2_Block_from_Start = 0  'Analog In Differential 1-2
Block from Start
Analog_In_Differential_1_2_Alarm$ = "Off"  'Analog In Differential 1-2 Alarm
Analog_In_Differential_1_2_Alarm_Relays$ = "Alarm"  'Analog In Differential 1-2
Alarm Relays
Analog_In_Differential_1_2_Percent_Alarm = 10  'Analog In Differential 1-2
Percent Alarm
Analog_In_Differential_1_2_Absolute_Alarm = 10  'Analog In Differential 1-2
Absolute Alarm
Analog_In_Differential_1_2_Alarm_Delay = 0.1  'Analog In Differential 1-2 Alarm
Delay
Analog_In_Differential_1_2_Alarm_Events$ = "Off/No"  'Analog In Differential 1-2
Alarm Events
Analog_In_Differential_1_2_Trip$ = "Off"  'Analog In Differential 1-2 Trip
Analog_In_Differential_1_2_Trip_Relays$ = "Trip"  'Analog In Differential 1-2
Trip Relays
Analog_In_Differential_1_2_Percent_Trip = 10  'Analog In Differential 1-2
Percent Trip
Analog_In_Differential_1_2_Absolute_Trip = 10  'Analog In Differential 1-2
Absolute Trip
Analog_In_Differential_1_2_Trip_Delay = 0.1  'Analog In Differential 1-2 Trip
Delay
Analog_In_Differential_3_4_Enable$ = "Disabled"  'Analog In Differential 3-4
Enable
Analog_In_Diff_3_4_Name = 0  'Analog In Diff. 3-4 Name
Analog_In_Differential_3_4_Comparison$ = "% Difference"  'Analog In Differential
3-4 Comparison
Analog_In_Differential_3_4_Logic$ = "1>2 (or 3>4)"  'Analog In Differential 3-4
Logic
Analog_In_Differential_3_4_Active_When$ = "Always"  'Analog In Differential 3-4
Active When
Analog_In_Differential_3_4_Block_from_Start = 0  'Analog In Differential 3-4
```

```
Block from Start
Analog_In_Differential_3_4_Alarm$ = "Off"  'Analog In Differential 3-4 Alarm
Analog_In_Differential_3_4_Alarm_Relays$ = "Alarm"  'Analog In Differential 3-4
Alarm Relays
Analog_In_Differential_3_4_Percent_Alarm = 10  'Analog In Differential 3-4
Percent Alarm
Analog_In_Differential_3_4_Absolute_Alarm = 10  'Analog In Differential 3-4
Absolute Alarm
Analog_In_Differential_3_4_Alarm_Delay = 0.1  'Analog In Differential 3-4 Alarm
Delay
Analog_In_Differential_3_4_Alarm_Events$ = "Off/No"  'Analog In Differential 3-4
Alarm Events
Analog_In_Differential_3_4_Trip$ = "Off"  'Analog In Differential 3-4 Trip
Analog_In_Differential_3_4_Trip_Relays$ = "Trip"  'Analog In Differential 3-4
Trip Relays
Analog_In_Differential_3_4_Percent_Trip = 10  'Analog In Differential 3-4
Percent Trip
Analog_In_Differential_3_4_Absolute_Trip = 10  'Analog In Differential 3-4
Absolute Trip
Analog_In_Differential_3_4_Trip_Delay = 0.1  'Analog In Differential 3-4 Trip
Delay
Ground_Fault_Overreach_Filter$ = "Off/No"  'Ground Fault Overreach Filter
User_Map_Address_1 = 512  'User Map Address #1
User_Map_Address_2 = 528  'User Map Address #2
User_Map_Address_3 = 529  'User Map Address #3
User_Map_Address_4 = 551  'User Map Address #4
User_Map_Address_5 = 552  'User Map Address #5
User_Map_Address_6 = 553  'User Map Address #6
User_Map_Address_7 = 554  'User Map Address #7
User_Map_Address_8 = 555  'User Map Address #8
User_Map_Address_9 = 556  'User Map Address #9
User_Map_Address_10 = 720  'User Map Address #10
User_Map_Address_11 = 721  'User Map Address #11
User_Map_Address_12 = 722  'User Map Address #12
User_Map_Address_13 = 723  'User Map Address #13
User_Map_Address_14 = 724  'User Map Address #14
User_Map_Address_15 = 729  'User Map Address #15
User_Map_Address_16 = 768  'User Map Address #16
User_Map_Address_17 = 769  'User Map Address #17
User_Map_Address_18 = 770  'User Map Address #18
User_Map_Address_19 = 771  'User Map Address #19
User_Map_Address_20 = 772  'User Map Address #20
User_Map_Address_21 = 773  'User Map Address #21
User_Map_Address_22 = 774  'User Map Address #22
User_Map_Address_23 = 775  'User Map Address #23
User_Map_Address_24 = 779  'User Map Address #24
User_Map_Address_25 = 780  'User Map Address #25
User_Map_Address_26 = 801  'User Map Address #26
User_Map_Address_27 = 802  'User Map Address #27
User_Map_Address_28 = 803  'User Map Address #28
User_Map_Address_29 = 804  'User Map Address #29
User_Map_Address_30 = 805  'User Map Address #30
User_Map_Address_31 = 806  'User Map Address #31
User_Map_Address_32 = 807  'User Map Address #32
User_Map_Address_33 = 808  'User Map Address #33
User_Map_Address_34 = 809  'User Map Address #34
User_Map_Address_35 = 810  'User Map Address #35
User_Map_Address_36 = 811  'User Map Address #36
User_Map_Address_37 = 812  'User Map Address #37
User_Map_Address_38 = 832  'User Map Address #38
User_Map_Address_39 = 833  'User Map Address #39
User_Map_Address_40 = 834  'User Map Address #40
User_Map_Address_41 = 835  'User Map Address #41
```

```
User_Map_Address_42 = 840  'User Map Address #42
User_Map_Address_43 = 880  'User Map Address #43
User_Map_Address_44 = 881  'User Map Address #44
User_Map_Address_45 = 882  'User Map Address #45
User_Map_Address_46 = 884  'User Map Address #46
User_Map_Address_47 = 885  'User Map Address #47
User_Map_Address_48 = 886  'User Map Address #48
User_Map_Address_49 = 781  'User Map Address #49
User_Map_Address_50 = 782  'User Map Address #50
User_Map_Address_51 = 783  'User Map Address #51
User_Map_Address_52 = 725  'User Map Address #52
User_Map_Address_53 = 726  'User Map Address #53
User_Map_Address_54 = 727  'User Map Address #54
User_Map_Address_55 = 728  'User Map Address #55
User_Map_Address_56 = 0  'User Map Address #56
User_Map_Address_57 = 0  'User Map Address #57
User_Map_Address_58 = 0  'User Map Address #58
User_Map_Address_59 = 0  'User Map Address #59
User_Map_Address_60 = 0  'User Map Address #60
User_Map_Address_61 = 0  'User Map Address #61
User_Map_Address_62 = 0  'User Map Address #62
User_Map_Address_63 = 0  'User Map Address #63
User_Map_Address_64 = 0  'User Map Address #64
User_Map_Address_65 = 0  'User Map Address #65
User_Map_Address_66 = 0  'User Map Address #66
User_Map_Address_67 = 0  'User Map Address #67
User_Map_Address_68 = 0  'User Map Address #68
User_Map_Address_69 = 0  'User Map Address #69
User_Map_Address_70 = 0  'User Map Address #70
User_Map_Address_71 = 0  'User Map Address #71
User_Map_Address_72 = 0  'User Map Address #72
User_Map_Address_73 = 0  'User Map Address #73
User_Map_Address_74 = 0  'User Map Address #74
User_Map_Address_75 = 0  'User Map Address #75
User_Map_Address_76 = 0  'User Map Address #76
User_Map_Address_77 = 0  'User Map Address #77
User_Map_Address_78 = 0  'User Map Address #78
User_Map_Address_79 = 0  'User Map Address #79
User_Map_Address_80 = 0  'User Map Address #80
User_Map_Address_81 = 0  'User Map Address #81
User_Map_Address_82 = 0  'User Map Address #82
User_Map_Address_83 = 0  'User Map Address #83
User_Map_Address_84 = 0  'User Map Address #84
User_Map_Address_85 = 0  'User Map Address #85
User_Map_Address_86 = 0  'User Map Address #86
User_Map_Address_87 = 0  'User Map Address #87
User_Map_Address_88 = 0  'User Map Address #88
User_Map_Address_89 = 0  'User Map Address #89
User_Map_Address_90 = 0  'User Map Address #90
User_Map_Address_91 = 0  'User Map Address #91
User_Map_Address_92 = 0  'User Map Address #92
User_Map_Address_93 = 0  'User Map Address #93
User_Map_Address_94 = 0  'User Map Address #94
User_Map_Address_95 = 0  'User Map Address #95
User_Map_Address_96 = 0  'User Map Address #96
User_Map_Address_97 = 0  'User Map Address #97
User_Map_Address_98 = 0  'User Map Address #98
User_Map_Address_99 = 0  'User Map Address #99
User_Map_Address_100 = 0  'User Map Address #100
User_Map_Address_101 = 0  'User Map Address #101
User_Map_Address_102 = 0  'User Map Address #102
User_Map_Address_103 = 0  'User Map Address #103
User_Map_Address_104 = 0  'User Map Address #104
```

```
User_Map_Address_105 = 0  'User Map Address #105
User_Map_Address_106 = 0  'User Map Address #106
User_Map_Address_107 = 0  'User Map Address #107
User_Map_Address_108 = 0  'User Map Address #108
User_Map_Address_109 = 0  'User Map Address #109
User_Map_Address_110 = 0  'User Map Address #110
User_Map_Address_111 = 0  'User Map Address #111
User_Map_Address_112 = 0  'User Map Address #112
User_Map_Address_113 = 0  'User Map Address #113
User_Map_Address_114 = 0  'User Map Address #114
User_Map_Address_115 = 0  'User Map Address #115
User_Map_Address_116 = 0  'User Map Address #116
User_Map_Address_117 = 0  'User Map Address #117
User_Map_Address_118 = 0  'User Map Address #118
User_Map_Address_119 = 0  'User Map Address #119
User_Map_Address_120 = 0  'User Map Address #120
User_Map_Address_121 = 0  'User Map Address #121
User_Map_Address_122 = 0  'User Map Address #122
User_Map_Address_123 = 0  'User Map Address #123
User_Map_Address_124 = 0  'User Map Address #124
User_Map_Address_125 = 0  'User Map Address #125
Motor_Load_Minimum = 0.00  'Motor Load Minimum
Motor_Load_Maximum = 1.25  'Motor Load Maximum
```

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: **READ TEST NOTES**

OK?
RAN

Relay Test Results for: **TURN ON BATTERY SIMULATOR**

OK?
RAN

Relay Test Results for: *** GET SETTINGS FILE FROM DEVICE ***

OK?
RAN

Relay Test Results for: ***RELAY SETTINGS TO SETTINGS TAB***

OK?
RAN

Relay Test Results for: MODIFY RELAY TRIP SETTINGS

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: ***CURRENT CONNECTIONS***

OK?
RAN

Relay Test Results for: CURRENT METER TEST

	EXPECTED CURRENT	CURRENT READ	RANGE	OK?
A PHASE	300.0	300.0	285.0 TO 315.0	PASS
B PHASE	300.0	300.0	285.0 TO 315.0	PASS
C PHASE	300.0	299.0	285.0 TO 315.0	PASS

Relay Test Results for: OVERLOAD PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	3.204	3.172	1.00	PASS

Relay Test Results for: OVERLOAD TIMING TEST

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
3.00	8.275	1310.26	21.838	21.864	-0.12	PASS
4.00	11.033	701.96	11.699	11.660	0.34	PASS

Relay Test Results for: OVERLOAD TIMING TEST

5.00	13.792	439.95	7.332	7.287	0.63	PASS

Relay Test Results for: SHORT CIRCUIT TRIP PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	37.880	37.500	1.01	PASS

Relay Test Results for: SHORT CIRCUIT TRIP DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	45.000	14.06	0.234	0.160 TO 0.260	PASS

Relay Test Results for: UNDERCURRENT TRIP PICKUP

OK?
RAN

Relay Test Results for: MECHANICAL JAM PICKUP

OK?
RAN

Relay Test Results for: MECHANICAL JAM DELAY

OK?
RAN

Relay Test Results for: CURRENT UNBALANCE PICKUP

UNBALANCE% PU	RANGE	OK?
0.00	0.00 TO 0.00	RAN

Relay Test Results for: CURRENT UNBALANCE DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
0.34	13.517	72.11	1.202	0.500 TO 1.500	PASS

Relay Test Results for: ACCELERATION TIMER

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
1.20	3.806	598.10	9.968	10.000	-0.32	PASS

Relay Test Results for: ***VOLTAGE INPUT TEST***

	EXPECTED VOLTAGE	VOLATGE READ	RANGE	OK?
APH-BPH	460.0	460.0	450.8 TO 469.2	PASS
BPH-CPH	460.0	460.0	450.8 TO 469.2	PASS
CPH-APH	460.0	461.0	450.8 TO 469.2	PASS

Relay Test Results for: UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: UNDERVOLTAGE DELAY

OK?
RAN

Relay Test Results for: OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: OVERVOLTAGE DELAY

OK?
RAN

Relay Test Results for: VOLTAGE PHASE REVERSAL

OK?
RAN

Relay Test Results for: UNDERFREQUENCY PICKUP

OK?
RAN

Relay Test Results for: UNDERFREQUENCY DELAY

OK?
RAN

Relay Test Results for: OVERFREQUENCY PICKUP

OK?
RAN

Relay Test Results for: OVERFREQUENCY DELAY

OK?
RAN

Relay Test Results for: ***POWER INPUT TEST***

EXPECTED POWER FACTOR	POWER FACTOR READ	EXPECTED KILOWATTS	KILOWATTS READ	RANGE	OK?
0.951	0.950	434.4	434.0	425.3 TO 443.6	PASS

Relay Test Results for: POWER FACTOR LEAD PICKUP

ANG(LAG)	VOLTAGE	CURRENT	POWER FACTOR	RANGE	OK?
0.00	0.00	0.000	0.000	0.000 TO 0.000	RAN

Relay Test Results for: POWER FACTOR LAG PICKUP

ANG(LAG)	VOLTAGE	CURRENT	POWER FACTOR	RANGE	OK?
0.00	0.00	0.000	0.000	0.000 TO 0.000	RAN

Relay Test Results for: REACTIVE POS KVAR TRIP PU

OK?
RAN

Relay Test Results for: REACTIVE NEG KVAR TRIP PU

OK?
RAN

Relay Test Results for: REACTIVE KVAR TRIP DELAY

OK?
RAN

Relay Test Results for: REVERSE POWER TRIP PU

OK?
RAN

Relay Test Results for: REVERSE POWER TRIP DELAY

OK?
RAN

Relay Test Results for: UNDERPOWER TRIP PU

OK?
RAN

Relay Test Results for: UNDERPOWER TRIP DELAY

OK?
RAN

Relay Test Results for: ***GROUND(50/025) INPUT TEST***

EXPECTED CURRENT	CURRENT READ	RANGE	OK?
30.0	30.0	27.0 TO 33.0	PASS

Relay Test Results for: GROUND(50/025) FAULT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.0005	0.0005	0.0000	PASS

Relay Test Results for: GROUND(50/025) FAULT DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.10	0.001	11.16	0.186	0.000 TO 0.700	PASS

Relay Test Results for: ***DIFFERENTIAL INPUT TEST***

0.0	0.0	0.0 TO 0.0	RAN

Relay Test Results for: DIFFERENTIAL PICKUP PH A

OK?
RAN

Relay Test Results for: DIFFERENTIAL PICKUP PH B

OK?
RAN

Relay Test Results for: DIFFERENTIAL PICKUP PH C

Relay Test Results for:	DIFFERENTIAL PICKUP PH C	
		OK? RAN
Relay Test Results for:	DIFFERENTIAL FAULT DELAY	
		OK? RAN
Relay Test Results for:	RETURN RELAY SETTING	
		OK? RAN
Relay Test Results for:	**TURN OFF BATTERY SIMULATOR**	
		OK? RAN

Test Results Report

Powered by: ENOSERV

Lib Routine:	SEL-351A.FST_LIB	**AF/AL:**	AL	**Pass/Fail:**	PASS
Lib Version:	8.3	**Test Date:**	03/04/2020		

Relay Data:

TESTED_BY:	Kate Murphy	SUBSTATION:	13.2kV
CUSTOMER:	Ann Arbor City	USER:	AAWWTP
LOCATION:	CEP	POSITION:	Bus2 - Bus 3 Tie Bkr
RELAY_MANF:	SEL	RELAY_TYPE:	SEL-351A
MODEL_STYLE:	0351a050x3a54x1	IEEE_DEVICE:	MF
IL_IB:	sel-351a	SERIAL_NUMBER:	1132770403
FIRMWARE:	SEL-351A-R515-V0-Z105104-D20130620RELAY_ID:		
52GT2			
CURRENT_TESTDATE:	3/4/2020	TESTSET_CALDATE:	11/2/2018

Global Defines:

```
SET_GROUP$="1"       'SET GROUP TO TEST
CONTACT$="107"       'OUTPUT CONTACT TO MASK
SEL_AUTO=1           '0=MANUAL, 1=AUTO MASK, 2=MANUAL W/MESSAGES
SKIP_TST=1           'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1             'NO ERROR MESSAGE IF NO OPERATION
DIR_TEST_VOLTS=30    'TEST VOLTAGE FOR DIRECTIONAL ELEMENTS
NORM_VOLTS=67        'NORM VOLTAGE
NORM_FREQ=60         'NORMAL VOLTAGE FREQUENCY
ZONE_TEST_AMPS=3   'TEST CURRENT FOR LOAD ENCHROACHMENT TESTS
```

Routine Notes:

Relay Settings Used for Testing:

```
RID$ = "GENERATOR MAIN"
TID$ = "TEST SETTING"
CTR = 120
CTRN = 120
PTR = 110.00
PTRS = 110.00
VNOM = 69.29
Z1MAG = 2.14
Z1ANG = 68.86
Z0MAG = 6.38
Z0ANG = 72.47
LL = 4.84
E50P = 1
E50N$ = "N"
E50G = 1
E50Q$ = "N"
E51P = 2
E51N$ = "N"
E51G = 1
E51Q$ = "N"
EHBL2$ = "N"
E32$ = "N"
ELOAD$ = "N"
ESOTF$ = "N"
```

```
EVOLT$ = "Y"
E25$ = "Y"
EFLOC$ = "Y"
ELOP$ = "N"
E81$ = "N"
E81R$ = "N"
E79$ = "N"
ESV = 10
EDEM$ = "THM"
s50P1P = 28.66
s67P1D = 0.00
s50PP1P$ = "OFF"
s50G1P = 8.620
s67G1D = 6.00
s51PP = 1.90
s51PC$ = "C3"
s51PTD = 0.37
s51PRS$ = "N"
s51AP$ = "OFF"
s51AC$ = "U3"
s51ATD = 3.00
s51ARS$ = "N"
s51BP$ = "OFF"
s51BC$ = "U3"
s51BTD = 3.00
s51BRS$ = "N"
s51CP$ = "OFF"
s51CC$ = "U3"
s51CTD = 3.00
s51CRS$ = "N"
s51GP = 0.60
s51GC$ = "U1"
s51GTD = 1.09
s51GRS$ = "N"
s27P1P = 62.00
s27P2P$ = "OFF"
s59P1P = 76.00
s59P2P$ = "OFF"
s59N1P$ = "OFF"
s59N2P$ = "OFF"
s59QP$ = "OFF"
s59V1P$ = "OFF"
s27SP = 10.00
s59S1P = 55.00
s59S2P$ = "OFF"
s27PP$ = "OFF"
s59PP$ = "OFF"
s25VLO = 62.00
s25VHI = 76.00
s25RCF = 1.00
s25SF = 0.050
s25ANG1 = 15
s25ANG2 = 15
SYNCP$ = "VA"
TCLOSD = 3.00
```

```
DMTC = 5
PDEMP = 5.00
NDEMP = 1.500
GDEMP = 1.50
QDEMP = 1.50
TDURD = 9.00
CFD = 60.00
s3POD = 1.50
s50LP = 0.25
SV1PU = 0.00
SV1DO = 0.00
SV2PU = 0.00
SV2DO = 0.00
SV3PU = 0.00
SV3DO = 0.00
SV4PU = 0.00
SV4DO = 0.00
SV5PU = 0.00
SV5DO = 0.00
SV6PU = 0.00
SV6DO = 0.00
SV7PU = 0.00
SV7DO = 0.00
SV8PU = 0.00
SV8DO = 0.00
SV9PU = 0.00
SV9DO = 0.00
SV10PU = 0.00
SV10DO = 0.00
TR$ = "50P1 + 51PT + 51GT + 50G1 + 67G1T"
TRQUAL = 0
TRSOTF = 0
DTT = 0
ULTR$ = "!(51P + 51G)"
s52A$ = "IN101"
CL$ = "CC + LB4"
ULCL$ = "TRIP"
s79RI$ = "TRIP"
s79RIS$ = "52A + 79CY"
s79DTL$ = "OC + !IN102 + LB3"
s79DLS$ = "79LO"
s79SKP = 0
s79STL$ = "TRIP"
s79BRS = 0
s79SEQ = 0
s79CLS = 1
SET1 = 0
RST1 = 0
SET2 = 0
RST2 = 0
SET3 = 0
RST3 = 0
SET4 = 0
RST4 = 0
SET5 = 0
```

```
RST5 = 0
SET6 = 0
RST6 = 0
SET7 = 0
RST7 = 0
SET8 = 0
RST8 = 0
SET9 = 0
RST9 = 0
SET10 = 0
RST10 = 0
SET11 = 0
RST11 = 0
SET12 = 0
RST12 = 0
SET13 = 0
RST13 = 0
SET14 = 0
RST14 = 0
SET15 = 0
RST15 = 0
SET16 = 0
RST16 = 0
s67P1TC = 1
s67P2TC = 1
s67P3TC = 1
s67P4TC = 1
s67N1TC = 1
s67N2TC = 1
s67N3TC = 1
s67N4TC = 1
s67G1TC = 1
s67G2TC = 1
s67G3TC = 1
s67G4TC = 1
s67Q1TC = 1
s67Q2TC = 1
s67Q3TC = 1
s67Q4TC = 1
s51ATC = 1
s51BTC = 1
s51CTC = 1
s51PTC = 1
s51NTC = 1
s51GTC = 1
s51G2TC = 1
s51QTC = 1
HBL2TC = 1
s81RTC$ = "!27B81"
LV1 = 0
LV2 = 0
LV3 = 0
LV4 = 0
LV5 = 0
LV6 = 0
```

```
LV7 = 0
LV8 = 0
LV9 = 0
LV10 = 0
LV11 = 0
LV12 = 0
LV13 = 0
LV14 = 0
LV15 = 0
LV16 = 0
LV17 = 0
LV18 = 0
LV19 = 0
LV20 = 0
LV21 = 0
LV22 = 0
LV23 = 0
LV24 = 0
LV25 = 0
LV26 = 0
LV27 = 0
LV28 = 0
LV29 = 0
LV30 = 0
LV31 = 0
LV32 = 0
SV1 = 0
SV2$ = "27A1 + 27B1 + 27C1 + 59A1 + 59B1 + 59C1"
SV3$ = "27A1 * 27B1 * 27C1"
SV4$ = "25A1 + (27S * !SV2)"
SV5$ = "25A1 + (27S * !SV2) + (59S1 * SV3) + (27S * SV3) "
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
SV15 = 0
SV16 = 0
OUT101$ = "TRIP"
OUT102$ = "SV4T"
OUT103 = 0
OUT104$ = "SV4T"
OUT105 = 0
OUT106 = 0
OUT107 = 0
ALRMOUT$ = "!(SALARM + HALARM)"
DP1$ = "IN101"
DP2 = 0
DP3 = 0
DP4 = 0
DP5 = 0
```

```
DP6 = 0
DP7 = 0
DP8 = 0
DP9 = 0
DP10 = 0
DP11 = 0
DP12 = 0
DP13 = 0
DP14 = 0
DP15 = 0
DP16 = 0
SS1 = 1
SS2 = 0
SS3 = 0
SS4 = 0
SS5 = 0
SS6 = 0
ER$ = "51P + 51G + 51N + 50P1 + 50G1 + 50N1"
FAULT$ = "51P + 51G"
BSYNCH$ = "52A"
CLMON = 0
BKMON$ = "TRIP"
BKCLS$ = "CLOSE"
E32IV = 1
LOPBLK = 0
SALARM$ = "BADPASS + CHGPASS + SETCHG + GRPSW + ACCESSP + PASNVAL "
RSTTRGT = 0
RST_DEM = 0
RST_PDM = 0
RST_BK = 0
RST_HIS = 0
RST_ENE = 0
RST_MML = 0
RST_HAL = 0
RSTDNPE = 0
PMTRIG = 0
TREA1 = 0
TREA2 = 0
TREA3 = 0
TREA4 = 0
PTCONN$ = "WYE"
VSCONN$ = "VS"
TGR = 0.00
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
FP_TO = 15
SCROLD = 2
FPNGD$ = "IG"
METHRES$ = "Y"
LER = 15
PRE = 4
FLTDISP$ = "MAX"
DCLOP$ = "OFF"
DCHIP$ = "OFF"
```

```
IN101D = 0.50
IN102D = 0.50
IN103D = 0.50
IN104D = 0.50
IN105D = 0.50
IN106D = 0.50
EBMON$ = "Y"
COSP1 = 10000
COSP2 = 150
COSP3 = 12
KASP1 = 1.20
KASP2 = 8.00
KASP3 = 20.00
ESTRT = 50
ESCLT = 120
MSTRT = 50
MSCLT = 120
EPMU$ = "N"
EVELOCK = 0
DNPSRC$ = "UTC"
BOOPTCC$ = "SET"
BOOPPUL$ = "SET"
IRIGC$ = "NONE"
UTC_OFF = 0.00
DST_BEGM$ = "NA"
P2_EPORT$ = "Y"
P2_PROTO$ = "SEL"
P2_MAXACC = 2
P2_SPEED = 2400
P2_BITS = 8
P2_PARITY$ = "N"
P2_STOP = 1
P2_RTSCTS$ = "N"
P2_T_OUT = 15
P2_AUTO$ = "N"
P2_FASTOP$ = "N"
P3_EPORT$ = "Y"
P3_PROTO$ = "SEL"
P3_MAXACC = 2
P3_SPEED = 2400
P3_BITS = 8
P3_PARITY$ = "N"
P3_STOP = 1
P3_RTSCTS$ = "N"
P3_T_OUT = 0
P3_AUTO$ = "N"
P3_FASTOP$ = "N"
PF_EPORT$ = "Y"
PF_PROTO$ = "SEL"
PF_MAXACC$ = "C"
PF_SPEED = 19200
PF_BITS = 8
PF_PARITY$ = "N"
PF_STOP = 1
PF_RTSCTS$ = "N"
```

```
PF_T_OUT = 15
PF_AUTO$ = "N"
PF_FASTOP$ = "N"
```

Relay Test Results for:
ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for:
LOG INTO THE RELAY

OK?
RAN

Relay Test Results for:
DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for:
SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for:
UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for:
RELAY STATUS CHECK

N/A

Additional Data:
STA

```
GENERATOR MAIN                    Date: 03/04/20    Time: 05:41:54.583
TEST SETTING

FID=SEL-351A-R515-V0-Z105104-D20130620       CID=F6EC

SELF TESTS

W=Warn    F=Fail

      IA      IB      IC      IN      VA      VB      VC      VS      MOF
OS   -1      -1      -1      -1      -1      -1      -1      -1      -1
OSH  -0      -0      -0      -1

      15V_PS  5V_REG  3.3V_REG
PS    14.87   4.97    3.24

      RAM     ROM     FPGA    EEPROM  FLASH   A/D     USB_BRD COM_BRD
      OK      OK      OK      OK      OK      OK      NA      NA

      TEMP    RTC     HMI
      33.3    OK      OK


 Relay Enabled

=>>
```

Relay Test Results for:
COMPONENT MAINTENANCE NOTES

OK?
RAN

Relay Test Results for:
CURRENT\VOLTAGE INJECTION METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
67.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	7.2	7.1	-0.1	216.0	215.8	-0.1	PASS
B-N	7.4	7.4	-0.0	240.0	239.5	-0.2	PASS
C-N	7.6	7.6	-0.1	264.0	263.5	-0.2	PASS

	CALCULATED MEGA WATT	MEASURED MEGA WATT	% ERROR	CALCULATED MEGA VAR	MEASURED MEGA VAR	% ERROR	OK?
	4.6	4.6	-0.4	2.7	2.7	0.1	PASS

Relay Test Results for:
RELAY OUTPUT VERIFICATION

Verify operation of the RELAY OUTPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that OUTPUTS
on this relay essential to proper functioning of
the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:
Verified all outputs currently in use.

Relay Test Results for:
RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for:
SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for:
SEL 351A SPECIFIC TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for:
RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for:
GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for:
MODIFY RELAY SETTINGS

OK?
RAN

Relay Test Results for:
POTENTIAL TESTING ISSUES CHECK

OK?
RAN

Relay Test Results for:
CONNECTION CHANGE FOR ELEMENT TESTS

OK?
RAN

Relay Test Results for:
METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
67.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	7.2	7.1	-0.1	216.0	215.8	-0.1	PASS
B-N	7.4	7.4	-0.0	240.0	239.6	-0.2	PASS
C-N	7.6	7.6	-0.1	264.0	263.5	-0.2	PASS

CALCULATED MEGA WATT	MEASURED MEGA WATT	% ERROR	CALCULATED MEGA VAR	MEASURED MEGA VAR	% ERROR	OK?
4.6	4.6	-0.3	2.7	2.7	0.1	PASS

Relay Test Results for:
ZLF FORWARD LOAD IMPEDANCE

OK?
RAN

Relay Test Results for:
ZLF FORWARD LOAD ANGLE

OK?
RAN

Relay Test Results for:
ZLR REVERSE LOAD IMPEDANCE

OK?
RAN

Relay Test Results for:
ZLR REVERSE LOAD ANGLE

OK?
RAN

Relay Test Results for:
27P1P PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.000	62.000	0.00	PASS

Relay Test Results for:
27P1P THREE PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.000	62.000	0.00	PASS

Relay Test Results for:
27P2P PHASE UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for:
27PP PHASE TO PHASE UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for:
27PP2P PHASE TO PHASE UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for:
50QFP FORWARD DIRECTIONAL NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
Z2F FORWARD DIRECTIONAL NEGATIVE SEQUENCE IMPEDANCE

OK?
RAN

Relay Test Results for:
50QRP REVERSE DIRECTIONAL NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
Z2R REVERSE DIRECTIONAL NEGATIVE SEQUENCE IMPEDANCE

OK?
RAN

Relay Test Results for:
50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		28.943	28.660	0.99	PASS
B-N		28.943	28.660	0.99	PASS
C-N		28.656	28.660	-0.01	PASS

Relay Test Results for:
50P2P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50P3P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50P4P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50P5P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50P6P PHASE OVERCURRENT PICKUP

Relay Test Results for:
50P6P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
67P1D PHASE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:
67P2D PHASE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:
67P3D PHASE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:
67P4D PHASE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:
50PP1P PHASE TO PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50PP2P PHASE TO PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50PP3P PHASE TO PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50PP4P PHASE TO PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50Q3P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50Q4P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50Q5P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50Q6P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
67Q1D NEGATIVE SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:
67Q2D NEGATIVE SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:
67Q3D NEGATIVE SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:
67Q4D NEGATIVE SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:
50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	8.623	8.620	0.04	PASS

Relay Test Results for:
50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50G3P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50G4P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50G5P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50G6P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
67G1D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(SEC)	TIME(CY)	RANGE	OK?
1.20	10.344	0.121	7.24	4.20 TO 7.80	PASS

Relay Test Results for:

67G2D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:

67G3D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:

67G4D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:

51PP PHASE TO PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		1.903	1.900	0.16	PASS
B-N		1.903	1.900	0.16	PASS
C-N		1.903	1.900	0.16	PASS

Relay Test Results for:

51P PHASE TIME OVERCURRENT CURVE

51P PHASE TIME OVERCURRENT CURVE (PHASE A-N)

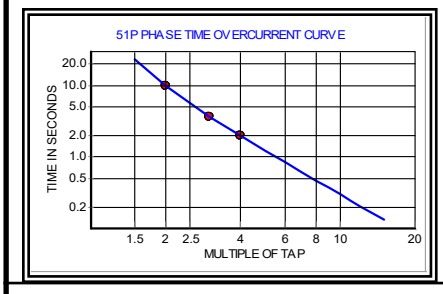
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	3.800	594.25	9.904	9.867	0.38	PASS
3.00	5.700	223.40	3.723	3.700	0.63	PASS
4.00	7.600	119.26	1.988	1.973	0.72	PASS

51P PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	3.800	594.14	9.902	9.867	0.36	PASS
3.00	5.700	222.45	3.708	3.700	0.20	PASS
4.00	7.600	118.94	1.982	1.973	0.45	PASS

51P PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	3.800	594.41	9.907	9.867	0.41	PASS
3.00	5.700	223.18	3.720	3.700	0.53	PASS
4.00	7.600	119.55	1.992	1.973	0.97	PASS



Relay Test Results for:

51AP PHASE A TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:

51A PHASE A TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for:
51BP PHASE B TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
51B PHASE B TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for:
51CP PHASE C TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
51C PHASE C TIME OVERCURRENT CURVE

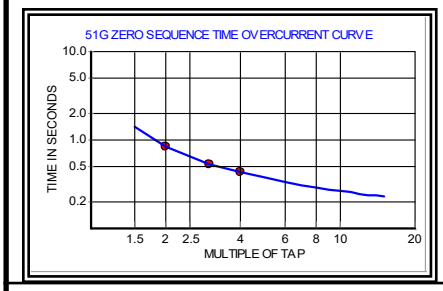
OK?
RAN

Relay Test Results for:
51GP ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.596	0.600	-0.67	PASS

Relay Test Results for:
51G ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	50.70	0.845	0.837	0.99	PASS
3.00	1.800	32.11	0.535	0.535	0.04	PASS
4.00	2.400	25.69	0.428	0.428	0.08	PASS



Relay Test Results for:
51G2P ZERO SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
51G2 ZERO SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for:
51QP NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
51Q NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for:
CONNECTION CHANGE FOR NEUTRAL TESTS

Relay Test Results for:
CONNECTION CHANGE FOR NEUTRAL TESTS

OK?
RAN

Relay Test Results for:
50N1P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50N2P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50N3P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50N4P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50N5P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50N6P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
67N1D NEUTRAL DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:
67N2D NEUTRAL DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:
67N3D NEUTRAL DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:
67N4D NEUTRAL DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:
51NP NEUTRAL TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
51N NEUTRAL TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for:
59P1P PHASE OVERVOLTAGE PICKUP

PICKUP	VOLTS	IDEAL	%ERROR	OK?
	76.760	76.000	1.00	PASS

Relay Test Results for:
59P1P THREE PHASE OVERVOLTAGE PICKUP

PICKUP	VOLTS	IDEAL	%ERROR	OK?
	76.760	76.000	1.00	PASS

Relay Test Results for:
59P2P PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for:
59PP PHASE TO PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for:
59PP2P PHASE TO PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for:
59N1P ZERO SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for:
59N2P ZERO SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for:
59QP NEGATIVE SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for:
59Q2P NEGATIVE SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for:
59V1P POSITIVE SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for:
27B81P UNDERVOLTAGE FRQEUENCY BLOCK

OK?
RAN

Relay Test Results for:
81D1P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for:
81D1D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for:
81D2P FRQEUENCY PICKUP

	OK?
	RAN

Relay Test Results for:
81D2D FRQEUENCY TIME DELAY

	OK?
	RAN

Relay Test Results for:
81D3P FRQEUENCY PICKUP

	OK?
	RAN

Relay Test Results for:
81D3D FRQEUENCY TIME DELAY

	OK?
	RAN

Relay Test Results for:
81D4P FRQEUENCY PICKUP

	OK?
	RAN

Relay Test Results for:
81D4D FRQEUENCY TIME DELAY

	OK?
	RAN

Relay Test Results for:
81D5P FRQEUENCY PICKUP

	OK?
	RAN

Relay Test Results for:
81D5D FRQEUENCY TIME DELAY

	OK?
	RAN

Relay Test Results for:
81D6P FRQEUENCY PICKUP

	OK?
	RAN

Relay Test Results for:
81D6D FRQEUENCY TIME DELAY

	OK?
	RAN

Relay Test Results for:
25VLO SOURCE VP SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.620	62.000	1.00	PASS

Relay Test Results for:
25VHI SOURCE VP SYNCHRONIZING PHASE HIGH VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.000	76.000	-0.00	PASS

Relay Test Results for:
<SYNCHRONIZING TEST CONNECTIONS>

	OK?
	RAN

Relay Test Results for:
27SP SYNCHRONIZING PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
10.000	10.000	0.00	PASS

Relay Test Results for:
59S1P SYNCHRONIZING PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
55.550	55.000	1.00	PASS

Relay Test Results for:
59S2P SYNCHRONIZING PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for:
25VLO SOURCE VS SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.620	62.000	1.00	PASS

Relay Test Results for:
25VHI SOURCE VS SYNCHRONIZING PHASE HIGH VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.000	76.000	-0.00	PASS

Relay Test Results for:
25ANG1 SYNCHRONIZING ANGLE 1

LAGGING ANGLE	IDEAL	RANGE	OK?
15.00	15.00	11.00 TO 19.00	PASS

LEADING ANGLE	IDEAL	RANGE	OK?
346.00	345.00	341.00 TO 349.00	PASS

Relay Test Results for:
25ANG2 SYNCHRONIZING ANGLE 2

LAGGING ANGLE	IDEAL	RANGE	OK?
15.00	15.00	11.00 TO 19.00	PASS

LEADING ANGLE	IDEAL	RANGE	OK?
346.00	345.00	341.00 TO 349.00	PASS

Relay Test Results for:
25SF SYNCHRONIZING SLIP FREQUENCY

DROPOUT HZ	IDEAL	RANGE	OK?
59.950	59.950	59.900 TO 60.000	PASS

Relay Test Results for:
RESTORE RELAY SETTINGS

OK?
RAN

Relay Test Results for:
RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for:
COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

OK?
RAN

Relay Test Results for:
LOG OUT OF THE RELAY

OK?
RAN

Test Results Report

Powered by: ENOSERV

Lib Routine:	SEL-551.FST_LIB	**AF/AL:**	AL	**Pass/Fail:**	PASS
Lib Version:	8.2	**Test Date:**	03/04/2020		

Relay Data:

TESTED_BY:	Kate Murphy	SUBSTATION:	13.2kV
CUSTOMER:	Ann Arbor City	USER:	AAWWTP
LOCATION:	CEB	POSITION:	Spare
RELAY_MANF:	SEL	RELAY_TYPE:	SEL-551
MODEL_STYLE:	0551003X551X	IEEE_DEVICE:	MF
IL_IB:	SEL-551	SERIAL_NUMBER:	1132620131
FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408RELAY_ID: 52F1SP		
CURRENT_TESTDATE:	3/4/2020	TESTSET_CALDATE:	11/2/2018

Global Defines:

```
CONTACT$="4"          'OUTPUT CONTACT TO MASK
SEL_AUTO=1            '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION
MESSAGES
SKIP_TST=1            'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1              'NO ERROR MESSAGE IF NO OPERATION
```

Routine Notes:

Relay Settings Used for Testing:

```
RID$ = "FDR-52F1SP"
TID$ = "EBB 52-2A"
CTR = 120
CTRN = 120
TDURD = 9.000
s50P1P = 45.0
s50P2P$ = "OFF"
s50P3P$ = "OFF"
s50P4P$ = "OFF"
s50P5P$ = "OFF"
s50P6P$ = "OFF"
s50ABCP$ = "OFF"
s51P1P = 2.0
s51P1C$ = "C3"
s51P1TD = 0.33
s51P1RS$ = "N"
s51P2P$ = "OFF"
s51P2C$ = "U3"
s51P2TD = 15.00
s51P2RS$ = "N"
s50N1P$ = "OFF"
s50N2P$ = "OFF"
s51N1P$ = "OFF"
s51N1C$ = "U4"
s51N1TD = 3.00
s51N1RS$ = "N"
s50G1P = 5.4
s50G2P$ = "OFF"
```

```
s51G1P = 0.5
s51G1C$ = "U1"
s51G1TD = 0.50
s51G1RS$ = "N"
s50Q1P$ = "OFF"
s50Q2P$ = "OFF"
s51Q1P$ = "OFF"
s51Q1C$ = "U3"
s51Q1TD = 15.00
s51Q1RS$ = "N"
s51Q2P$ = "OFF"
s51Q2C$ = "U3"
s51Q2TD = 15.00
s51Q2RS$ = "N"
s79OI1 = 0.000
s79OI2 = 600.000
s79OI3 = 0.000
s79OI4 = 0.000
s79RSD = 1800.000
s79RSLD = 300.000
CFD = 60.000
DMTC = 5
PDEMP = 5.00
NDEMP = 1.50
GDEMP = 1.50
QDEMP = 1.50
SV5PU = 0.000
SV5DO = 0.000
SV6PU = 0.000
SV6DO = 0.000
SV7PU = 0.000
SV7DO = 0.000
SV8PU = 0.000
SV8DO = 0.000
SV9PU = 0.000
SV9DO = 0.000
SV10PU = 0.000
SV10DO = 0.000
SV11PU = 0.000
SV11DO = 0.000
SV12PU = 0.000
SV12DO = 0.000
SV13PU = 0.000
SV13DO = 0.000
SV14PU = 0.000
SV14DO = 0.000
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
TR$ = "51P1T + 51G1T + 50P1 + 50G1"
ULTR$ = "!(51P1 + 51G1)"
s51P1TC = 1
s51P2TC = 1
s51N1TC = 1
s51G1TC = 1
```

```
s51Q1TC = 1
s51Q2TC = 1
s52A$ = "IN1"
CL$ = "LB4"
ULCL$ = "TRIP"
s79RI$ = "TRIP"
s79RIS$ = "IN1"
s79DTL$ = "!LB1 + LB3"
s79DLS$ = "79LO"
s79SKP$ = "50P2 * SH0"
s79STL$ = "TRIP"
s79BRS$ = "(51P1 + 51G1) * (79RS + 79CY)"
s79SEQ = 0
ER1$ = "51P1 + 51G1 + 51N1"
ER2 = 0
SV1 = 0
SV2 = 0
SV3 = 0
SV4 = 0
SV5 = 0
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
OUT1$ = "TRIP"
OUT2 = 0
OUT3 = 0
OUT4 = 0
DP1$ = "IN1"
DP2 = 0
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
```

Relay Test Results for:
ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for:
LOG INTO THE RELAY

OK?
RAN

Relay Test Results for:
DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for:
SET PORT TIMEOUT AND AUTO

Relay Test Results for:
SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for:
UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for:
RELAY STATUS CHECK

N/A

Additional Data:
STA

FDR-52F1SP Date: 03/04/20 Time: 09:33:10.963
EBB 52-2A

FID=SEL-551-R514-Vf-Z002002-D20110408 CID=CCFD

SELF TESTS

W=Warn F=Fail

	IA	IB	IC	IN	MOF
OS	3	3	3	3	0

	+5V_PS	+5V_REG	-5V_REG	+10V_PS	-10V_PS	VBAT
PS	4.98	4.99	-4.98	9.97	-10.02	3.46

TEMP	RAM	ROM	CR_RAM	EEPROM
33.8	OK	OK	OK	OK

Relay Enabled

=>>

Relay Test Results for:
COMPONENT MAINTENANCE NOTES

OK?
RAN

Relay Test Results for:
CURRENT INJECTION METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	215.0	-0.5	PASS
B-N	0.0	0.0	0.0	240.0	239.0	-0.4	PASS
C-N	0.0	0.0	0.0	264.0	263.0	-0.4	PASS

Relay Test Results for:
RELAY OUTPUT VERIFICATION

Relay Test Results for:
RELAY OUTPUT VERIFICATION

Verify operation of the RELAY OUTPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that OUTPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:
Verified operation of all in-service outputs.

Relay Test Results for:
RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for:
SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for:
RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for:
GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for:
CONNECTION CHANGE FOR ELEMENT TEST

OK?
RAN

Relay Test Results for:
METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	214.0	-0.9	PASS
B-N	0.0	0.0	0.0	240.0	239.0	-0.4	PASS
C-N	0.0	0.0	0.0	264.0	262.0	-0.8	PASS

Relay Test Results for:
50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	45.010	45.000	0.02	PASS
B-N	45.010	45.000	0.02	PASS

Relay Test Results for:
50P1P PHASE OVERCURRENT PICKUP

C-N	45.460	45.000	1.02	PASS

Relay Test Results for:
50P2P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50P3P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50P4P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50P5P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50P6P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50ABCP PHASE A OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50ABCP PHASE B OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50ABCP PHASE C OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.398	5.400	-0.04	PASS

Relay Test Results for:
50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
51P1P PHASE TIME OVERCURRENT PICKUP

Relay Test Results for:

51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		2.020	2.000	1.00	PASS
B-N		1.980	2.000	-1.00	PASS
C-N		2.020	2.000	1.00	PASS

Relay Test Results for:

51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

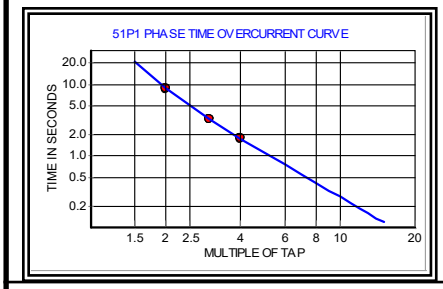
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.000	529.96	8.833	8.800	0.37	PASS
3.00	6.000	200.24	3.337	3.300	1.13	PASS
4.00	8.000	106.33	1.772	1.760	0.69	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.000	524.12	8.735	8.800	-0.73	PASS
3.00	6.000	197.50	3.292	3.300	-0.25	PASS
4.00	8.000	105.79	1.763	1.760	0.18	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.000	534.37	8.906	8.800	1.21	PASS
3.00	6.000	199.21	3.320	3.300	0.61	PASS
4.00	8.000	106.30	1.772	1.760	0.66	PASS



Relay Test Results for:

51P2P PHASE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:

51P2 PHASE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for:

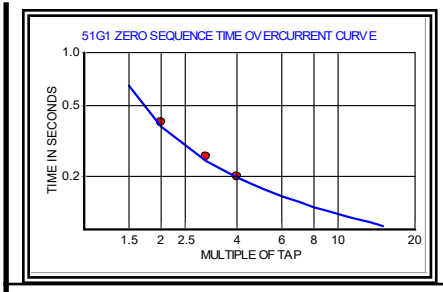
51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.520	0.500	4.00	PASS

Relay Test Results for:

51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.000	24.14	0.402	0.384	4.82	PASS
3.00	1.500	15.41	0.257	0.245	4.66	PASS
4.00	2.000	12.04	0.201	0.196	2.26	PASS



Relay Test Results for:
51Q1P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
51Q1 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for:
51Q2P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
51Q2 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for:
NEUTRAL TEST CONNECTIONS

OK?
RAN

Relay Test Results for:
50N1P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50N2P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
51N1P NEUTRAL TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
51N1 NEUTRAL TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for:
RESTORE LOGIC SETTINGS

OK?
RAN

Relay Test Results for:
RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for:	
COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS	
	OK?
	RAN
Relay Test Results for:	
LOG OUT OF THE RELAY	
	OK?
	RAN

Test Results Report

Powered by: ENOSERV

Lib Routine:	SEL-551.FST_LIB	**AF/AL:**	AL	**Pass/Fail:**	PASS
Lib Version:	8.2	**Test Date:**	03/04/2020		

Relay Data:

TESTED_BY:	Kate Murphy	SUBSTATION:	13.2kV
CUSTOMER:	Ann Arbor City	USER:	AAWWTP
LOCATION:	CEB	POSITION:	Spare
RELAY_MANF:	SEL	RELAY_TYPE:	SEL-551
MODEL_STYLE:	0551003X551X	IEEE_DEVICE:	MF
IL_IB:	SEL-551	SERIAL_NUMBER:	1132620122
FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408RELAY_ID: 52F2SP		
CURRENT_TESTDATE:	3/4/2020	TESTSET_CALDATE:	11/2/2018

Global Defines:

```
CONTACT$="4"          'OUTPUT CONTACT TO MASK
SEL_AUTO=1            '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION
MESSAGES
SKIP_TST=1            'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1              'NO ERROR MESSAGE IF NO OPERATION
```

Routine Notes:

Relay Settings Used for Testing:

```
RID$ = "FDR-52F2SP"
TID$ = "EBB 52-1A"
CTR = 120
CTRN = 120
TDURD = 9.000
s50P1P = 45.0
s50P2P$ = "OFF"
s50P3P$ = "OFF"
s50P4P$ = "OFF"
s50P5P$ = "OFF"
s50P6P$ = "OFF"
s50ABCP$ = "OFF"
s51P1P = 2.0
s51P1C$ = "C3"
s51P1TD = 0.33
s51P1RS$ = "N"
s51P2P$ = "OFF"
s51P2C$ = "U3"
s51P2TD = 15.00
s51P2RS$ = "N"
s50N1P$ = "OFF"
s50N2P$ = "OFF"
s51N1P$ = "OFF"
s51N1C$ = "U4"
s51N1TD = 3.00
s51N1RS$ = "N"
s50G1P = 5.4
s50G2P$ = "OFF"
```

```
s51G1P = 0.5
s51G1C$ = "U1"
s51G1TD = 0.50
s51G1RS$ = "N"
s50Q1P$ = "OFF"
s50Q2P$ = "OFF"
s51Q1P$ = "OFF"
s51Q1C$ = "U3"
s51Q1TD = 15.00
s51Q1RS$ = "N"
s51Q2P$ = "OFF"
s51Q2C$ = "U3"
s51Q2TD = 15.00
s51Q2RS$ = "N"
s79OI1 = 0.000
s79OI2 = 600.000
s79OI3 = 0.000
s79OI4 = 0.000
s79RSD = 1800.000
s79RSLD = 300.000
CFD = 60.000
DMTC = 5
PDEMP = 5.00
NDEMP = 1.50
GDEMP = 1.50
QDEMP = 1.50
SV5PU = 0.000
SV5DO = 0.000
SV6PU = 0.000
SV6DO = 0.000
SV7PU = 0.000
SV7DO = 0.000
SV8PU = 0.000
SV8DO = 0.000
SV9PU = 0.000
SV9DO = 0.000
SV10PU = 0.000
SV10DO = 0.000
SV11PU = 0.000
SV11DO = 0.000
SV12PU = 0.000
SV12DO = 0.000
SV13PU = 0.000
SV13DO = 0.000
SV14PU = 0.000
SV14DO = 0.000
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
TR$ = "51P1T + 51G1T + 50P1 + 50G1"
ULTR$ = "!(51P1 + 51G1)"
s51P1TC = 1
s51P2TC = 1
s51N1TC = 1
s51G1TC = 1
```

```
s51Q1TC = 1
s51Q2TC = 1
s52A$ = "IN1"
CL$ = "LB4"
ULCL$ = "TRIP"
s79RI$ = "TRIP"
s79RIS$ = "IN1"
s79DTL$ = "!LB1 + LB3"
s79DLS$ = "79LO"
s79SKP$ = "50P2 * SH0"
s79STL$ = "TRIP"
s79BRS$ = "(51P1 + 51G1) * (79RS + 79CY)"
s79SEQ = 0
ER1$ = "51P1 + 51G1 + 51N1"
ER2 = 0
SV1 = 0
SV2 = 0
SV3 = 0
SV4 = 0
SV5 = 0
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
OUT1$ = "TRIP"
OUT2 = 0
OUT3 = 0
OUT4 = 0
DP1$ = "IN1"
DP2 = 0
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
```

Relay Test Results for:
ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for:
LOG INTO THE RELAY

OK?
RAN

Relay Test Results for:
DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for:
SET PORT TIMEOUT AND AUTO

Relay Test Results for:
SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for:
UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for:
RELAY STATUS CHECK

N/A

Additional Data:
STA

FDR-52F2SP Date: 03/04/20 Time: 10:05:06.171
EBB 52-1A

FID=SEL-551-R514-Vf-Z002002-D20110408 CID=CCFD

SELF TESTS

W=Warn F=Fail

	IA	IB	IC	IN	MOF
OS	3	3	3	3	0

	+5V_PS	+5V_REG	-5V_REG	+10V_PS	-10V_PS	VBAT
PS	4.99	5.01	-5.01	9.94	-10.00	3.45

TEMP	RAM	ROM	CR_RAM	EEPROM
28.6	OK	OK	OK	OK

Relay Enabled

=>>

Relay Test Results for:
COMPONENT MAINTENANCE NOTES

OK?
RAN

Relay Test Results for:
CURRENT INJECTION METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	215.0	-0.5	PASS
B-N	0.0	0.0	0.0	240.0	242.0	0.8	PASS
C-N	0.0	0.0	0.0	264.0	264.0	0.0	PASS

Relay Test Results for:
RELAY OUTPUT VERIFICATION

Relay Test Results for:
RELAY OUTPUT VERIFICATION

Verify operation of the RELAY OUTPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that OUTPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:
Verified operation of in-service outputs.

Relay Test Results for:
RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for:
SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for:
RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for:
GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for:
CONNECTION CHANGE FOR ELEMENT TEST

OK?
RAN

Relay Test Results for:
METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	215.0	-0.5	PASS
B-N	0.0	0.0	0.0	240.0	241.0	0.4	PASS
C-N	0.0	0.0	0.0	264.0	262.0	-0.8	PASS

Relay Test Results for:
50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	45.010	45.000	0.02	PASS
B-N	45.010	45.000	0.02	PASS

Relay Test Results for:
50P1P PHASE OVERCURRENT PICKUP

C-N	45.460	45.000	1.02	PASS

Relay Test Results for:
50P2P PHASE OVERCURRENT PICKUP

	OK?
	RAN

Relay Test Results for:
50P3P PHASE OVERCURRENT PICKUP

	OK?
	RAN

Relay Test Results for:
50P4P PHASE OVERCURRENT PICKUP

	OK?
	RAN

Relay Test Results for:
50P5P PHASE OVERCURRENT PICKUP

	OK?
	RAN

Relay Test Results for:
50P6P PHASE OVERCURRENT PICKUP

	OK?
	RAN

Relay Test Results for:
50ABCP PHASE A OVERCURRENT PICKUP

	OK?
	RAN

Relay Test Results for:
50ABCP PHASE B OVERCURRENT PICKUP

	OK?
	RAN

Relay Test Results for:
50ABCP PHASE C OVERCURRENT PICKUP

	OK?
	RAN

Relay Test Results for:
50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.398	5.400	-0.04	PASS

Relay Test Results for:
50G2P ZERO SEQUENCE OVERCURRENT PICKUP

	OK?
	RAN

Relay Test Results for:
50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

	OK?
	RAN

Relay Test Results for:
50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

	OK?
	RAN

Relay Test Results for:
51P1P PHASE TIME OVERCURRENT PICKUP

Relay Test Results for:

51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		2.020	2.000	1.00	PASS
B-N		2.000	2.000	0.00	PASS
C-N		2.000	2.000	0.00	PASS

Relay Test Results for:

51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

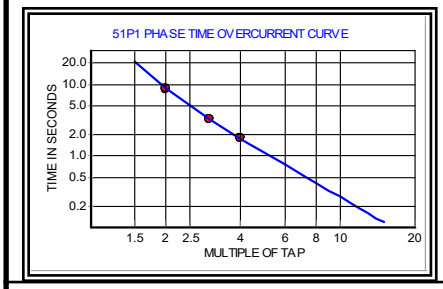
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.000	526.05	8.768	8.800	-0.37	PASS
3.00	6.000	197.95	3.299	3.300	-0.03	PASS
4.00	8.000	106.49	1.775	1.760	0.85	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.000	522.76	8.713	8.800	-0.99	PASS
3.00	6.000	198.22	3.304	3.300	0.11	PASS
4.00	8.000	106.22	1.770	1.760	0.59	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.000	531.61	8.860	8.800	0.68	PASS
3.00	6.000	199.87	3.331	3.300	0.94	PASS
4.00	8.000	106.39	1.773	1.760	0.74	PASS



Relay Test Results for:

51P2P PHASE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:

51P2 PHASE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for:

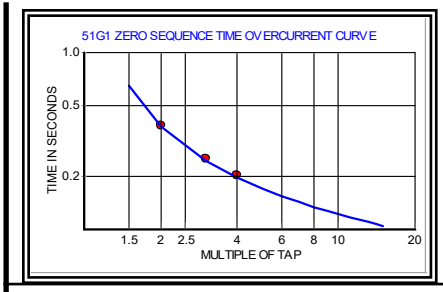
51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.485	0.500	-3.00	PASS

Relay Test Results for:

51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.000	23.13	0.386	0.384	0.44	PASS
3.00	1.500	15.17	0.253	0.245	3.03	PASS
4.00	2.000	12.16	0.203	0.196	3.28	PASS



Relay Test Results for:
51Q1P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
51Q1 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for:
51Q2P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
51Q2 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for:
NEUTRAL TEST CONNECTIONS

OK?
RAN

Relay Test Results for:
50N1P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50N2P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
51N1P NEUTRAL TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
51N1 NEUTRAL TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for:
RESTORE LOGIC SETTINGS

OK?
RAN

Relay Test Results for:
RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for:	
COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS	
	OK?
	RAN
Relay Test Results for:	
LOG OUT OF THE RELAY	
	OK?
	RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-551.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 8.2 **Test Date:** 02/27/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	13.2 KV	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	CENTRAL ELECTRICAL BUILDING
POSITION:	52F23 UNIT SUB 3-WBB	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	SEL-551
SERIAL_NUMBER:	1132620124	FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408
RELAY_ID:	AACI207024	CURRENT_TESTDATE:	2/27/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
CONTACT$="4"          'OUTPUT CONTACT TO MASK
SEL_AUTO=1            '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1            'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1              'NO ERROR MESSAGE IF NO OPERATION
```

Routine Notes:

Relay Settings Used for Testing:

```
RID$ = "52F23"
TID$ = "SUB 3 WBB"
CTR = 120
CTRN = 120
TDURD = 9.000
s50P1P = 16.5
s50P2P = 3.7
s50P3P$ = "OFF"
s50P4P$ = "OFF"
s50P5P$ = "OFF"
s50P6P$ = "OFF"
s50ABCP$ = "OFF"
s51P1P = 1.2
s51P1C$ = "C3"
s51P1TD = 1.00
s51P1RS$ = "N"
s51P2P$ = "OFF"
s51P2C$ = "U3"
s51P2TD = 15.00
s51P2RS$ = "N"
s50N1P$ = "OFF"
s50N2P$ = "OFF"
s51N1P$ = "OFF"
s51N1C$ = "U4"
s51N1TD = 3.00
s51N1RS$ = "N"
s50G1P = 5.4
s50G2P$ = "OFF"
s51G1P = 0.5
s51G1C$ = "U1"
s51G1TD = 0.50
```

```
s51G1RS$ = "N"
s50Q1P$ = "OFF"
s50Q2P$ = "OFF"
s51Q1P$ = "OFF"
s51Q1C$ = "U3"
s51Q1TD = 15.00
s51Q1RS$ = "N"
s51Q2P$ = "OFF"
s51Q2C$ = "U3"
s51Q2TD = 15.00
s51Q2RS$ = "N"
s79OI1 = 0.000
s79OI2 = 600.000
s79OI3 = 0.000
s79OI4 = 0.000
s79RSD = 1800.000
s79RSLD = 300.000
CFD = 60.000
DMTC = 5
PDEMP = 5.00
NDEMP = 1.50
GDEMP = 1.50
QDEMP = 1.50
SV5PU = 0.000
SV5DO = 0.000
SV6PU = 0.000
SV6DO = 0.000
SV7PU = 0.000
SV7DO = 0.000
SV8PU = 0.000
SV8DO = 0.000
SV9PU = 0.000
SV9DO = 0.000
SV10PU = 0.000
SV10DO = 0.000
SV11PU = 0.000
SV11DO = 0.000
SV12PU = 0.000
SV12DO = 0.000
SV13PU = 0.000
SV13DO = 0.000
SV14PU = 0.000
SV14DO = 0.000
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
TR$ = "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "
ULTR$ = "!(51P1 + 51G1)"
s51P1TC = 1
s51P2TC = 1
s51N1TC = 1
s51G1TC = 1
s51Q1TC = 1
s51Q2TC = 1
s52A$ = "IN1"
CL$ = "LB4"
ULCL$ = "TRIP"
s79RI$ = "TRIP"
s79RIS$ = "IN1"
s79DTL$ = "!LB1 + LB3"
s79DLS$ = "79LO"
s79SKP$ = "50P2 * SH0"
s79STL$ = "TRIP"
```

```
s79BRS$ = "(51P1 + 51G1) * (79RS + 79CY)"
s79SEQ = 0
ER1$ = "51P1 + 51G1 + 51N1"
ER2 = 0
SV1 = 0
SV2 = 0
SV3 = 0
SV4 = 0
SV5 = 0
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
OUT1$ = "TRIP"
OUT2 = 0
OUT3 = 0
OUT4 = 0
DP1$ = "IN1"
DP2$ = "LB2"
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
```

Relay Test Results for: ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for: LOG INTO THE RELAY

OK?
RAN

Relay Test Results for: DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for: SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

Relay Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

52F23                              Date: 02/27/20    Time: 11:25:32.267
SUB 3 WBB

FID=SEL-551-R514-Vf-Z002002-D20110408      CID=CCFD

SELF TESTS

W=Warn    F=Fail

       IA        IB        IC        IN        MOF
OS      3         3         3         3         0

       +5V_PS    +5V_REG   -5V_REG   +10V_PS   -10V_PS   VBAT
PS      4.96      5.01     -5.01      9.90     -9.97      3.45

       TEMP      RAM       ROM       CR_RAM    EEPROM
        27.6     OK        OK        OK        OK

 Relay Enabled

=>>
```

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR ELEMENT TEST

OK?
RAN

Relay Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	214.0	-0.9	PASS
B-N	0.0	0.0	0.0	240.0	238.0	-0.8	PASS
C-N	0.0	0.0	0.0	264.0	263.0	-0.4	PASS

Relay Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		16.505	16.500	0.03	PASS
B-N		16.505	16.500	0.03	PASS
C-N		16.505	16.500	0.03	PASS

Relay Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		3.699	3.700	-0.03	PASS
B-N		3.736	3.700	0.97	PASS
C-N		3.699	3.700	-0.03	PASS

Relay Test Results for: 50P3P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P4P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P5P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P6P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE A OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE B OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE C OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.398	5.400	-0.04	PASS

Relay Test Results for: 50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		1.216	1.200	1.33	PASS
B-N		1.204	1.200	0.33	PASS
C-N		1.216	1.200	1.33	PASS

Relay Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

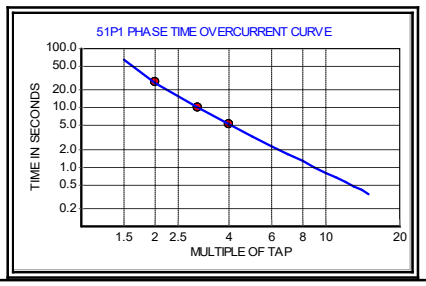
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.400	1614.80	26.913	26.667	0.93	PASS
3.00	3.600	600.98	10.016	10.000	0.16	PASS
4.00	4.800	318.23	5.304	5.333	-0.55	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.400	1625.59	27.093	26.667	1.60	PASS
3.00	3.600	604.72	10.079	10.000	0.79	PASS
4.00	4.800	322.00	5.367	5.333	0.62	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.400	1623.40	27.057	26.667	1.46	PASS
3.00	3.600	605.41	10.090	10.000	0.90	PASS
4.00	4.800	321.28	5.355	5.333	0.40	PASS



Relay Test Results for: 51P2P PHASE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P2 PHASE TIME OVERCURRENT CURVE

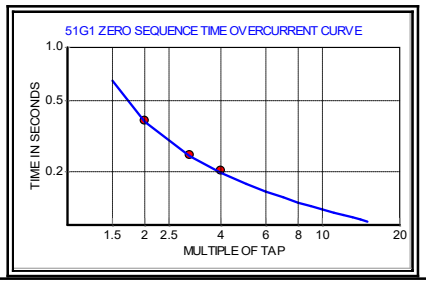
OK?
RAN

Relay Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.500	0.500	0.00	PASS

Relay Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.000	23.38	0.390	0.384	1.51	PASS
3.00	1.500	14.87	0.248	0.245	1.03	PASS
4.00	2.000	12.08	0.201	0.196	2.62	PASS



Relay Test Results for: 51Q1P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q1 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51Q2P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q2 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: NEUTRAL TEST CONNECTIONS

OK?
RAN

Relay Test Results for: 50N1P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N2P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1P NEUTRAL TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1 NEUTRAL TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: RESTORE LOGIC SETTINGS

OK?
RAN

Relay Test Results for: RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

```
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE
```

Relay Test Results for: LOG OUT OF THE RELAY

OK?
RAN

Test Results Report

Powered by: ENOSERV

Lib Routine:	SEL-551.FST_LIB	**AF/AL:**	AL	**Pass/Fail:**	PASS
Lib Version:	8.2	**Test Date:**	03/12/2020		

Relay Data:

TESTED_BY:	Kate Murphy	SUBSTATION:	13.2kV
CUSTOMER:	Ann Arbor City	USER:	AAWWTP
LOCATION:	CEB	POSITION:	Sub 8-EBB
RELAY_MANF:	SEL	RELAY_TYPE:	SEL-551
MODEL_STYLE:	0551003x552x	IEEE_DEVICE:	MF
IL_IB:	SEL-551	SERIAL_NUMBER:	1132490448
FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408	RELAY_ID:	52F28
CURRENT_TESTDATE:	3/12/2020	TESTSET_CALDATE:	11/2/2018

Global Defines:

```
CONTACT$="4"          'OUTPUT CONTACT TO MASK
SEL_AUTO=1            '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION
MESSAGES
SKIP_TST=1            'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1              'NO ERROR MESSAGE IF NO OPERATION
```

Routine Notes:

Relay Settings Used for Testing:

```
RID$ = "FDR-52F28"
TID$ = "SUB 8 EBB"
CTR = 120
CTRN = 120
TDURD = 9.000
s50P1P = 12.4
s50P2P = 3.0
s50P3P$ = "OFF"
s50P4P$ = "OFF"
s50P5P$ = "OFF"
s50P6P$ = "OFF"
s50ABCP$ = "OFF"
s51P1P = 1.1
s51P1C$ = "C3"
s51P1TD = 0.37
s51P1RS$ = "N"
s51P2P$ = "OFF"
s51P2C$ = "U3"
s51P2TD = 15.00
s51P2RS$ = "N"
s50N1P$ = "OFF"
s50N2P$ = "OFF"
s51N1P$ = "OFF"
s51N1C$ = "U4"
s51N1TD = 3.00
s51N1RS$ = "N"
s50G1P = 5.4
s50G2P$ = "OFF"
```

```
s51G1P = 0.5
s51G1C$ = "U1"
s51G1TD = 0.50
s51G1RS$ = "N"
s50Q1P$ = "OFF"
s50Q2P$ = "OFF"
s51Q1P$ = "OFF"
s51Q1C$ = "U3"
s51Q1TD = 15.00
s51Q1RS$ = "N"
s51Q2P$ = "OFF"
s51Q2C$ = "U3"
s51Q2TD = 15.00
s51Q2RS$ = "N"
s79OI1 = 0.000
s79OI2 = 600.000
s79OI3 = 0.000
s79OI4 = 0.000
s79RSD = 1800.000
s79RSLD = 300.000
CFD = 60.000
DMTC = 5
PDEMP = 5.00
NDEMP = 1.50
GDEMP = 1.50
QDEMP = 1.50
SV5PU = 0.000
SV5DO = 0.000
SV6PU = 0.000
SV6DO = 0.000
SV7PU = 0.000
SV7DO = 0.000
SV8PU = 0.000
SV8DO = 0.000
SV9PU = 0.000
SV9DO = 0.000
SV10PU = 0.000
SV10DO = 0.000
SV11PU = 0.000
SV11DO = 0.000
SV12PU = 0.000
SV12DO = 0.000
SV13PU = 0.000
SV13DO = 0.000
SV14PU = 0.000
SV14DO = 0.000
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
TR$ = "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "
ULTR$ = "!(51P1 + 51G1)"
s51P1TC = 1
s51P2TC = 1
s51N1TC = 1
s51G1TC = 1
```

```
s51Q1TC = 1
s51Q2TC = 1
s52A$ = "IN1"
CL$ = "LB4"
ULCL$ = "TRIP"
s79RI$ = "TRIP"
s79RIS$ = "IN1"
s79DTL$ = "!LB1 + LB3"
s79DLS$ = "79LO"
s79SKP$ = "50P2 * SH0"
s79STL$ = "TRIP"
s79BRS$ = "(51P1 + 51G1) * (79RS + 79CY)"
s79SEQ = 0
ER1$ = "51P1 + 51G1 + 51N1"
ER2 = 0
SV1 = 0
SV2 = 0
SV3 = 0
SV4 = 0
SV5 = 0
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
OUT1$ = "TRIP"
OUT2 = 0
OUT3 = 0
OUT4 = 0
DP1$ = "IN1"
DP2$ = "LB2"
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
```

Relay Test Results for:
ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for:
LOG INTO THE RELAY

OK?
RAN

Relay Test Results for:
DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for:
SET PORT TIMEOUT AND AUTO

Relay Test Results for:
SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for:
UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for:
RELAY STATUS CHECK

N/A

Additional Data:
STA

FDR-52F28 Date: 03/12/20 Time: 11:40:10.183
SUB 8 EBB

FID=SEL-551-R514-Vf-Z002002-D20110408 CID=CCFD

SELF TESTS

W=Warn F=Fail

	IA	IB	IC	IN	MOF
OS	2	2	2	2	0

	+5V_PS	+5V_REG	-5V_REG	+10V_PS	-10V_PS	VBAT
PS	4.99	5.03	-4.99	9.97	-10.04	3.38

TEMP	RAM	ROM	CR_RAM	EEPROM
28.6	OK	OK	OK	OK

Relay Enabled

=>>

Relay Test Results for:
COMPONENT MAINTENANCE NOTES

OK?
RAN

Relay Test Results for:
CURRENT INJECTION METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	219.0	1.4	PASS
B-N	0.0	0.0	0.0	240.0	239.0	-0.4	PASS
C-N	0.0	0.0	0.0	264.0	267.0	1.1	PASS

Relay Test Results for:
RELAY OUTPUT VERIFICATION

Relay Test Results for:
RELAY OUTPUT VERIFICATION

Verify operation of the RELAY OUTPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that OUTPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:
Verified operation of all in-use outputs.

Relay Test Results for:
RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for:
SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for:
RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for:
GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for:
CONNECTION CHANGE FOR ELEMENT TEST

OK?
RAN

Relay Test Results for:
METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	217.0	0.5	PASS
B-N	0.0	0.0	0.0	240.0	240.0	0.0	PASS
C-N	0.0	0.0	0.0	264.0	264.0	0.0	PASS

Relay Test Results for:
50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	12.522	12.400	0.98	PASS
B-N	12.398	12.400	-0.02	PASS

Relay Test Results for:
50P1P PHASE OVERCURRENT PICKUP

C-N	12.398	12.400	-0.02	PASS

Relay Test Results for:
50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	3.000	3.000	-0.00	PASS
B-N	2.970	3.000	-1.00	PASS
C-N	3.000	3.000	-0.00	PASS

Relay Test Results for:
50P3P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50P4P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50P5P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50P6P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50ABCP PHASE A OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50ABCP PHASE B OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50ABCP PHASE C OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
5.398	5.400	-0.04	PASS

Relay Test Results for:
50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:

51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		1.130	1.100	2.73	PASS
B-N		1.097	1.100	-0.27	PASS
C-N		1.086	1.100	-1.27	PASS

Relay Test Results for:

51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

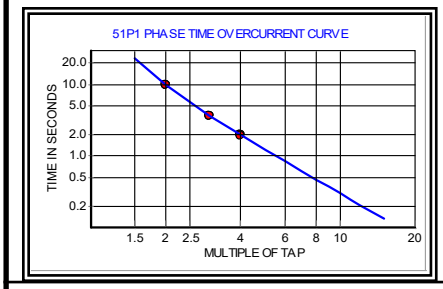
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.200	591.83	9.864	9.867	-0.03	PASS
3.00	3.300	222.28	3.705	3.700	0.13	PASS
4.00	4.400	118.51	1.975	1.973	0.09	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.200	595.70	9.928	9.867	0.63	PASS
3.00	3.300	221.92	3.699	3.700	-0.04	PASS
4.00	4.400	118.16	1.969	1.973	-0.20	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.200	589.49	9.825	9.867	-0.42	PASS
3.00	3.300	218.53	3.642	3.700	-1.56	PASS
4.00	4.400	117.47	1.958	1.973	-0.78	PASS



Relay Test Results for:

51P2P PHASE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:

51P2 PHASE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for:

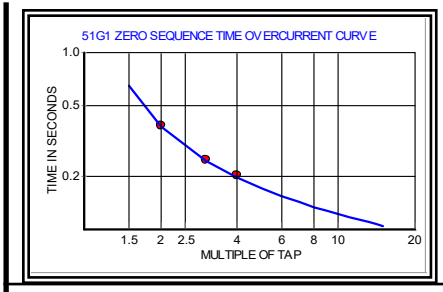
51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.475	0.500	-5.00	PASS

Relay Test Results for:

51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.000	23.20	0.387	0.384	0.75	PASS
3.00	1.500	14.87	0.248	0.245	0.99	PASS
4.00	2.000	12.12	0.202	0.196	2.92	PASS



Relay Test Results for:
51Q1P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
51Q1 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for:
51Q2P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
51Q2 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for:
NEUTRAL TEST CONNECTIONS

OK?
RAN

Relay Test Results for:
50N1P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50N2P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
51N1P NEUTRAL TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
51N1 NEUTRAL TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for:
RESTORE LOGIC SETTINGS

OK?
RAN

Relay Test Results for:
RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for:	
COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS	
	OK?
	RAN
Relay Test Results for:	
LOG OUT OF THE RELAY	
	OK?
	RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-551.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 8.2 **Test Date:** 03/02/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	GEN	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	CENTRAL ELECTRICAL BUILDING
POSITION:	52LB LOAD BANK	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	SEL-551
SERIAL_NUMBER:	1132620133	FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408
RELAY_ID:	AACI207024	CURRENT_TESTDATE:	3/2/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
CONTACT$="4"          'OUTPUT CONTACT TO MASK
SEL_AUTO=1            '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1            'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1              'NO ERROR MESSAGE IF NO OPERATION
```

Routine Notes:

Relay Settings Used for Testing:

```
RID$ = "GEN LOADBANK"
TID$ = "LOAD BANK"
CTR = 40
CTRN = 40
TDURD = 9.000
s50P1P = 5.2
s50P2P$ = "OFF"
s50P3P$ = "OFF"
s50P4P$ = "OFF"
s50P5P$ = "OFF"
s50P6P$ = "OFF"
s50ABCP$ = "OFF"
s51P1P = 2.8
s51P1C$ = "U1"
s51P1TD = 0.50
s51P1RS$ = "N"
s51P2P$ = "OFF"
s51P2C$ = "U3"
s51P2TD = 15.00
s51P2RS$ = "N"
s50N1P$ = "OFF"
s50N2P$ = "OFF"
s51N1P$ = "OFF"
s51N1C$ = "U4"
s51N1TD = 3.00
s51N1RS$ = "N"
s50G1P = 12.5
s50G2P$ = "OFF"
s51G1P = 1.5
s51G1C$ = "U1"
s51G1TD = 1.49
```

```
s51G1RS$ = "N"
s50Q1P$ = "OFF"
s50Q2P$ = "OFF"
s51Q1P$ = "OFF"
s51Q1C$ = "U3"
s51Q1TD = 15.00
s51Q1RS$ = "N"
s51Q2P$ = "OFF"
s51Q2C$ = "U3"
s51Q2TD = 15.00
s51Q2RS$ = "N"
s79OI1 = 0.000
s79OI2 = 600.000
s79OI3 = 0.000
s79OI4 = 0.000
s79RSD = 1800.000
s79RSLD = 300.000
CFD = 60.000
DMTC = 5
PDEMP = 5.00
NDEMP = 1.50
GDEMP = 1.50
QDEMP = 1.50
SV5PU = 0.000
SV5DO = 0.000
SV6PU = 0.000
SV6DO = 0.000
SV7PU = 0.000
SV7DO = 0.000
SV8PU = 0.000
SV8DO = 0.000
SV9PU = 0.000
SV9DO = 0.000
SV10PU = 0.000
SV10DO = 0.000
SV11PU = 0.000
SV11DO = 0.000
SV12PU = 0.000
SV12DO = 0.000
SV13PU = 0.000
SV13DO = 0.000
SV14PU = 0.000
SV14DO = 0.000
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
TR$ = "51P1T + 51G1T + 50P1 + 50G1"
ULTR$ = "!(51P1 + 51G1)"
s51P1TC = 1
s51P2TC = 1
s51N1TC = 1
s51G1TC = 1
s51Q1TC = 1
s51Q2TC = 1
s52A$ = "IN1"
CL$ = "LB4"
ULCL$ = "TRIP"
s79RI$ = "TRIP"
s79RIS$ = "IN1"
s79DTL$ = "!LB1 + LB3"
s79DLS$ = "79LO"
s79SKP$ = "50P2 * SH0"
s79STL$ = "TRIP"
```

```
s79BRS$ = "(51P1 + 51G1) * (79RS + 79CY)"
s79SEQ = 0
ER1$ = "51P1 + 51G1 + 51N1"
ER2 = 0
SV1 = 0
SV2 = 0
SV3 = 0
SV4 = 0
SV5 = 0
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
OUT1$ = "TRIP"
OUT2 = 0
OUT3 = 0
OUT4 = 0
DP1$ = "IN1"
DP2 = 0
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
```

Relay Test Results for: ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for: LOG INTO THE RELAY

OK?
RAN

Relay Test Results for: DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for: SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

Relay Test Results for: RELAY STATUS CHECK

N/A

Additional Data:
STA

GEN LOADBANK Date: 03/02/20 Time: 11:27:01.350
LOAD BANK

FID=SEL-551-R514-Vf-Z002002-D20110408 CID=CCFD

SELF TESTS

W=Warn F=Fail

	IA	IB	IC	IN	MOF
OS	3	3	3	3	0

	+5V_PS	+5V_REG	-5V_REG	+10V_PS	-10V_PS	VBAT
PS	4.99	5.01	-4.98	9.97	-10.02	3.44

TEMP	RAM	ROM	CR_RAM	EEPROM
32.8	OK	OK	OK	OK

Relay Enabled

=>>

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR ELEMENT TEST

OK?
RAN

Relay Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	72.0	72.0	0.0	PASS
B-N	0.0	0.0	0.0	80.0	79.0	-1.2	PASS
C-N	0.0	0.0	0.0	88.0	87.0	-1.1	PASS

Relay Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		5.204	5.200	0.08	PASS
B-N		5.204	5.200	0.08	PASS
C-N		5.204	5.200	0.08	PASS

Relay Test Results for: 50P2P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P3P PHASE OVERCURRENT PICKUP

Relay Test Results for: 50P3P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P4P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P5P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P6P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE A OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE B OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE C OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	12.505	12.500	0.04	PASS

Relay Test Results for: 50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		2.824	2.800	0.86	PASS
B-N		2.796	2.800	-0.14	PASS
C-N		2.824	2.800	0.86	PASS

Relay Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

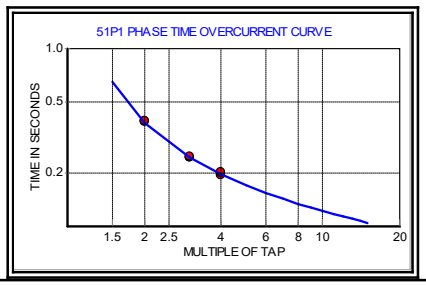
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	5.600	23.53	0.392	0.384	2.16	PASS
3.00	8.400	14.75	0.246	0.245	0.17	PASS
4.00	11.200	11.69	0.195	0.196	-0.69	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	5.600	23.38	0.390	0.384	1.51	PASS
3.00	8.400	14.74	0.246	0.245	0.09	PASS
4.00	11.200	11.92	0.199	0.196	1.24	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	5.600	23.41	0.390	0.384	1.67	PASS
3.00	8.400	14.90	0.248	0.245	1.19	PASS
4.00	11.200	12.07	0.201	0.196	2.46	PASS



Relay Test Results for: 51P2P PHASE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P2 PHASE TIME OVERCURRENT CURVE

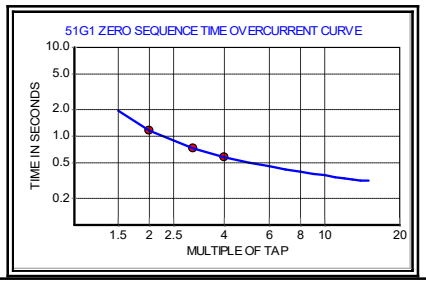
OK?
RAN

Relay Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	1.535	1.500	2.33	PASS

Relay Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	3.000	68.59	1.143	1.144	-0.06	PASS
3.00	4.500	43.80	0.730	0.731	-0.17	PASS
4.00	6.000	35.14	0.586	0.585	0.13	PASS



Relay Test Results for: 51Q1P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q1 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51Q2P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q2 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: NEUTRAL TEST CONNECTIONS

OK?
RAN

Relay Test Results for: 50N1P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N2P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1P NEUTRAL TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1 NEUTRAL TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: RESTORE LOGIC SETTINGS

OK?
RAN

Relay Test Results for: RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

```
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE
```

Relay Test Results for: LOG OUT OF THE RELAY

OK?
RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-351.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 8.4 **Test Date:** 05/12/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	13.2 KV	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	CENTRAL ELECTRICAL BUILDING
POSITION:	52M1 BUS 1 MAIN	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-351	MODEL_STYLE:	035176A3A54XX1
IEEE_DEVICE:	MF	IL_IB:	SEL-351
SERIAL_NUMBER:	1123350225	FIRMWARE:	SEL-351-7-R512-V0-Z104104-D20120830
RELAY_ID:	MAIN1	CURRENT_TESTDATE:	5/12/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
SET_GROUP$="1"       'SET GROUP TO TEST
CONTACT$="107"       'OUTPUT CONTACT TO MASK
SEL_AUTO=1           '0=MANUAL, 1=AUTO MASK, 2=MANUAL W/MESSAGES
SKIP_TST=1           'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1             'NO ERROR MESSAGE IF NO OPERATION
DIR_TEST_VOLTS=30    'TEST VOLTAGE FOR DIRECTIONAL ELEMENTS
NORM_VOLTS=67        'NORM VOLTAGE
NORM_FREQ=60         'NORMAL VOLTAGE FREQUENCY
ZONE_TEST_AMPS=3   'TEST CURRENT FOR LOAD ENCHROACHMENT TESTS
```

Routine Notes:

```
»Tue May 12, 2020
JOB # AACI207024
```

Relay Settings Used for Testing:

```
RID$ = "UTILITY MAIN BUS 1"
TID$ = "52M1"
CTR = 120
CTRN = 120
PTR = 110.00
PTRS = 110.00
VNOM = 69.29
Z1MAG = 2.14
Z1ANG = 68.86
Z0MAG = 6.38
Z0ANG = 72.47
LL = 4.84
E50P = 1
E50N$ = "N"
E50G = 1
E50Q$ = "N"
E51P = 1
E51N$ = "N"
E51G = 1
E51Q$ = "N"
E50BF$ = "N"
EHBL2$ = "N"
E32$ = "N"
ELOAD$ = "N"
ESOTF$ = "N"
EVOLT$ = "Y"
E25$ = "Y"
```

```
EFLOC$ = "Y"
ELOP$ = "N"
ECOMM$ = "N"
E81 = 4
E81R$ = "N"
E79$ = "N"
ESV = 10
EDEM$ = "THM"
EPWR = 4
ESSI$ = "N"
s50P1P = 100.00
s67P1D = 0.00
s50PP1P$ = "OFF"
s50G1P = 16.710
s67G1D = 12.00
s51PP = 2.45
s51PC$ = "C3"
s51PTD = 0.52
s51PRS$ = "N"
s51GP = 0.70
s51GC$ = "U1"
s51GTD = 1.57
s51GRS$ = "N"
s27P1P = 62.00
s27P2P$ = "OFF"
s59P1P = 76.00
s59P2P$ = "OFF"
s59N1P$ = "OFF"
s59N2P$ = "OFF"
s59QP = 5.54
s59V1P$ = "OFF"
s27SP = 10.00
s59S1P = 55.00
s59S2P$ = "OFF"
s27PP$ = "OFF"
s59PP$ = "OFF"
s25VLO = 62.00
s25VHI = 76.00
s25RCF = 1.00
s25SF = 0.050
s25ANG1 = 15
s25ANG2 = 15
SYNCP$ = "VA"
TCLOSD = 3.00
s27B81P = 40.00
s81D1P = 59.00
s81D1D = 180.00
s81D2P = 61.00
s81D2D = 180.00
s81D3P = 59.50
s81D3D = 6.00
s81D4P = 60.50
s81D4D = 6.00
DMTC = 5
PDEMP = 5.00
NDEMP = 1.500
GDEMP = 1.50
QDEMP = 1.50
TDURD = 9.00
CFD = 60.00
s3POD = 1.50
s50LP = 0.25
SV1PU = 180.00
```

```
SV1DO = 0.00
SV2PU = 0.00
SV2DO = 0.00
SV3PU = 180.00
SV3DO = 0.00
SV4PU = 0.00
SV4DO = 0.00
SV5PU = 0.00
SV5DO = 0.00
SV6PU = 6.00
SV6DO = 0.00
SV7PU = 6.00
SV7DO = 0.00
SV8PU = 0.00
SV8DO = 0.00
SV9PU = 480.00
SV9DO = 0.00
SV10PU = 0.00
SV10DO = 0.00
PWR1P = 7.50
PWR1T$ = "-WATTS"
PWR1D = 600.00
PWR2P$ = "OFF"
PWR2T$ = "+WATTS"
PWR2D = 0.00
PWR3P$ = "OFF"
PWR3T$ = "+VARS"
PWR3D = 0.00
PWR4P$ = "OFF"
PWR4T$ = "-VARS"
PWR4D = 0.00
TR$ = "51PT + 51GT + 50P1 + SV8T + 67G1T + 67P1T + 50G1 "
TRQUAL = 0
TRCOMM = 0
TRSOTF = 0
DTT = 0
ULTR$ = "!(51P + 51G)"
PT1 = 0
LOG1 = 0
PT2 = 0
LOG2 = 0
BT = 0
s52A$ = "IN101"
CL$ = "CC + LB4"
ULCL$ = "TRIP"
s79RI$ = "TRIP"
s79RIS$ = "52A + 79CY"
s79DTL$ = "OC + !IN102 + LB3"
s79DLS$ = "79LO"
s79SKP = 0
s79STL$ = "TRIP"
s79BRS = 0
s79SEQ = 0
s79CLS = 1
SET1$ = "OUT101 * SV8T"
RST1$ = "TRGTR * !OUT101"
SET2$ = "OUT102 * 81D4T"
RST2$ = "TRGTR * !OUT102"
SET3$ = "OUT102 * 81D3T"
RST3$ = "TRGTR * !OUT102"
SET4$ = "OUT102 * SV6T"
RST4$ = "TRGTR * !OUT102"
SET5$ = "OUT102 * SV7T"
```

```
RST5$ = "TRGTR * !OUT102"
SET6 = 0
RST6 = 0
SET7 = 0
RST7 = 0
SET8 = 0
RST8 = 0
SET9 = 0
RST9 = 0
SET10 = 0
RST10 = 0
SET11 = 0
RST11 = 0
SET12 = 0
RST12 = 0
SET13 = 0
RST13 = 0
SET14 = 0
RST14 = 0
SET15 = 0
RST15 = 0
SET16 = 0
RST16 = 0
s67P1TC = 1
s67P2TC = 1
s67P3TC = 1
s67P4TC = 1
s67N1TC = 1
s67N2TC = 1
s67N3TC = 1
s67N4TC = 1
s67G1TC = 1
s67G2TC = 1
s67G3TC = 1
s67G4TC = 1
s67Q1TC = 1
s67Q2TC = 1
s67Q3TC = 1
s67Q4TC = 1
s51ATC = 1
s51BTC = 1
s51CTC = 1
s51PTC = 1
s51NTC = 1
s51GTC = 1
s51G2TC = 1
s51QTC = 1
HBL2TC = 1
s81RTC$ = "!27B81"
BFI = 0
BFTR = 0
BFULTR = 0
LV1 = 0
LV2 = 0
LV3 = 0
LV4 = 0
LV5 = 0
LV6 = 0
LV7 = 0
LV8 = 0
LV9 = 0
LV10 = 0
LV11 = 0
```

```
LV12 = 0
LV13 = 0
LV14 = 0
LV15 = 0
LV16 = 0
LV17 = 0
LV18 = 0
LV19 = 0
LV20 = 0
LV21 = 0
LV22 = 0
LV23 = 0
LV24 = 0
LV25 = 0
LV26 = 0
LV27 = 0
LV28 = 0
LV29 = 0
LV30 = 0
LV31 = 0
LV32 = 0
SV1$ = "59A1 + 59B1 + 59C1"
SV2$ = "27A1 * 27B1 * 27C1"
SV3$ = "27A1 + 27B1 + 27C1"
SV4$ = "50A1 + 50B1 + 50C1"
SV5$ = "25A1 + 27S * !SV1 * !SV3"
SV6$ = "27A1 + 27B1 + 27C1"
SV7$ = "59A1 + 59B1 + 59C1"
SV8$ = "(PWRA1 + PWRB1 + PWRC1) * !IN104"
SV9$ = "59Q"
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
SV15 = 0
SV16 = 0
OUT101$ = "TRIP"
OUT102$ = "(SV6T + SV7T + 81D3T + 81D4T) * IN103"
OUT103$ = "SV1T + SV3T + 81D1T + 81D2T + SV9T"
OUT104$ = "SV5T"
OUT105$ = "SV5T"
OUT106 = 0
OUT107 = 0
ALRMOUT$ = "!(SALARM + HALARM)"
DP1$ = "IN101"
DP2$ = "SV1T + SV3T + 81D1 + 81D2 + SV9T"
DP3$ = "LT1"
DP4$ = "LT2"
DP5$ = "LT3"
DP6$ = "LT4"
DP7$ = "LT5"
DP8 = 0
DP9 = 0
DP10 = 0
DP11 = 0
DP12 = 0
DP13 = 0
DP14 = 0
DP15 = 0
DP16 = 0
SS1 = 1
SS2 = 0
```

```
SS3 = 0
SS4 = 0
SS5 = 0
SS6 = 0
ER$ = "51P + 51G"
FAULT$ = "51P + 51G"
BSYNCH$ = "52A"
CLMON = 0
BKMON$ = "TRIP"
BKCLS$ = "CLOSE"
E32IV = 1
LOPBLK = 0
SALARM$ = "BADPASS + CHGPASS + SETCHG + GRPSW + ACCESSP + PASNVAL "
RSTTRGT = 0
RST_DEM = 0
RST_PDM = 0
RST_BK = 0
RST_HIS = 0
RST_ENE = 0
RST_MML = 0
RST_HAL = 0
RSTDNPE = 0
PMTRIG = 0
TREA1 = 0
TREA2 = 0
TREA3 = 0
TREA4 = 0
TMB1A = 0
TMB2A = 0
TMB3A = 0
TMB4A = 0
TMB5A = 0
TMB6A = 0
TMB7A = 0
TMB8A = 0
TMB1B = 0
TMB2B = 0
TMB3B = 0
TMB4B = 0
TMB5B = 0
TMB6B = 0
TMB7B = 0
TMB8B = 0
PTCONN$ = "WYE"
VSCONN$ = "VS"
TGR = 0.00
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
FP_TO = 15
SCROLD = 2
FPNGD$ = "IG"
METHRES$ = "Y"
LER = 15
PRE = 4
FLTDISP$ = "MAX"
DCLOP$ = "OFF"
DCHIP$ = "OFF"
IN101D = 0.50
IN102D = 0.50
IN103D = 0.50
IN104D = 0.50
IN105D = 0.50
```

```
IN106D = 0.50
EBMON$ = "Y"
COSP1 = 10000
COSP2 = 150
COSP3 = 12
KASP1 = 1.20
KASP2 = 8.00
KASP3 = 20.00
ESTRT = 50
ESCLT = 120
MSTRT = 50
MSCLT = 120
EPMU$ = "N"
EVELOCK = 0
DNPSRC$ = "UTC"
BOOPTCC$ = "SET"
BOOPPUL$ = "SET"
IRIGC$ = "NONE"
UTC_OFF = 0.00
DST_BEGM$ = "NA"
P2_EPORT$ = "Y"
P2_PROTO$ = "SEL"
P2_MAXACC = 2
P2_SPEED = 2400
P2_BITS = 8
P2_PARITY$ = "N"
P2_STOP = 1
P2_RTSCTS$ = "N"
P2_T_OUT = 15
P2_AUTO$ = "N"
P2_FASTOP$ = "N"
P3_EPORT$ = "Y"
P3_PROTO$ = "SEL"
P3_MAXACC = 2
P3_SPEED = 2400
P3_BITS = 8
P3_PARITY$ = "N"
P3_STOP = 1
P3_RTSCTS$ = "N"
P3_T_OUT = 15
P3_AUTO$ = "N"
P3_FASTOP$ = "N"
PF_EPORT$ = "Y"
PF_PROTO$ = "SEL"
PF_MAXACC$ = "C"
PF_SPEED = 19200
PF_BITS = 8
PF_PARITY$ = "N"
PF_STOP = 1
PF_RTSCTS$ = "N"
PF_T_OUT = 15
PF_AUTO$ = "N"
PF_FASTOP$ = "N"
```

Relay Test Results for: ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for: LOG INTO THE RELAY

OK?
RAN

Relay Test Results for: DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for: SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

N/A

Additional Data:
STA

UTILITY MAIN BUS 1 Date: 05/12/20 Time: 08:17:36.972
52M1

FID=SEL-351-7-R512-V0-Z104104-D20120830 CID=7CF9

SELF TESTS

W=Warn F=Fail

	IA	IB	IC	IN	VA	VB	VC	VS	MOF
OS	-2	-2	-2	-2	-2	-2	-2	-2	-2
OSH	-0	-0	-0	0					

	15V_PS	5V_REG	3.3V_REG
PS	14.93	4.96	3.30

RAM	ROM	FPGA	EEPROM	FLASH	A/D	USB_BRD	COM_BRD	IO_BRD
OK	OK	OK	OK	OK	OK	NA	NA	NA

TEMP	RTC	HMI
30.6	OK	OK

Relay Enabled

=>>

Relay Test Results for: RELAY INPUT VERIFICATION

Verify operation of the RELAY INPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that INPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Relay Test Results for: RELAY OUTPUT VERIFICATION

Relay Test Results for: RELAY OUTPUT VERIFICATION

Verify operation of the RELAY OUTPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that OUTPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: SEL 351 SPECIFIC TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: MODIFY RELAY SETTINGS

OK?
RAN

Relay Test Results for: POTENTIAL TESTING ISSUES CHECK

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR ELEMENT TESTS

OK?
RAN

Relay Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
67.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	7.2	7.1	-0.0	216.0	215.8	-0.1	PASS
B-N	7.4	7.4	0.0	240.0	239.7	-0.1	PASS
C-N	7.6	7.6	-0.1	264.0	263.4	-0.2	PASS

CALCULATED MEGA WATT	MEASURED MEGA WATT	% ERROR	CALCULATED MEGA VAR	MEASURED MEGA VAR	% ERROR	OK?
4.6	4.6	-0.1	2.7	2.6	-0.4	PASS

Relay Test Results for: ZLF FORWARD LOAD IMPEDANCE

OK?
RAN

Relay Test Results for: ZLF FORWARD LOAD ANGLE

Relay Test Results for: ZLF FORWARD LOAD ANGLE

OK?
RAN

Relay Test Results for: ZLR REVERSE LOAD IMPEDANCE

OK?
RAN

Relay Test Results for: ZLR REVERSE LOAD ANGLE

OK?
RAN

Relay Test Results for: 27P1P PHASE UNDERVOLTAGE PICKUP

PICKUP	VOLTS	IDEAL	%ERROR	OK?
	61.380	62.000	-1.00	PASS

Relay Test Results for: 27P1P THREE PHASE UNDERVOLTAGE PICKUP

PICKUP	VOLTS	IDEAL	%ERROR	OK?
	61.380	62.000	-1.00	PASS

Relay Test Results for: 27P2P PHASE UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 27PP PHASE TO PHASE UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 27PP2P PHASE TO PHASE UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 50QFP FORWARD DIRECTIONAL NEGATIVE SEQUENCE OVERCURRENT PI

OK?
RAN

Relay Test Results for: Z2F FORWARD DIRECTIONAL NEGATIVE SEQUENCE IMPEDANCE

OK?
RAN

Relay Test Results for: 50QRP REVERSE DIRECTIONAL NEGATIVE SEQUENCE OVERCURRENT PI

OK?
RAN

Relay Test Results for: Z2R REVERSE DIRECTIONAL NEGATIVE SEQUENCE IMPEDANCE

OK?
RAN

Relay Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		99.990	100.000	-0.01	PASS
B-N		99.990	100.000	-0.01	PASS
C-N		99.990	100.000	-0.01	PASS

Relay Test Results for: 50P2P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P3P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P4P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P5P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P6P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 67P1D PHASE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67P2D PHASE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67P3D PHASE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67P4D PHASE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 50PP1P PHASE TO PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50PP2P PHASE TO PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50PP3P PHASE TO PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50PP4P PHASE TO PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	16.710	16.710	-0.00	PASS

Relay Test Results for: 50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G3P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G4P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G5P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G6P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 67G1D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(SEC)	TIME(CY)	RANGE	OK?
1.20	20.052	0.226	13.56	9.90 TO 14.10	PASS

Relay Test Results for: 67G2D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67G3D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67G4D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

Relay Test Results for: 50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q3P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q4P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q5P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q6P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 67Q1D NEGATIVE SEQUENCE DIRECTIONAL OVERCURRENT TIME DELA

OK?
RAN

Relay Test Results for: 67Q2D NEGATIVE SEQUENCE DIRECTIONAL OVERCURRENT TIME DELA

OK?
RAN

Relay Test Results for: 67Q3D NEGATIVE SEQUENCE DIRECTIONAL OVERCURRENT TIME DELA

OK?
RAN

Relay Test Results for: 67Q4D NEGATIVE SEQUENCE DIRECTIONAL OVERCURRENT TIME DELA

OK?
RAN

Relay Test Results for: 51PP PHASE TO PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		2.452	2.450	0.06	PASS
B-N		2.476	2.450	1.06	PASS
C-N		2.452	2.450	0.06	PASS

Relay Test Results for: 51P PHASE TIME OVERCURRENT CURVE

51P PHASE TIME OVERCURRENT CURVE (PHASE A-N)

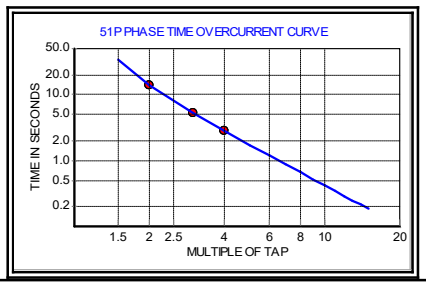
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.900	834.39	13.906	13.867	0.29	PASS
3.00	7.350	313.27	5.221	5.200	0.41	PASS
4.00	9.800	167.26	2.788	2.773	0.52	PASS

51P PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.900	832.66	13.878	13.867	0.08	PASS
3.00	7.350	311.88	5.198	5.200	-0.04	PASS
4.00	9.800	166.52	2.775	2.773	0.07	PASS

51P PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.900	835.60	13.927	13.867	0.43	PASS
3.00	7.350	313.23	5.220	5.200	0.39	PASS
4.00	9.800	167.04	2.784	2.773	0.38	PASS



Relay Test Results for: 51AP PHASE A TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51A PHASE A TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51BP PHASE B TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51B PHASE B TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51CP PHASE C TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51C PHASE C TIME OVERCURRENT CURVE

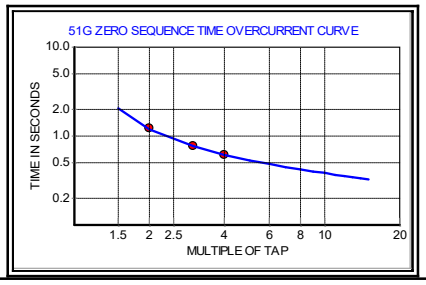
OK?
RAN

Relay Test Results for: 51GP ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.699	0.700	-0.14	PASS

Relay Test Results for: 51G ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.400	72.97	1.216	1.205	0.91	PASS
3.00	2.100	46.33	0.772	0.770	0.21	PASS
4.00	2.800	37.11	0.618	0.616	0.36	PASS



Relay Test Results for: 51G2P ZERO SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51G2 ZERO SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51QP NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 59P1P PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.000	76.000	0.00	PASS

Relay Test Results for: 59P1P THREE PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.760	76.000	1.00	PASS

Relay Test Results for: 59P2P PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59PP PHASE TO PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59PP2P PHASE TO PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59N1P ZERO SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59N2P ZERO SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59QP NEGATIVE SEQUENCE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
5.593	5.540	0.96	PASS

Relay Test Results for: 59Q2P NEGATIVE SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59V1P POSITIVE SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 27B81P UNDERVOLTAGE FRQEUENCY BLOCK

PICKUP VOLTS	IDEAL	%ERROR	OK?
40.000	40.000	0.00	PASS

Relay Test Results for: 81D1P FRQEUENCY PICKUP

PICKUP HZ	IDEAL	RANGE	OK?
59.000	59.000	58.950 TO 59.050	PASS

Relay Test Results for: 81D1D FRQEUENCY TIME DELAY

APPLIED VALUE	TIME(SEC)	TIME(CY)	RANGE	OK?
58.800	3.122	183.55	180.00 TO 184.50	PASS

Relay Test Results for: 81D2P FRQEUENCY PICKUP

PICKUP HZ	IDEAL	RANGE	OK?
61.000	61.000	60.950 TO 61.050	PASS

Relay Test Results for: 81D2D FRQEUENCY TIME DELAY

APPLIED VALUE	TIME(SEC)	TIME(CY)	RANGE	OK?
61.200	2.996	183.37	180.00 TO 184.50	PASS

Relay Test Results for: 81D3P FRQEUENCY PICKUP

PICKUP HZ	IDEAL	RANGE	OK?
59.500	59.500	59.450 TO 59.550	PASS

Relay Test Results for: 81D3D FRQEUENCY TIME DELAY

APPLIED VALUE	TIME(SEC)	TIME(CY)	RANGE	OK?
59.300	0.148	8.79	6.00 TO 10.50	PASS

Relay Test Results for: 81D4P FRQEUENCY PICKUP

PICKUP HZ	IDEAL	RANGE	OK?
60.500	60.500	60.450 TO 60.550	PASS

Relay Test Results for: 81D4D FRQEUENCY TIME DELAY

Relay Test Results for: 81D4D FRQEUENCY TIME DELAY

APPLIED VALUE	TIME(SEC)	TIME(CY)	RANGE	OK?
60.700	0.151	9.18	6.00 TO 10.50	PASS

Relay Test Results for: 81D5P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for: 81D5D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for: 81D6P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for: 81D6D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR NEUTRAL TESTS

OK?
RAN

Relay Test Results for: 50N1P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N2P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N3P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N4P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N5P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N6P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 67N1D NEUTRAL DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67N2D NEUTRAL DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67N3D NEUTRAL DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67N4D NEUTRAL DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 51NP NEUTRAL TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N NEUTRAL TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 25VLO SOURCE VP SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

Relay Test Results for: 25VLO SOURCE VP SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.000	62.000	-0.00	PASS

Relay Test Results for: 25VHI SOURCE VP SYNCHRONIZING PHASE HIGH VOLTAGE THRESHOLI

PICKUP VOLTS	IDEAL	%ERROR	OK?
75.240	76.000	-1.00	PASS

Relay Test Results for: <25 SYNCHRONIZING TEST CONNECTIONS>

OK?
RAN

Relay Test Results for: 27SP SYNCHRONIZING PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
10.000	10.000	0.00	PASS

Relay Test Results for: 59S1P SYNCHRONIZING PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
55.000	55.000	-0.00	PASS

Relay Test Results for: 59S2P SYNCHRONIZING PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 25VLO SOURCE VS SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.620	62.000	1.00	PASS

Relay Test Results for: 25VHI SOURCE VS SYNCHRONIZING PHASE HIGH VOLTAGE THRESHOLI

PICKUP VOLTS	IDEAL	%ERROR	OK?
75.240	76.000	-1.00	PASS

Relay Test Results for: 25ANG1 SYNCHRONIZING ANGLE 1

LAGGING ANGLE	IDEAL	RANGE	OK?
15.00	15.00	11.00 TO 19.00	PASS

LEADING ANGLE	IDEAL	RANGE	OK?
346.00	345.00	341.00 TO 349.00	PASS

Relay Test Results for: 25ANG2 SYNCHRONIZING ANGLE 2

LAGGING ANGLE	IDEAL	RANGE	OK?
15.00	15.00	11.00 TO 19.00	PASS

LEADING ANGLE	IDEAL	RANGE	OK?
346.00	345.00	341.00 TO 349.00	PASS

Relay Test Results for: 25SF SYNCHRONIZING SLIP FREQUENCY

DROPOUT HZ	IDEAL	RANGE	OK?
59.950	59.950	59.900 TO 60.000	PASS

Relay Test Results for: RESTORE RELAY SETTINGS

OK?
RAN

Relay Test Results for: RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

```
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE
```

Relay Test Results for: LOG OUT OF THE RELAY

OK?
RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-351.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 8.4 **Test Date:** 05/13/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	13.2 KV	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	CENTRAL ELECTRICAL BUILDING
POSITION:	52M2 BUS 2 MAIN	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-351	MODEL_STYLE:	035176A3A54XX1
IEEE_DEVICE:	MF	IL_IB:	SEL-351
SERIAL_NUMBER:	1123350226	FIRMWARE:	SEL-351-7-R512-V0-Z104104-D20120830
RELAY_ID:	MAIN2	CURRENT_TESTDATE:	5/13/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
SET_GROUP$="1"       'SET GROUP TO TEST
CONTACT$="107"       'OUTPUT CONTACT TO MASK
SEL_AUTO=1           '0=MANUAL, 1=AUTO MASK, 2=MANUAL W/MESSAGES
SKIP_TST=1           'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1             'NO ERROR MESSAGE IF NO OPERATION
DIR_TEST_VOLTS=30    'TEST VOLTAGE FOR DIRECTIONAL ELEMENTS
NORM_VOLTS=67        'NORM VOLTAGE
NORM_FREQ=60         'NORMAL VOLTAGE FREQUENCY
ZONE_TEST_AMPS=3   'TEST CURRENT FOR LOAD ENCHROACHMENT TESTS
```

Routine Notes:

```
»Wed May 13, 2020
JOB # AACI207024
```

Relay Settings Used for Testing:

```
RID$ = "UTILITY MAIN BUS 2"
TID$ = "52M2"
CTR = 120
CTRN = 120
PTR = 110.00
PTRS = 110.00
VNOM = 69.29
Z1MAG = 2.14
Z1ANG = 68.86
Z0MAG = 6.38
Z0ANG = 72.47
LL = 4.84
E50P = 1
E50N$ = "N"
E50G = 1
E50Q$ = "N"
E51P = 1
E51N$ = "N"
E51G = 1
E51Q$ = "N"
E50BF$ = "N"
EHBL2$ = "N"
E32$ = "N"
ELOAD$ = "N"
ESOTF$ = "N"
EVOLT$ = "Y"
E25$ = "Y"
```

```
EFLOC$ = "Y"
ELOP$ = "N"
ECOMM$ = "N"
E81 = 4
E81R$ = "N"
E79$ = "N"
ESV = 10
EDEM$ = "THM"
EPWR = 4
ESSI$ = "N"
s50P1P = 100.00
s67P1D = 0.00
s50PP1P$ = "OFF"
s50G1P = 16.710
s67G1D = 12.00
s51PP = 2.45
s51PC$ = "C3"
s51PTD = 0.52
s51PRS$ = "N"
s51GP = 0.70
s51GC$ = "U1"
s51GTD = 1.57
s51GRS$ = "N"
s27P1P = 62.00
s27P2P$ = "OFF"
s59P1P = 76.00
s59P2P$ = "OFF"
s59N1P$ = "OFF"
s59N2P$ = "OFF"
s59QP = 5.54
s59V1P$ = "OFF"
s27SP = 10.00
s59S1P = 55.00
s59S2P$ = "OFF"
s27PP$ = "OFF"
s59PP$ = "OFF"
s25VLO = 62.00
s25VHI = 76.00
s25RCF = 1.00
s25SF = 0.050
s25ANG1 = 15
s25ANG2 = 15
SYNCP$ = "VA"
TCLOSD = 3.00
s27B81P = 40.00
s81D1P = 59.00
s81D1D = 180.00
s81D2P = 61.00
s81D2D = 180.00
s81D3P = 59.50
s81D3D = 6.00
s81D4P = 60.50
s81D4D = 6.00
DMTC = 5
PDEMP = 5.00
NDEMP = 1.500
GDEMP = 1.50
QDEMP = 1.50
TDURD = 9.00
CFD = 60.00
s3POD = 1.50
s50LP = 0.25
SV1PU = 180.00
```

```
SV1DO = 0.00
SV2PU = 0.00
SV2DO = 0.00
SV3PU = 180.00
SV3DO = 0.00
SV4PU = 0.00
SV4DO = 0.00
SV5PU = 0.00
SV5DO = 0.00
SV6PU = 6.00
SV6DO = 0.00
SV7PU = 6.00
SV7DO = 0.00
SV8PU = 0.00
SV8DO = 0.00
SV9PU = 480.00
SV9DO = 0.00
SV10PU = 0.00
SV10DO = 0.00
PWR1P = 7.50
PWR1T$ = "-WATTS"
PWR1D = 600.00
PWR2P$ = "OFF"
PWR2T$ = "+WATTS"
PWR2D = 0.00
PWR3P$ = "OFF"
PWR3T$ = "+VARS"
PWR3D = 0.00
PWR4P$ = "OFF"
PWR4T$ = "-VARS"
PWR4D = 0.00
TR$ = "51PT + 51GT + 50P1 + SV8T + 67G1T + 67P1T + 50G1 "
TRQUAL = 0
TRCOMM = 0
TRSOTF = 0
DTT = 0
ULTR$ = "!(51P + 51G)"
PT1 = 0
LOG1 = 0
PT2 = 0
LOG2 = 0
BT = 0
s52A$ = "IN101"
CL$ = "CC + LB4"
ULCL$ = "TRIP"
s79RI$ = "TRIP"
s79RIS$ = "52A + 79CY"
s79DTL$ = "OC + !IN102 + LB3"
s79DLS$ = "79LO"
s79SKP = 0
s79STL$ = "TRIP"
s79BRS = 0
s79SEQ = 0
s79CLS = 1
SET1$ = "OUT101 * SV8T"
RST1$ = "TRGTR * !OUT101"
SET2$ = "OUT102 * 81D4T"
RST2$ = "TRGTR * !OUT102"
SET3$ = "OUT102 * 81D3T"
RST3$ = "TRGTR * !OUT102"
SET4$ = "OUT102 * SV6T"
RST4$ = "TRGTR * !OUT102"
SET5$ = "OUT102 * SV7T"
```

```
RST5$ = "TRGTR * !OUT102"
SET6 = 0
RST6 = 0
SET7 = 0
RST7 = 0
SET8 = 0
RST8 = 0
SET9 = 0
RST9 = 0
SET10 = 0
RST10 = 0
SET11 = 0
RST11 = 0
SET12 = 0
RST12 = 0
SET13 = 0
RST13 = 0
SET14 = 0
RST14 = 0
SET15 = 0
RST15 = 0
SET16 = 0
RST16 = 0
s67P1TC = 1
s67P2TC = 1
s67P3TC = 1
s67P4TC = 1
s67N1TC = 1
s67N2TC = 1
s67N3TC = 1
s67N4TC = 1
s67G1TC = 1
s67G2TC = 1
s67G3TC = 1
s67G4TC = 1
s67Q1TC = 1
s67Q2TC = 1
s67Q3TC = 1
s67Q4TC = 1
s51ATC = 1
s51BTC = 1
s51CTC = 1
s51PTC = 1
s51NTC = 1
s51GTC = 1
s51G2TC = 1
s51QTC = 1
HBL2TC = 1
s81RTC$ = "!27B81"
BFI = 0
BFTR = 0
BFULTR = 0
LV1 = 0
LV2 = 0
LV3 = 0
LV4 = 0
LV5 = 0
LV6 = 0
LV7 = 0
LV8 = 0
LV9 = 0
LV10 = 0
LV11 = 0
```

```
LV12 = 0
LV13 = 0
LV14 = 0
LV15 = 0
LV16 = 0
LV17 = 0
LV18 = 0
LV19 = 0
LV20 = 0
LV21 = 0
LV22 = 0
LV23 = 0
LV24 = 0
LV25 = 0
LV26 = 0
LV27 = 0
LV28 = 0
LV29 = 0
LV30 = 0
LV31 = 0
LV32 = 0
SV1$ = "59A1 + 59B1 + 59C1"
SV2$ = "27A1 * 27B1 * 27C1"
SV3$ = "27A1 + 27B1 + 27C1"
SV4$ = "50A1 + 50B1 + 50C1"
SV5$ = "25A1 + 27S * !SV1 * !SV3"
SV6$ = "27A1 + 27B1 + 27C1"
SV7$ = "59A1 + 59B1 + 59C1"
SV8$ = "(PWRA1 + PWRB1 + PWRC1) * !IN104"
SV9$ = "59Q"
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
SV15 = 0
SV16 = 0
OUT101$ = "TRIP"
OUT102$ = "(SV6T + SV7T + 81D3T + 81D4T) * IN103"
OUT103$ = "SV5T"
OUT104$ = "SV5T"
OUT105$ = "SV1T + SV3T + 81D1T + 81D2T + SV9T"
OUT106 = 0
OUT107 = 0
ALRMOUT$ = "!(SALARM + HALARM)"
DP1$ = "IN101"
DP2$ = "SV1T + SV3T + 81D1 + 81D2 + SV9T"
DP3$ = "LT1"
DP4$ = "LT2"
DP5$ = "LT3"
DP6$ = "LT4"
DP7$ = "LT5"
DP8 = 0
DP9 = 0
DP10 = 0
DP11 = 0
DP12 = 0
DP13 = 0
DP14 = 0
DP15 = 0
DP16 = 0
SS1 = 1
SS2 = 0
```

```
SS3 = 0
SS4 = 0
SS5 = 0
SS6 = 0
ER$ = "51P + 51G"
FAULT$ = "51P + 51G"
BSYNCH$ = "52A"
CLMON = 0
BKMON$ = "TRIP"
BKCLS$ = "CLOSE"
E32IV = 1
LOPBLK = 0
SALARM$ = "BADPASS + CHGPASS + SETCHG + GRPSW + ACCESSP + PASNVAL "
RSTTRGT = 0
RST_DEM = 0
RST_PDM = 0
RST_BK = 0
RST_HIS = 0
RST_ENE = 0
RST_MML = 0
RST_HAL = 0
RSTDNPE = 0
PMTRIG = 0
TREA1 = 0
TREA2 = 0
TREA3 = 0
TREA4 = 0
TMB1A = 0
TMB2A = 0
TMB3A = 0
TMB4A = 0
TMB5A = 0
TMB6A = 0
TMB7A = 0
TMB8A = 0
TMB1B = 0
TMB2B = 0
TMB3B = 0
TMB4B = 0
TMB5B = 0
TMB6B = 0
TMB7B = 0
TMB8B = 0
PTCONN$ = "WYE"
VSCONN$ = "VS"
TGR = 0.00
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
FP_TO = 15
SCROLD = 2
FPNGD$ = "IG"
METHRES$ = "Y"
LER = 15
PRE = 4
FLTDISP$ = "MAX"
DCLOP$ = "OFF"
DCHIP$ = "OFF"
IN101D = 0.50
IN102D = 0.50
IN103D = 0.50
IN104D = 0.50
IN105D = 0.50
```

```
IN106D = 0.50
EBMON$ = "Y"
COSP1 = 10000
COSP2 = 150
COSP3 = 12
KASP1 = 1.20
KASP2 = 8.00
KASP3 = 20.00
ESTRT = 50
ESCLT = 120
MSTRT = 50
MSCLT = 120
EPMU$ = "N"
EVELOCK = 0
DNPSRC$ = "UTC"
BOOPTCC$ = "SET"
BOOPPUL$ = "SET"
IRIGC$ = "NONE"
UTC_OFF = 0.00
DST_BEGM$ = "NA"
P2_EPORT$ = "Y"
P2_PROTO$ = "SEL"
P2_MAXACC = 2
P2_SPEED = 2400
P2_BITS = 8
P2_PARITY$ = "N"
P2_STOP = 1
P2_RTSCTS$ = "N"
P2_T_OUT = 15
P2_AUTO$ = "N"
P2_FASTOP$ = "N"
P3_EPORT$ = "Y"
P3_PROTO$ = "SEL"
P3_MAXACC = 2
P3_SPEED = 2400
P3_BITS = 8
P3_PARITY$ = "N"
P3_STOP = 1
P3_RTSCTS$ = "N"
P3_T_OUT = 15
P3_AUTO$ = "N"
P3_FASTOP$ = "N"
PF_EPORT$ = "Y"
PF_PROTO$ = "SEL"
PF_MAXACC$ = "C"
PF_SPEED = 19200
PF_BITS = 8
PF_PARITY$ = "N"
PF_STOP = 1
PF_RTSCTS$ = "N"
PF_T_OUT = 15
PF_AUTO$ = "N"
PF_FASTOP$ = "N"
```

Relay Test Results for: ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for: LOG INTO THE RELAY

OK?
RAN

Relay Test Results for: DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for: SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

N/A

Additional Data:
STA

UTILITY MAIN BUS 2 Date: 05/13/20 Time: 04:44:16.358
52M2

FID=SEL-351-7-R512-V0-Z104104-D20120830 CID=7CF9

SELF TESTS

W=Warn F=Fail

	IA	IB	IC	IN	VA	VB	VC	VS	MOF
OS	-3	-3	-3	-3	-3	-3	-3	-3	-3
OSH	-0	-0	-0	-0					

	15V_PS	5V_REG	3.3V_REG
PS	14.83	4.98	3.28

RAM	ROM	FPGA	EEPROM	FLASH	A/D	USB_BRD	COM_BRD	IO_BRD
OK	OK	OK	OK	OK	OK	NA	NA	NA

TEMP	RTC	HMI
34.2	OK	OK

Relay Enabled

=>>

Relay Test Results for: COMPONENT MAINTENANCE NOTES

OK?
RAN

Relay Test Results for: RELAY INPUT VERIFICATION

Verify operation of the RELAY INPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that INPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Relay Test Results for: RELAY OUTPUT VERIFICATION

Relay Test Results for: RELAY OUTPUT VERIFICATION

Verify operation of the RELAY OUTPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that OUTPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: SEL 351 SPECIFIC TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: MODIFY RELAY SETTINGS

OK?
RAN

Relay Test Results for: POTENTIAL TESTING ISSUES CHECK

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR ELEMENT TESTS

OK?
RAN

Relay Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
67.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	7.2	7.1	-0.1	216.0	215.8	-0.1	PASS
B-N	7.4	7.4	-0.0	240.0	239.5	-0.2	PASS
C-N	7.6	7.6	-0.1	264.0	263.5	-0.2	PASS

CALCULATED MEGA WATT	MEASURED MEGA WATT	% ERROR	CALCULATED MEGA VAR	MEASURED MEGA VAR	% ERROR	OK?
4.6	4.6	-0.2	2.7	2.6	-0.5	PASS

Relay Test Results for: ZLF FORWARD LOAD IMPEDANCE

OK?
RAN

Relay Test Results for: ZLF FORWARD LOAD ANGLE

Relay Test Results for: ZLF FORWARD LOAD ANGLE

OK?
RAN

Relay Test Results for: ZLR REVERSE LOAD IMPEDANCE

OK?
RAN

Relay Test Results for: ZLR REVERSE LOAD ANGLE

OK?
RAN

Relay Test Results for: 27P1P PHASE UNDERVOLTAGE PICKUP

PICKUP	VOLTS	IDEAL	%ERROR	OK?
	62.000	62.000	0.00	PASS

Relay Test Results for: 27P1P THREE PHASE UNDERVOLTAGE PICKUP

PICKUP	VOLTS	IDEAL	%ERROR	OK?
	62.000	62.000	0.00	PASS

Relay Test Results for: 27P2P PHASE UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 27PP PHASE TO PHASE UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 27PP2P PHASE TO PHASE UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 50QFP FORWARD DIRECTIONAL NEGATIVE SEQUENCE OVERCURRENT PI

OK?
RAN

Relay Test Results for: Z2F FORWARD DIRECTIONAL NEGATIVE SEQUENCE IMPEDANCE

OK?
RAN

Relay Test Results for: 50QRP REVERSE DIRECTIONAL NEGATIVE SEQUENCE OVERCURRENT PI

OK?
RAN

Relay Test Results for: Z2R REVERSE DIRECTIONAL NEGATIVE SEQUENCE IMPEDANCE

OK?
RAN

Relay Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		99.990	100.000	-0.01	PASS
B-N		99.990	100.000	-0.01	PASS
C-N		99.990	100.000	-0.01	PASS

Relay Test Results for: 50P2P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P3P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P4P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P5P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P6P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 67P1D PHASE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67P2D PHASE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67P3D PHASE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67P4D PHASE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 50PP1P PHASE TO PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50PP2P PHASE TO PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50PP3P PHASE TO PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50PP4P PHASE TO PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	16.710	16.710	-0.00	PASS

Relay Test Results for: 50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G3P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G4P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G5P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G6P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 67G1D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(SEC)	TIME(CY)	RANGE	OK?
1.20	20.052	0.224	13.41	9.90 TO 14.10	PASS

Relay Test Results for: 67G2D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67G3D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67G4D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

Relay Test Results for: 50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q3P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q4P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q5P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q6P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 67Q1D NEGATIVE SEQUENCE DIRECTIONAL OVERCURRENT TIME DELA

OK?
RAN

Relay Test Results for: 67Q2D NEGATIVE SEQUENCE DIRECTIONAL OVERCURRENT TIME DELA

OK?
RAN

Relay Test Results for: 67Q3D NEGATIVE SEQUENCE DIRECTIONAL OVERCURRENT TIME DELA

OK?
RAN

Relay Test Results for: 67Q4D NEGATIVE SEQUENCE DIRECTIONAL OVERCURRENT TIME DELA

OK?
RAN

Relay Test Results for: 51PP PHASE TO PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		2.452	2.450	0.06	PASS
B-N		2.476	2.450	1.06	PASS
C-N		2.452	2.450	0.06	PASS

Relay Test Results for: 51P PHASE TIME OVERCURRENT CURVE

51P PHASE TIME OVERCURRENT CURVE (PHASE A-N)

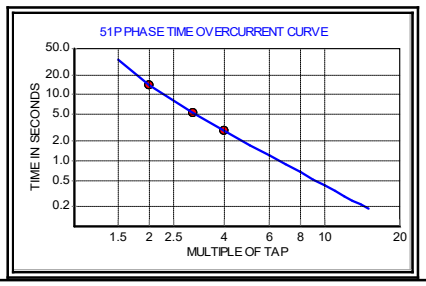
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.900	835.12	13.919	13.867	0.38	PASS
3.00	7.350	313.13	5.219	5.200	0.36	PASS
4.00	9.800	167.24	2.787	2.773	0.51	PASS

51P PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.900	833.96	13.899	13.867	0.24	PASS
3.00	7.350	312.74	5.212	5.200	0.24	PASS
4.00	9.800	166.94	2.782	2.773	0.32	PASS

51P PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.900	835.02	13.917	13.867	0.36	PASS
3.00	7.350	313.04	5.217	5.200	0.33	PASS
4.00	9.800	167.68	2.795	2.773	0.77	PASS



Relay Test Results for: 51AP PHASE A TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51A PHASE A TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51BP PHASE B TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51B PHASE B TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51CP PHASE C TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51C PHASE C TIME OVERCURRENT CURVE

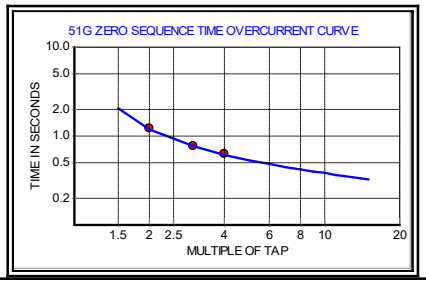
OK?
RAN

Relay Test Results for: 51GP ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.699	0.700	-0.14	PASS

Relay Test Results for: 51G ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.400	72.88	1.215	1.205	0.78	PASS
3.00	2.100	46.04	0.767	0.770	-0.40	PASS
4.00	2.800	37.63	0.627	0.616	1.76	PASS



Relay Test Results for: 51G2P ZERO SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51G2 ZERO SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51QP NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 59P1P PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.000	76.000	0.00	PASS

Relay Test Results for: 59P1P THREE PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.760	76.000	1.00	PASS

Relay Test Results for: 59P2P PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59PP PHASE TO PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59PP2P PHASE TO PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59N1P ZERO SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59N2P ZERO SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59QP NEGATIVE SEQUENCE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
5.538	5.540	-0.04	PASS

Relay Test Results for: 59Q2P NEGATIVE SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59V1P POSITIVE SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 27B81P UNDERVOLTAGE FRQEUENCY BLOCK

PICKUP VOLTS	IDEAL	%ERROR	OK?
40.000	40.000	0.00	PASS

Relay Test Results for: 81D1P FRQEUENCY PICKUP

PICKUP HZ	IDEAL	RANGE	OK?
59.000	59.000	58.950 TO 59.050	PASS

Relay Test Results for: 81D1D FRQEUENCY TIME DELAY

APPLIED VALUE	TIME(SEC)	TIME(CY)	RANGE	OK?
58.800	3.120	183.45	180.00 TO 184.50	PASS

Relay Test Results for: 81D2P FRQEUENCY PICKUP

PICKUP HZ	IDEAL	RANGE	OK?
61.010	61.000	60.950 TO 61.050	PASS

Relay Test Results for: 81D2D FRQEUENCY TIME DELAY

APPLIED VALUE	TIME(SEC)	TIME(CY)	RANGE	OK?
61.200	3.002	183.69	180.00 TO 184.50	PASS

Relay Test Results for: 81D3P FRQEUENCY PICKUP

PICKUP HZ	IDEAL	RANGE	OK?
59.500	59.500	59.450 TO 59.550	PASS

Relay Test Results for: 81D3D FRQEUENCY TIME DELAY

APPLIED VALUE	TIME(SEC)	TIME(CY)	RANGE	OK?
59.300	0.157	9.33	6.00 TO 10.50	PASS

Relay Test Results for: 81D4P FRQEUENCY PICKUP

PICKUP HZ	IDEAL	RANGE	OK?
60.510	60.500	60.450 TO 60.550	PASS

Relay Test Results for: 81D4D FRQEUENCY TIME DELAY

Relay Test Results for: 81D4D FRQEUENCY TIME DELAY

APPLIED VALUE	TIME(SEC)	TIME(CY)	RANGE	OK?
60.700	0.155	9.41	6.00 TO 10.50	PASS

Relay Test Results for: 81D5P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for: 81D5D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for: 81D6P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for: 81D6D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR NEUTRAL TESTS

OK?
RAN

Relay Test Results for: 50N1P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N2P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N3P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N4P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N5P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N6P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 67N1D NEUTRAL DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67N2D NEUTRAL DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67N3D NEUTRAL DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67N4D NEUTRAL DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 51NP NEUTRAL TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N NEUTRAL TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 25VLO SOURCE VP SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

Relay Test Results for: 25VLO SOURCE VP SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.620	62.000	1.00	PASS

Relay Test Results for: 25VHI SOURCE VP SYNCHRONIZING PHASE HIGH VOLTAGE THRESHOLI

PICKUP VOLTS	IDEAL	%ERROR	OK?
75.240	76.000	-1.00	PASS

Relay Test Results for: <25 SYNCHRONIZING TEST CONNECTIONS>

OK?
RAN

Relay Test Results for: 27SP SYNCHRONIZING PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
10.000	10.000	0.00	PASS

Relay Test Results for: 59S1P SYNCHRONIZING PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
55.000	55.000	-0.00	PASS

Relay Test Results for: 59S2P SYNCHRONIZING PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 25VLO SOURCE VS SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.620	62.000	1.00	PASS

Relay Test Results for: 25VHI SOURCE VS SYNCHRONIZING PHASE HIGH VOLTAGE THRESHOLI

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.000	76.000	-0.00	PASS

Relay Test Results for: 25ANG1 SYNCHRONIZING ANGLE 1

LAGGING ANGLE	IDEAL	RANGE	OK?
14.00	15.00	11.00 TO 19.00	PASS

LEADING ANGLE	IDEAL	RANGE	OK?
346.00	345.00	341.00 TO 349.00	PASS

Relay Test Results for: 25ANG2 SYNCHRONIZING ANGLE 2

LAGGING ANGLE	IDEAL	RANGE	OK?
15.00	15.00	11.00 TO 19.00	PASS

LEADING ANGLE	IDEAL	RANGE	OK?
346.00	345.00	341.00 TO 349.00	PASS

Relay Test Results for: 25SF SYNCHRONIZING SLIP FREQUENCY

DROPOUT HZ	IDEAL	RANGE	OK?
59.950	59.950	59.900 TO 60.000	PASS

Relay Test Results for: RESTORE RELAY SETTINGS

OK?
RAN

Relay Test Results for: RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

```
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE
```

Relay Test Results for: LOG OUT OF THE RELAY

OK?
RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-351A.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 8.3 **Test Date:** 05/08/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	13.2 KV	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	CENTRAL ELECTRICAL BUILDING
POSITION:	52T BUS1-BUS2 TIE BKR	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-351A	MODEL_STYLE:	0351A050X3A54X1
IEEE_DEVICE:	MF	IL_IB:	SEL-351A
SERIAL_NUMBER:	1132770402	FIRMWARE:	SEL-351A-R515-V0-Z105104-D20130620
RELAY_ID:	TIE BREAKER	CURRENT_TESTDATE:	5/8/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
SET_GROUP$="1"       'SET GROUP TO TEST
CONTACT$="107"       'OUTPUT CONTACT TO MASK
SEL_AUTO=1           '0=MANUAL, 1=AUTO MASK, 2=MANUAL W/MESSAGES
SKIP_TST=1           'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1             'NO ERROR MESSAGE IF NO OPERATION
DIR_TEST_VOLTS=30    'TEST VOLTAGE FOR DIRECTIONAL ELEMENTS
NORM_VOLTS=67        'NORM VOLTAGE
NORM_FREQ=60         'NORMAL VOLTAGE FREQUENCY
ZONE_TEST_AMPS=3   'TEST CURRENT FOR LOAD ENCHROACHMENT TESTS
```

Routine Notes:

»Fri May 08, 2020
JOB # AACI207024

Relay Settings Used for Testing:

```
RID$ = "TIE"
TID$ = "TEST SETTING"
CTR = 120
CTRN = 120
PTR = 110.00
PTRS = 110.00
VNOM = 69.29
Z1MAG = 2.14
Z1ANG = 68.86
Z0MAG = 6.38
Z0ANG = 72.47
LL = 4.84
E50P = 1
E50N$ = "N"
E50G = 1
E50Q$ = "N"
E51P = 1
E51N$ = "N"
E51G = 1
E51Q$ = "N"
EHBL2$ = "N"
E32$ = "N"
ELOAD$ = "N"
ESOTF$ = "N"
EVOLT$ = "Y"
E25$ = "Y"
EFLOC$ = "Y"
```

```
ELOP$ = "N"
E81$ = "N"
E81R$ = "N"
E79$ = "N"
ESV = 10
EDEM$ = "THM"
s50P1P = 90.00
s67P1D = 0.00
s50PP1P$ = "OFF"
s50G1P = 8.760
s67G1D = 6.00
s51PP = 2.20
s51PC$ = "C3"
s51PTD = 0.40
s51PRS$ = "N"
s51GP = 0.60
s51GC$ = "U1"
s51GTD = 0.86
s51GRS$ = "N"
s27P1P = 62.00
s27P2P$ = "OFF"
s59P1P = 76.00
s59P2P$ = "OFF"
s59N1P$ = "OFF"
s59N2P$ = "OFF"
s59QP$ = "OFF"
s59V1P$ = "OFF"
s27SP = 10.00
s59S1P = 55.00
s59S2P$ = "OFF"
s27PP$ = "OFF"
s59PP$ = "OFF"
s25VLO = 62.00
s25VHI = 76.00
s25RCF = 1.00
s25SF = 0.050
s25ANG1 = 15
s25ANG2 = 15
SYNCP$ = "VA"
TCLOSD = 3.00
DMTC = 5
PDEMP = 5.00
NDEMP = 1.500
GDEMP = 1.50
QDEMP = 1.50
TDURD = 9.00
CFD = 60.00
s3POD = 1.50
s50LP = 0.25
SV1PU = 0.00
SV1DO = 0.00
SV2PU = 0.00
SV2DO = 0.00
SV3PU = 0.00
SV3DO = 0.00
SV4PU = 0.00
SV4DO = 0.00
SV5PU = 0.00
SV5DO = 0.00
SV6PU = 0.00
SV6DO = 0.00
SV7PU = 0.00
SV7DO = 0.00
```

```
SV8PU = 0.00
SV8DO = 0.00
SV9PU = 0.00
SV9DO = 0.00
SV10PU = 0.00
SV10DO = 0.00
TR$ = "50P1 + 51PT + 51GT + 50G1 + 67G1T"
TRQUAL = 0
TRSOTF = 0
DTT = 0
ULTR$ = "!(51P + 51G)"
s52A$ = "IN101"
CL$ = "CC + LB4"
ULCL$ = "TRIP"
s79RI$ = "TRIP"
s79RIS$ = "52A + 79CY"
s79DTL$ = "OC + !IN102 + LB3"
s79DLS$ = "79LO"
s79SKP = 0
s79STL$ = "TRIP"
s79BRS = 0
s79SEQ = 0
s79CLS = 1
SET1 = 0
RST1 = 0
SET2 = 0
RST2 = 0
SET3 = 0
RST3 = 0
SET4 = 0
RST4 = 0
SET5 = 0
RST5 = 0
SET6 = 0
RST6 = 0
SET7 = 0
RST7 = 0
SET8 = 0
RST8 = 0
SET9 = 0
RST9 = 0
SET10 = 0
RST10 = 0
SET11 = 0
RST11 = 0
SET12 = 0
RST12 = 0
SET13 = 0
RST13 = 0
SET14 = 0
RST14 = 0
SET15 = 0
RST15 = 0
SET16 = 0
RST16 = 0
s67P1TC = 1
s67P2TC = 1
s67P3TC = 1
s67P4TC = 1
s67N1TC = 1
s67N2TC = 1
s67N3TC = 1
s67N4TC = 1
```

```
s67G1TC = 1
s67G2TC = 1
s67G3TC = 1
s67G4TC = 1
s67Q1TC = 1
s67Q2TC = 1
s67Q3TC = 1
s67Q4TC = 1
s51ATC = 1
s51BTC = 1
s51CTC = 1
s51PTC = 1
s51NTC = 1
s51GTC = 1
s51G2TC = 1
s51QTC = 1
HBL2TC = 1
s81RTC$ = "!27B81"
LV1 = 0
LV2 = 0
LV3 = 0
LV4 = 0
LV5 = 0
LV6 = 0
LV7 = 0
LV8 = 0
LV9 = 0
LV10 = 0
LV11 = 0
LV12 = 0
LV13 = 0
LV14 = 0
LV15 = 0
LV16 = 0
LV17 = 0
LV18 = 0
LV19 = 0
LV20 = 0
LV21 = 0
LV22 = 0
LV23 = 0
LV24 = 0
LV25 = 0
LV26 = 0
LV27 = 0
LV28 = 0
LV29 = 0
LV30 = 0
LV31 = 0
LV32 = 0
SV1$ = "IN101 * IN102 * IN103"
SV2$ = "27A1 + 27B1 + 27C1"
SV3$ = "27A1 * 27B1 * 27C1"
SV4$ = "25A1 + (27S * !SV2) + (!27S * SV2)"
SV5 = 0
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
```

```
SV14 = 0
SV15 = 0
SV16 = 0
OUT101$ = "TRIP"
OUT102 = 0
OUT103$ = "SV4T"
OUT104 = 0
OUT105 = 0
OUT106$ = "SV4T"
OUT107 = 0
ALRMOUT$ = "!(SALARM + HALARM)"
DP1$ = "IN101"
DP2 = 0
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
DP9 = 0
DP10 = 0
DP11 = 0
DP12 = 0
DP13 = 0
DP14 = 0
DP15 = 0
DP16 = 0
SS1 = 1
SS2 = 0
SS3 = 0
SS4 = 0
SS5 = 0
SS6 = 0
ER$ = "51P + 51G + 51N + 50P1 + 50G1 + 50N1"
FAULT$ = "51P + 51G"
BSYNCH$ = "52A"
CLMON = 0
BKMON$ = "TRIP"
BKCLS$ = "CLOSE"
E32IV = 1
LOPBLK = 0
SALARM$ = "BADPASS + CHGPASS + SETCHG + GRPSW + ACCESSP + PASNVAL "
RSTTRGT = 0
RST_DEM = 0
RST_PDM = 0
RST_BK = 0
RST_HIS = 0
RST_ENE = 0
RST_MML = 0
RST_HAL = 0
RSTDNPE = 0
PMTRIG = 0
TREA1 = 0
TREA2 = 0
TREA3 = 0
TREA4 = 0
PTCONN$ = "WYE"
VSCONN$ = "VS"
TGR = 0.00
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
FP_TO = 15
```

```
SCROLD = 2
FPNGD$ = "IG"
METHRES$ = "Y"
LER = 15
PRE = 4
FLTDISP$ = "MAX"
DCLOP$ = "OFF"
DCHIP$ = "OFF"
IN101D = 0.50
IN102D = 0.50
IN103D = 0.50
IN104D = 0.50
IN105D = 0.50
IN106D = 0.50
EBMON$ = "Y"
COSP1 = 10000
COSP2 = 150
COSP3 = 12
KASP1 = 1.20
KASP2 = 8.00
KASP3 = 20.00
ESTRT = 50
ESCLT = 120
MSTRT = 50
MSCLT = 120
EPMU$ = "N"
EVELOCK = 0
DNPSRC$ = "UTC"
BOOPTCC$ = "SET"
BOOPPUL$ = "SET"
IRIGC$ = "NONE"
UTC_OFF = 0.00
DST_BEGM$ = "NA"
P2_EPORT$ = "Y"
P2_PROTO$ = "SEL"
P2_MAXACC = 2
P2_SPEED = 2400
P2_BITS = 8
P2_PARITY$ = "N"
P2_STOP = 1
P2_RTSCTS$ = "N"
P2_T_OUT = 15
P2_AUTO$ = "N"
P2_FASTOP$ = "N"
P3_EPORT$ = "Y"
P3_PROTO$ = "SEL"
P3_MAXACC = 2
P3_SPEED = 2400
P3_BITS = 8
P3_PARITY$ = "N"
P3_STOP = 1
P3_RTSCTS$ = "N"
P3_T_OUT = 0
P3_AUTO$ = "N"
P3_FASTOP$ = "N"
PF_EPORT$ = "Y"
PF_PROTO$ = "SEL"
PF_MAXACC$ = "C"
PF_SPEED = 19200
PF_BITS = 8
PF_PARITY$ = "N"
PF_STOP = 1
PF_RTSCTS$ = "N"
```

```
PF_T_OUT = 15
PF_AUTO$ = "N"
PF_FASTOP$ = "N"
```

Relay Test Results for: ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for: LOG INTO THE RELAY

OK?
RAN

Relay Test Results for: DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for: SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

N/A

```
Additional Data:
STA

TIE                                Date: 05/08/20    Time: 06:24:35.690
TEST SETTING

FID=SEL-351A-R515-V0-Z105104-D20130620       CID=F6EC

SELF TESTS

W=Warn    F=Fail

      IA      IB      IC      IN      VA      VB      VC      VS      MOF
OS   -1      -1      -1      -1      -1      -1      -1      -1      -1
OSH  -0      -0      -0       0

      15V_PS  5V_REG  3.3V_REG
PS    14.90   4.94    3.28

      RAM     ROM     FPGA    EEPROM  FLASH   A/D     USB_BRD COM_BRD
      OK      OK      OK      OK      OK      OK      NA      NA

      TEMP    RTC     HMI
      31.7    OK      OK


 Relay Enabled

=>>
```

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: SEL 351A SPECIFIC TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: MODIFY RELAY SETTINGS

OK?
RAN

Relay Test Results for: POTENTIAL TESTING ISSUES CHECK

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR ELEMENT TESTS

OK?
RAN

Relay Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
67.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	7.2	7.1	-0.1	216.0	215.7	-0.2	PASS
B-N	7.4	7.4	-0.1	240.0	239.5	-0.2	PASS
C-N	7.6	7.6	-0.1	264.0	263.5	-0.2	PASS

CALCULATED MEGA WATT	MEASURED MEGA WATT	% ERROR	CALCULATED MEGA VAR	MEASURED MEGA VAR	% ERROR	OK?
4.6	4.6	-0.2	2.7	2.6	-0.5	PASS

Relay Test Results for: ZLF FORWARD LOAD IMPEDANCE

OK?
RAN

Relay Test Results for: ZLF FORWARD LOAD ANGLE

OK?
RAN

Relay Test Results for: ZLR REVERSE LOAD IMPEDANCE

OK?
RAN

Relay Test Results for: ZLR REVERSE LOAD ANGLE

OK?
RAN

Relay Test Results for: 27P1P PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.000	62.000	0.00	PASS

Relay Test Results for: 27P1P THREE PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.000	62.000	0.00	PASS

Relay Test Results for: 27P2P PHASE UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 27PP PHASE TO PHASE UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 27PP2P PHASE TO PHASE UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 50QFP FORWARD DIRECTIONAL NEGATIVE SEQUENCE OVERCURRENT P

Relay Test Results for: 50QFP FORWARD DIRECTIONAL NEGATIVE SEQUENCE OVERCURRENT P

OK?
RAN

Relay Test Results for: Z2F FORWARD DIRECTIONAL NEGATIVE SEQUENCE IMPEDANCE

OK?
RAN

Relay Test Results for: 50QRP REVERSE DIRECTIONAL NEGATIVE SEQUENCE OVERCURRENT P

OK?
RAN

Relay Test Results for: Z2R REVERSE DIRECTIONAL NEGATIVE SEQUENCE IMPEDANCE

OK?
RAN

Relay Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		90.000	90.000	0.00	PASS
B-N		90.900	90.000	1.00	PASS
C-N		89.100	90.000	-1.00	PASS

Relay Test Results for: 50P2P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P3P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P4P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P5P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P6P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 67P1D PHASE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67P2D PHASE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67P3D PHASE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67P4D PHASE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 50PP1P PHASE TO PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50PP2P PHASE TO PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50PP3P PHASE TO PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50PP4P PHASE TO PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q3P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q4P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q5P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q6P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 67Q1D NEGATIVE SEQUENCE DIRECTIONAL OVERCURRENT TIME DELA

OK?
RAN

Relay Test Results for: 67Q2D NEGATIVE SEQUENCE DIRECTIONAL OVERCURRENT TIME DELA

OK?
RAN

Relay Test Results for: 67Q3D NEGATIVE SEQUENCE DIRECTIONAL OVERCURRENT TIME DELA

OK?
RAN

Relay Test Results for: 67Q4D NEGATIVE SEQUENCE DIRECTIONAL OVERCURRENT TIME DELA

OK?
RAN

Relay Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	8.763	8.760	0.04	PASS

Relay Test Results for: 50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G3P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G4P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G5P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G6P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 67G1D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(SEC)	TIME(CY)	RANGE	OK?
1.20	10.512	0.126	7.57	4.20 TO 7.80	PASS

Relay Test Results for: 67G2D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67G3D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

Relay Test Results for: 67G3D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67G4D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 51PP PHASE TO PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		2.204	2.200	0.18	PASS
B-N		2.204	2.200	0.18	PASS
C-N		2.204	2.200	0.18	PASS

Relay Test Results for: 51P PHASE TIME OVERCURRENT CURVE

51P PHASE TIME OVERCURRENT CURVE (PHASE A-N)

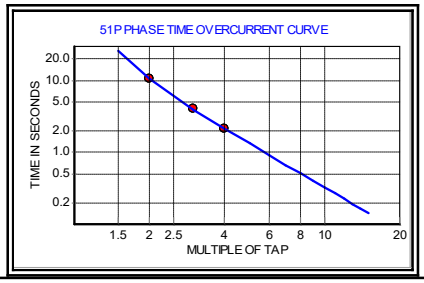
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.400	642.79	10.713	10.667	0.44	PASS
3.00	6.600	241.36	4.023	4.000	0.56	PASS
4.00	8.800	128.53	2.142	2.133	0.41	PASS

51P PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.400	642.34	10.706	10.667	0.36	PASS
3.00	6.600	240.74	4.012	4.000	0.31	PASS
4.00	8.800	128.91	2.148	2.133	0.71	PASS

51P PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.400	642.43	10.707	10.667	0.38	PASS
3.00	6.600	240.80	4.013	4.000	0.33	PASS
4.00	8.800	128.29	2.138	2.133	0.23	PASS



Relay Test Results for: 51AP PHASE A TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51A PHASE A TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51BP PHASE B TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51B PHASE B TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51CP PHASE C TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51C PHASE C TIME OVERCURRENT CURVE

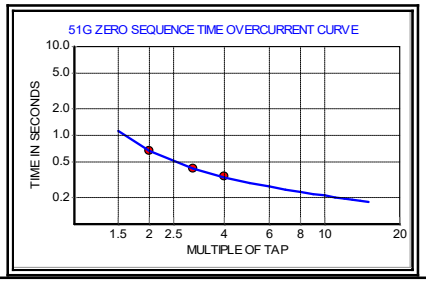
OK?
RAN

Relay Test Results for: 51GP ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.602	0.600	0.33	PASS

Relay Test Results for: 51G ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	40.40	0.673	0.660	2.01	PASS
3.00	1.800	25.41	0.424	0.422	0.35	PASS
4.00	2.400	20.57	0.343	0.338	1.55	PASS



Relay Test Results for: 51G2P ZERO SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51G2 ZERO SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51QP NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR NEUTRAL TESTS

OK?
RAN

Relay Test Results for: 50N1P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N2P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N3P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N4P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N5P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N6P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 67N1D NEUTRAL DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67N2D NEUTRAL DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67N3D NEUTRAL DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67N4D NEUTRAL DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 51NP NEUTRAL TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N NEUTRAL TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 59P1P PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.760	76.000	1.00	PASS

Relay Test Results for: 59P1P THREE PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.760	76.000	1.00	PASS

Relay Test Results for: 59P2P PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59PP PHASE TO PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59PP2P PHASE TO PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59N1P ZERO SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59N2P ZERO SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59QP NEGATIVE SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59Q2P NEGATIVE SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59V1P POSITIVE SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 27B81P UNDERVOLTAGE FRQEUENCY BLOCK

OK?
RAN

Relay Test Results for: 81D1P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for: 81D1D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for: 81D2P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for: 81D2D FRQEUENCY TIME DELAY

Relay Test Results for: 81D2D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for: 81D3P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for: 81D3D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for: 81D4P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for: 81D4D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for: 81D5P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for: 81D5D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for: 81D6P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for: 81D6D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for: 25VLO SOURCE VP SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.620	62.000	1.00	PASS

Relay Test Results for: 25VHI SOURCE VP SYNCHRONIZING PHASE HIGH VOLTAGE THRESHOLI

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.000	76.000	-0.00	PASS

Relay Test Results for: <SYNCHRONIZING TEST CONNECTIONS>

OK?
RAN

Relay Test Results for: 27SP SYNCHRONIZING PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
10.000	10.000	0.00	PASS

Relay Test Results for: 59S1P SYNCHRONIZING PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
55.000	55.000	-0.00	PASS

Relay Test Results for: 59S2P SYNCHRONIZING PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 25VLO SOURCE VS SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.620	62.000	1.00	PASS

Relay Test Results for: 25VHI SOURCE VS SYNCHRONIZING PHASE HIGH VOLTAGE THRESHOLI

PICKUP VOLTS	IDEAL	%ERROR	OK?
75.240	76.000	-1.00	PASS

Relay Test Results for: 25ANG1 SYNCHRONIZING ANGLE 1

LAGGING ANGLE	IDEAL	RANGE	OK?
15.00	15.00	11.00 TO 19.00	PASS

Relay Test Results for: 25ANG1 SYNCHRONIZING ANGLE 1

LEADING ANGLE	IDEAL	RANGE		OK?
346.00	345.00	341.00	TO 349.00	PASS

Relay Test Results for: 25ANG2 SYNCHRONIZING ANGLE 2

LAGGING ANGLE	IDEAL	RANGE		OK?
15.00	15.00	11.00	TO 19.00	PASS
LEADING ANGLE	IDEAL	RANGE		OK?
346.00	345.00	341.00	TO 349.00	PASS

Relay Test Results for: 25SF SYNCHRONIZING SLIP FREQUENCY

DROPOUT HZ	IDEAL	RANGE		OK?
59.950	59.950	59.900	TO 60.000	PASS

Relay Test Results for: RESTORE RELAY SETTINGS

OK?
RAN

Relay Test Results for: RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

```
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE
```

Relay Test Results for: LOG OUT OF THE RELAY

OK?
RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SR-469.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 2.7 **Test Date:** 02/27/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	3 - MCC-WBB-B	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	WEST BLOWER BLDG
POSITION:	PAB-W2	RELAY_MANF:	GE MULTILIN
RELAY_TYPE:	SR-469	MODEL_STYLE:	469-P5-HI-A20-T
IEEE_DEVICE:	MF	IL_IB:	SR469-RELAY
SERIAL_NUMBER:	B3041700	FIRMWARE:	30I520A8.000
RELAY_ID:	AACI207024	CURRENT_TESTDATE:	2/27/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
RELAY_ADDRESS=1                              'SPECIFIC RELAY ADDRESS USED FOR
MODBUS COMMUNICATIONS (DEFAULT=1)
TRIP_OUTPUT$="F1-E2"                         'OUTPUT CONTACT TO SENSE A TRIP
AUTO_MASK=1                                  'SET TO 2 TO DISPLAY FLEX PROGRAMMING
SKIP_TST=1                                   'SET TO 1 TO SKIP MESSAGES FOR TESTS
SKIPPED
PRINT_RAN_TESTS=1                            'MARKS TESTS IF THEY WERE ATTEMPTED
BUT NOT APPLICABLE
Phase_CT_Secondary=5                         'THIS IS THE RELAYS PHASE NOMINAL CT
INPUT
VTR=Voltage_Transformer_Ratio                'VT RATIO
CTR=Phase_CT_Primary/Phase_CT_Secondary      'CALCULATED CT RATIO
FLA=(MOTOR_Full_load_Amps)/CTR               'SECONDARY FULL LOAD CURRENT
MTR_START_MULT=0.5                           'MULT OF FULL LOAD AMPS
MTR_START_DELAY=120                          'WAIT TIME IN CYCLES FOR START
```

Routine Notes:

Relay Settings Used for Testing:

```
SR_PART_NUM$ = "469-P5-HI-A20-T"  'Information acquired from Settings file
SR_FIRMWARE$ = "5200"  'Information acquired from Settings file
Default_Message_Cycle_Time = 2.0  'Default Message Cycle Time
Default_Message_Timeout = 300  'Default Message Timeout
Average_Motor_Load_Calculation_Period = 15  'Average Motor Load Calculation
Period
Temperature_Display_Units$ = "Celsius"  'Temperature Display Units
Trace_Memory_Trigger_Position = 25  'Trace Memory Trigger Position
Trace_Memory_Buffers$ = "8 x 28 cycles"  'Trace Memory Buffers
Display_Update_Interval = 0.4  'Display Update Interval
Motor_Load_Filter_Interval = 0  'Motor Load Filter Interval
Communication_Port_Passcode = 0  'Communication Port Passcode
Passcode_write_Only_ = 0  'Passcode (write Only)
First_Scratchpad_Message$ = "PAB-W2"  'First Scratchpad Message
Second_Scratchpad_Message$ = ""  'Second Scratchpad Message
Third_Scratchpad_Message$ = ""  'Third Scratchpad Message
Fourth_Scratchpad_Message$ = ""  'Fourth Scratchpad Message
Fifth_Scratchpad_Message$ = ""  'Fifth Scratchpad Message
Phase_CT_Primary = 600  'Phase CT Primary
Motor_Full_Load_Amps = 331  'Motor Full Load Amps
Ethernet_IP_Address = 0  'Ethernet IP Address
Ethernet_Subnet_Mask = 4294966272  'Ethernet Subnet Mask
Ethernet_Gateway_Address = 0  'Ethernet Gateway Address
```

```
DeviceNet_MAC_ID = 1  'DeviceNet MAC ID
DeviceNet_Baud_Rate$ = "125 kbps"  'DeviceNet Baud Rate
Front_RS232_baud_rate$ = "19200 baud"  'Front RS232 baud rate
Slave_Address = 254  'Slave Address
Computer_RS485_Baud_Rate$ = "9600 baud"  'Computer RS485 Baud Rate
Computer_RS485_Parity$ = "None"  'Computer RS485 Parity
Auxiliary_RS485_Baud_Rate$ = "9600 baud"  'Auxiliary RS485 Baud Rate
Auxiliary_RS485_Parity$ = "None"  'Auxiliary RS485 Parity
Ground_CT_Type$ = "Multlin CT 50/0.025"  'Ground CT Type
Phase_Differential_CT_Type$ = "None"  'Phase Differential CT Type
Enable_Two_Speed_Motor_Option$ = "Off/No"  'Enable Two Speed Motor Option
Speed_Two_Phase_CT_Primary = 100  'Speed Two Phase CT Primary
Speed_Two_Motor_Full_Load_Amps = 1  'Speed Two Motor Full Load Amps
VoltageTransformer_Connection_Type$ = "Open Delta"  'VoltageTransformer
Connection Type
Enable_Single_VT_Connection$ = "Off"  'Enable Single VT Connection
Voltage_Transformer_Ratio = 4.00  'Voltage Transformer Ratio
Motor_Nameplate_Voltage = 460  'Motor Nameplate Voltage
Nominal_System_Frequency$ = "60 Hz"  'Nominal System Frequency
System_Phase_Sequence$ = "ABC"  'System Phase Sequence
Serial_Communication_Control$ = "Off/No"  'Serial Communication Control
Assign_Start_Control_Relays$ = "Auxiliary 2"  'Assign Start Control Relays
Reduced_Voltage_Starting$ = "Off/No"  'Reduced Voltage Starting
Control_Relays_for_Reduced_Voltage_Starting$ = "Auxiliary 3"  'Control Relays
for Reduced Voltage Starting
Transition_On$ = "Current Only"  'Transition On
Reduced_Voltage_Start_Level = 100  'Reduced Voltage Start Level
Reduced_Voltage_Start_Timer = 200  'Reduced Voltage Start Timer
Incomplete_Sequence_Trip_Relays$ = "Trip"  'Incomplete Sequence Trip Relays
Starter_Status_Switch$ = "Start Aux a"  'Starter Status Switch
Assignable_Input_1_Function$ = "Off"  'Assignable Input 1 Function
Counter_Alarm_Events$ = "Off/No"  'Counter Alarm Events
Rated_Speed = 3600  'Rated Speed
Tachometer_Alarm$ = "Off"  'Tachometer Alarm
Tachometer_Alarm_Relays$ = "Alarm"  'Tachometer Alarm Relays
Tachometer_Alarm_Speed = 10  'Tachometer Alarm Speed
Tachometer_Alarm_Delay = 1  'Tachometer Alarm Delay
Tachometer_Alarm_Events$ = "Off/No"  'Tachometer Alarm Events
Tachometer_Trip$ = "Off"  'Tachometer Trip
Tachometer_Trip_Relays$ = "Trip"  'Tachometer Trip Relays
Tachometer_Trip_Speed = 10  'Tachometer Trip Speed
Tachometer_Trip_Delay = 1  'Tachometer Trip Delay
General_Switch_A_Name = 0  'General Switch A Name
General_Switch_A_Normal_State$ = "Normally Open"  'General Switch A Normal State
General_Switch_A_Block_Input_From_Start = 0  'General Switch A Block Input From
Start
General_Switch_A_Alarm$ = "Off"  'General Switch A Alarm
General_Switch_A_Alarm_Relays$ = "Alarm"  'General Switch A Alarm Relays
General_Switch_A_Alarm_Delay = 5.0  'General Switch A Alarm Delay
General_Switch_A_Alarm_Events$ = "Off/No"  'General Switch A Alarm Events
General_Switch_A_Trip$ = "Off"  'General Switch A Trip
General_Switch_A_Trip_Relays$ = "Trip"  'General Switch A Trip Relays
General_Switch_A_Trip_Delay = 5.0  'General Switch A Trip Delay
General_Switch_B_Name = 0  'General Switch B Name
General_Switch_B_Normal_State$ = "Normally Open"  'General Switch B Normal State
General_Switch_B_Block_Input_From_Start = 0  'General Switch B Block Input From
Start
General_Switch_B_Alarm$ = "Off"  'General Switch B Alarm
General_Switch_B_Alarm_Relays$ = "Alarm"  'General Switch B Alarm Relays
General_Switch_B_Alarm_Delay = 5.0  'General Switch B Alarm Delay
General_Switch_B_Alarm_Events$ = "Off/No"  'General Switch B Alarm Events
General_Switch_B_Trip$ = "Off"  'General Switch B Trip
General_Switch_B_Trip_Relays$ = "Trip"  'General Switch B Trip Relays
```

```
General_Switch_B_Trip_Delay = 5.0  'General Switch B Trip Delay
General_Switch_C_Name = 0  'General Switch C Name
General_Switch_C_Normal_State$ = "Normally Open"  'General Switch C Normal State
General_Switch_C_Block_Input_From_Start = 0  'General Switch C Block Input From
Start
General_Switch_C_Alarm$ = "Off"  'General Switch C Alarm
General_Switch_C_Alarm_Relays$ = "Alarm"  'General Switch C Alarm Relays
General_Switch_C_Alarm_Delay = 5.0  'General Switch C Alarm Delay
General_Switch_C_Alarm_Events$ = "Off/No"  'General Switch C Alarm Events
General_Switch_C_Trip$ = "Off"  'General Switch C Trip
General_Switch_C_Trip_Relays$ = "Trip"  'General Switch C Trip Relays
General_Switch_C_Trip_Delay = 5.0  'General Switch C Trip Delay
General_Switch_D_Name = 0  'General Switch D Name
General_Switch_D_Normal_State$ = "Normally Open"  'General Switch D Normal State
General_Switch_D_Block_Input_From_Start = 0  'General Switch D Block Input From
Start
General_Switch_D_Alarm$ = "Off"  'General Switch D Alarm
General_Switch_D_Alarm_Relays$ = "Alarm"  'General Switch D Alarm Relays
General_Switch_D_Alarm_Delay = 5.0  'General Switch D Alarm Delay
General_Switch_D_Alarm_Events$ = "Off/No"  'General Switch D Alarm Events
General_Switch_D_Trip$ = "Off"  'General Switch D Trip
General_Switch_D_Trip_Relays$ = "Trip"  'General Switch D Trip Relays
General_Switch_D_Trip_Delay = 5.0  'General Switch D Trip Delay
Assignable_Input_2_Function$ = "Off"  'Assignable Input 2 Function
Assignable_Input_3_Function$ = "Off"  'Assignable Input 3 Function
Assignable_Input_4_Function$ = "Off"  'Assignable Input 4 Function
Reset_Mode_R1_Trip$ = "All Resets"  'Reset Mode R1 Trip
Force_R1_Output_Relay$ = "Disabled"  'Force R1 Output Relay
Force_R1_Operate_Time = 0  'Force R1 Operate Time
Reset_Mode_R4_Auxiliary$ = "All Resets"  'Reset Mode R4 Auxiliary
Force_R4_Output_Relay$ = "Disabled"  'Force R4 Output Relay
Force_R4_Operate_Time = 0  'Force R4 Operate Time
Reset_Mode_R2_Auxiliary$ = "All Resets"  'Reset Mode R2 Auxiliary
Force_R2_Output_Relay$ = "Disabled"  'Force R2 Output Relay
Force_R2_Output_Operate_Time = 0  'Force R2 Output Operate Time
Reset_Mode_R3_Auxiliary$ = "All Resets"  'Reset Mode R3 Auxiliary
Force_R3_Output_Relay$ = "Disabled"  'Force R3 Output Relay
Force_R3_Operate_Time = 0  'Force R3 Operate Time
Force_R5_Output_Relay$ = "Disabled"  'Force R5 Output Relay
Force_R5_Operate_Time = 0  'Force R5 Operate Time
Reset_Mode_R6_Service$ = "All Resets"  'Reset Mode R6 Service
Curve_Style$ = "Standard"  'Curve Style
Overload_Pickup_Level = 1.15  'Overload Pickup Level
Unbalance_k_Factor = 0  'Unbalance k Factor
Cool_Time_Constant_Running = 15  'Cool Time Constant Running
Cool_Time_Constant_Stopped = 30  'Cool Time Constant Stopped
Hot_Cold_Safe_Stall_Ratio = 0.89  'Hot/Cold Safe Stall Ratio
RTD_Blasing$ = "Off/No"  'RTD Blasing
RTD_Blas_Minimum = 40  'RTD Blas Minimum
RTD_Blas_Center_Point = 130  'RTD Blas Center Point
RTD_Blas_Maximum = 155  'RTD Blas Maximum
Thermal_Capacity_Alarm$ = "Off"  'Thermal Capacity Alarm
Thermal_Capacity_Alarm_Relays$ = "Alarm"  'Thermal Capacity Alarm Relays
Thermal_Capacity_Alarm_Level = 75  'Thermal Capacity Alarm Level
Thermal_Capacity_Alarm_Events$ = "Off/No"  'Thermal Capacity Alarm Events
Overload_Trip_Relays$ = "Trip"  'Overload Trip Relays
Standard_Overload_Curve_Number = 2  'Standard Overload Curve Number
Minimum_Allowable_Line_Voltage = 80  'Minimum Allowable Line Voltage
Stall_Current_at_Min_Vline = 4.80  'Stall Current at Min Vline
Safe_Stall_Time_at_Min_Vline = 20.0  'Safe Stall Time at Min Vline
Accel_Intersect_at_Min_Vline = 3.80  'Accel. Intersect at Min Vline
Stall_Current_at_100_Vline = 6.00  'Stall Current at 100% Vline
Safe_Stall_Time_at_100_Vline = 10.0  'Safe Stall Time at 100% Vline
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Accel_Intersect_at_100_Vline = 5.00  'Accel. Intersect at 100% Vline
Short_Circuit_Trip$ = "Latched"  'Short Circuit Trip
Short_Circuit_Trip_Backup$ = "Off/No"  'Short Circuit Trip Backup
Short_Circuit_Backup_Relays$ = "Aux2"  'Short Circuit Backup Relays
Short_Circuit_Trip_Backup_Delay = 200  'Short Circuit Trip Backup Delay
Overload_Alarm$ = "Off"  'Overload Alarm
Overload_Alarm_Relays$ = "Alarm"  'Overload Alarm Relays
Overload_Alarm_Events$ = "Off/No"  'Overload Alarm Events
Overload_Alarm_Delay = 0.1  'Overload Alarm Delay
Mechanical_Jam_Trip$ = "Off"  'Mechanical Jam Trip
Mechanical_Jam_Trip_Relays$ = "Trip"  'Mechanical Jam Trip Relays
Mechanical_Jam_Pickup = 1.50  'Mechanical Jam Pickup
Mechanical_Jam_Delay = 1  'Mechanical Jam Delay
Block_Undercurrent_from_Start = 0  'Block Undercurrent from Start
Undercurrent_Alarm$ = "Off"  'Undercurrent Alarm
Undercurrent_Alarm_Relays$ = "Alarm"  'Undercurrent Alarm Relays
Undercurrent_Alarm_Pickup = 0.70  'Undercurrent Alarm Pickup
Undercurrent_Alarm_Delay = 1  'Undercurrent Alarm Delay
Undercurrent_Alarm_Events$ = "Off/No"  'Undercurrent Alarm Events
Undercurrent_Trip$ = "Off"  'Undercurrent Trip
Undercurrent_Trip_Relays$ = "Trip"  'Undercurrent Trip Relays
Undercurrent_Trip_Pickup = 0.70  'Undercurrent Trip Pickup
Undercurrent_Trip_Delay = 1  'Undercurrent Trip Delay
Current_Unbalance_Alarm$ = "Off"  'Current Unbalance Alarm
Current_Unbalance_Alarm_Relays$ = "Alarm"  'Current Unbalance Alarm Relays
Current_Unbalance_Alarm_Pickup = 15  'Current Unbalance Alarm Pickup
Current_Unbalance_Alarm_Delay = 1  'Current Unbalance Alarm Delay
Current_Unbalance_Alarm_Events$ = "Off/No"  'Current Unbalance Alarm Events
Current_Unbalance_Trip$ = "Off"  'Current Unbalance Trip
Current_Unbalance_Trip_Relays$ = "Trip"  'Current Unbalance Trip Relays
Current_Unbalance_Trip_Pickup = 20  'Current Unbalance Trip Pickup
Current_Unbalance_Trip_Delay = 1  'Current Unbalance Trip Delay
Ground_Fault_Alarm$ = "Off"  'Ground Fault Alarm
Ground_Fault_Alarm_Relays$ = "Alarm"  'Ground Fault Alarm Relays
Ground_Fault_Alarm_Pickup = 0.10  'Ground Fault Alarm Pickup
Alarm_Pickup_for_Multlin_CT_50_025 = 1.00  'Alarm Pickup for Multlin CT 50/.025
Intentional_GF_Alarm_Delay = 0  'Intentional GF Alarm Delay
Ground_Fault_Alarm_Events$ = "Off/No"  'Ground Fault Alarm Events
Ground_Fault_Trip$ = "Latched"  'Ground Fault Trip
Ground_Fault_Trip_Relays$ = "Trip"  'Ground Fault Trip Relays
Ground_Fault_Trip_Pickup = 0.20  'Ground Fault Trip Pickup
Trip_Pickup_for_Multlin_CT_50_025 = 2.00  'Trip Pickup for Multlin CT 50/.025
Intentional_GF_Trip_Delay = 400  'Intentional GF Trip Delay
Ground_Fault_Trip_Backup$ = "Off/No"  'Ground Fault Trip Backup
Phase_Differential_Trip$ = "Off"  'Phase Differential Trip
Phase_Differential_Trip_Relays$ = "Trip"  'Phase Differential Trip Relays
Differential_Trip_Pickup_While_Starting = 0.10  'Differential Trip Pickup While
Starting
Differential_Trip_Delay_While_Starting = 0  'Differential Trip Delay While
Starting
Differential_Trip_Pickup_While_Running = 0.10  'Differential Trip Pickup While
Running
Differential_Trip_Delay_While_Running = 0  'Differential Trip Delay While Running
Accleration_Timer_Trip$ = "Off"  'Accleration Timer Trip
Acceleration_Timer_Trip_Relays$ = "Trip"  'Acceleration Timer Trip Relays
Acceleration_Timer_from_Start = 10.0  'Acceleration Timer from Start
Start_Inhibit_Block$ = "Off/No"  'Start Inhibit Block
Thermal_Capacity_Used_Margin = 25  'Thermal Capacity Used Margin
Jogging_Block$ = "Off/No"  'Jogging Block
Maximum_Starts_Hour_Permissible = 3  'Maximum Starts/Hour Permissible
Time_Between_Starts = 10  'Time Between Starts
Restart_Block$ = "Off/No"  'Restart Block
Restart_Block_Time = 1  'Restart Block Time
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Stator_RTD_Type$ = "100 Ohm Platinum"  'Stator RTD Type
Bearing_RTD_Type$ = "100 Ohm Platinum"  'Bearing RTD Type
Ambient_RTD_Type$ = "100 Ohm Platinum"  'Ambient RTD Type
Other_RTD_Type$ = "100 Ohm Platinum"  'Other RTD Type
RTD_1_Application$ = "None"  'RTD #1 Application
RTD_1_Name = 0  'RTD #1 Name
RTD_1_Alarm$ = "Off"  'RTD #1 Alarm
RTD_1_Alarm_Relays$ = "Alarm"  'RTD #1 Alarm Relays
RTD_1_Alarm_Temperature = 130  'RTD #1 Alarm Temperature
RTD_1_Alarm_Events$ = "Off/No"  'RTD #1 Alarm Events
RTD_1_Trip$ = "Off"  'RTD #1 Trip
RTD_1_Trip_Voting$ = "RTD #1"  'RTD #1 Trip Voting
RTD_1_Trip_Relays$ = "Trip"  'RTD #1 Trip Relays
RTD_1_Trip_Temperature = 155  'RTD #1 Trip Temperature
RTD_1_Hi_Alarm$ = "Off"  'RTD #1 Hi Alarm
RTD_1_Hi_Alarm_Relays$ = "Alarm"  'RTD #1 Hi Alarm Relays
RTD_1_Hi_Alarm_Level = 130  'RTD #1 Hi Alarm Level
RTD_2_Application$ = "None"  'RTD #2 Application
RTD_2_Name = 0  'RTD #2 Name
RTD_2_Alarm$ = "Off"  'RTD #2 Alarm
RTD_2_Alarm_Relays$ = "Alarm"  'RTD #2 Alarm Relays
RTD_2_Alarm_Temperature = 130  'RTD #2 Alarm Temperature
RTD_2_Alarm_Events$ = "Off/No"  'RTD #2 Alarm Events
RTD_2_Trip$ = "Off"  'RTD #2 Trip
RTD_2_Trip_Voting$ = "RTD #2"  'RTD #2 Trip Voting
RTD_2_Trip_Relays$ = "Trip"  'RTD #2 Trip Relays
RTD_2_Trip_Temperature = 155  'RTD #2 Trip Temperature
RTD_2_Hi_Alarm$ = "Off"  'RTD #2 Hi Alarm
RTD_2_Hi_Alarm_Relays$ = "Alarm"  'RTD #2 Hi Alarm Relays
RTD_2_Hi_Alarm_Level = 130  'RTD #2 Hi Alarm Level
RTD_3_Application$ = "None"  'RTD #3 Application
RTD_3_Name = 0  'RTD #3 Name
RTD_3_Alarm$ = "Off"  'RTD #3 Alarm
RTD_3_Alarm_Relays$ = "Alarm"  'RTD #3 Alarm Relays
RTD_3_Alarm_Temperature = 130  'RTD #3 Alarm Temperature
RTD_3_Alarm_Events$ = "Off/No"  'RTD #3 Alarm Events
RTD_3_Trip$ = "Off"  'RTD #3 Trip
RTD_3_Trip_Voting$ = "RTD #3"  'RTD #3 Trip Voting
RTD_3_Trip_Relays$ = "Trip"  'RTD #3 Trip Relays
RTD_3_Trip_Temperature = 155  'RTD #3 Trip Temperature
RTD_3_Hi_Alarm$ = "Off"  'RTD #3 Hi Alarm
RTD_3_Hi_Alarm_Relays$ = "Alarm"  'RTD #3 Hi Alarm Relays
RTD_3_Hi_Alarm_Level = 130  'RTD #3 Hi Alarm Level
RTD_4_Application$ = "None"  'RTD #4 Application
RTD_4_Name = 0  'RTD #4 Name
RTD_4_Alarm$ = "Off"  'RTD #4 Alarm
RTD_4_Alarm_Relays$ = "Alarm"  'RTD #4 Alarm Relays
RTD_4_Alarm_Temperature = 130  'RTD #4 Alarm Temperature
RTD_4_Alarm_Events$ = "Off/No"  'RTD #4 Alarm Events
RTD_4_Trip$ = "Off"  'RTD #4 Trip
RTD_4_Trip_Voting$ = "RTD #4"  'RTD #4 Trip Voting
RTD_4_Trip_Relays$ = "Trip"  'RTD #4 Trip Relays
RTD_4_Trip_Temperature = 155  'RTD #4 Trip Temperature
RTD_4_Hi_Alarm$ = "Off"  'RTD #4 Hi Alarm
RTD_4_Hi_Alarm_Relays$ = "Alarm"  'RTD #4 Hi Alarm Relays
RTD_4_Hi_Alarm_Level = 130  'RTD #4 Hi Alarm Level
RTD_5_Application$ = "None"  'RTD #5 Application
RTD_5_Name = 0  'RTD #5 Name
RTD_5_Alarm$ = "Off"  'RTD #5 Alarm
RTD_5_Alarm_Relays$ = "Alarm"  'RTD #5 Alarm Relays
RTD_5_Alarm_Temperature = 130  'RTD #5 Alarm Temperature
RTD_5_Alarm_Events$ = "Off/No"  'RTD #5 Alarm Events
RTD_5_Trip$ = "Off"  'RTD #5 Trip
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RTD_5_Trip_Voting$ = "RTD #5"  'RTD #5 Trip Voting
RTD_5_Trip_Relays$ = "Trip"  'RTD #5 Trip Relays
RTD_5_Trip_Temperature = 155  'RTD #5 Trip Temperature
RTD_5_Hi_Alarm$ = "Off"  'RTD #5 Hi Alarm
RTD_5_Hi_Alarm_Relays$ = "Alarm"  'RTD #5 Hi Alarm Relays
RTD_5_Hi_Alarm_Level = 130  'RTD #5 Hi Alarm Level
RTD_6_Application$ = "None"  'RTD #6 Application
RTD_6_Name = 0  'RTD #6 Name
RTD_6_Alarm$ = "Off"  'RTD #6 Alarm
RTD_6_Alarm_Relays$ = "Alarm"  'RTD #6 Alarm Relays
RTD_6_Alarm_Temperature = 130  'RTD #6 Alarm Temperature
RTD_6_Alarm_Events$ = "Off/No"  'RTD #6 Alarm Events
RTD_6_Trip$ = "Off"  'RTD #6 Trip
RTD_6_Trip_Voting$ = "RTD #6"  'RTD #6 Trip Voting
RTD_6_Trip_Relays$ = "Trip"  'RTD #6 Trip Relays
RTD_6_Trip_Temperature = 155  'RTD #6 Trip Temperature
RTD_6_Hi_Alarm$ = "Off"  'RTD #6 Hi Alarm
RTD_6_Hi_Alarm_Relays$ = "Alarm"  'RTD #6 Hi Alarm Relays
RTD_6_Hi_Alarm_Level = 130  'RTD #6 Hi Alarm Level
RTD_7_Application$ = "None"  'RTD #7 Application
RTD_7_Name = 0  'RTD #7 Name
RTD_7_Alarm$ = "Off"  'RTD #7 Alarm
RTD_7_Alarm_Relays$ = "Alarm"  'RTD #7 Alarm Relays
RTD_7_Alarm_Temperature = 80  'RTD #7 Alarm Temperature
RTD_7_Alarm_Events$ = "Off/No"  'RTD #7 Alarm Events
RTD_7_Trip$ = "Off"  'RTD #7 Trip
RTD_7_Trip_Voting$ = "RTD #7"  'RTD #7 Trip Voting
RTD_7_Trip_Relays$ = "Trip"  'RTD #7 Trip Relays
RTD_7_Trip_Temperature = 90  'RTD #7 Trip Temperature
RTD_7_Hi_Alarm$ = "Off"  'RTD #7 Hi Alarm
RTD_7_Hi_Alarm_Relays$ = "Alarm"  'RTD #7 Hi Alarm Relays
RTD_7_Hi_Alarm_Level = 80  'RTD #7 Hi Alarm Level
RTD_8_Application$ = "None"  'RTD #8 Application
RTD_8_Name = 0  'RTD #8 Name
RTD_8_Alarm$ = "Off"  'RTD #8 Alarm
RTD_8_Alarm_Relays$ = "Alarm"  'RTD #8 Alarm Relays
RTD_8_Alarm_Temperature = 80  'RTD #8 Alarm Temperature
RTD_8_Alarm_Events$ = "Off/No"  'RTD #8 Alarm Events
RTD_8_Trip$ = "Off"  'RTD #8 Trip
RTD_8_Trip_Voting$ = "RTD #8"  'RTD #8 Trip Voting
RTD_8_Trip_Relays$ = "Trip"  'RTD #8 Trip Relays
RTD_8_Trip_Temperature = 90  'RTD #8 Trip Temperature
RTD_8_Hi_Alarm$ = "Off"  'RTD #8 Hi Alarm
RTD_8_Hi_Alarm_Relays$ = "Alarm"  'RTD #8 Hi Alarm Relays
RTD_8_Hi_Alarm_Level = 80  'RTD #8 Hi Alarm Level
RTD_9_Application$ = "None"  'RTD #9 Application
RTD_9_Name = 0  'RTD #9 Name
RTD_9_Alarm$ = "Off"  'RTD #9 Alarm
RTD_9_Alarm_Relays$ = "Alarm"  'RTD #9 Alarm Relays
RTD_9_Alarm_Temperature = 80  'RTD #9 Alarm Temperature
RTD_9_Alarm_Events$ = "Off/No"  'RTD #9 Alarm Events
RTD_9_Trip$ = "Off"  'RTD #9 Trip
RTD_9_Trip_Voting$ = "RTD #9"  'RTD #9 Trip Voting
RTD_9_Trip_Relays$ = "Trip"  'RTD #9 Trip Relays
RTD_9_Trip_Temperature = 90  'RTD #9 Trip Temperature
RTD_9_Hi_Alarm$ = "Off"  'RTD #9 Hi Alarm
RTD_9_Hi_Alarm_Relays$ = "Alarm"  'RTD #9 Hi Alarm Relays
RTD_9_Hi_Alarm_Level = 80  'RTD #9 Hi Alarm Level
RTD_10_Application$ = "None"  'RTD #10 Application
RTD_10_Name = 0  'RTD #10 Name
RTD_10_Alarm$ = "Off"  'RTD #10 Alarm
RTD_10_Alarm_Relays$ = "Alarm"  'RTD #10 Alarm Relays
RTD_10_Alarm_Temperature = 80  'RTD #10 Alarm Temperature
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RTD_10_Alarm_Events$ = "Off/No"  'RTD #10 Alarm Events
RTD_10_Trip$ = "Off"  'RTD #10 Trip
RTD_10_Trip_Voting$ = "RTD #10"  'RTD #10 Trip Voting
RTD_10_Trip_Relays$ = "Trip"  'RTD #10 Trip Relays
RTD_10_Trip_Temperature = 90  'RTD #10 Trip Temperature
RTD_10_Hi_Alarm$ = "Off"  'RTD #10 Hi Alarm
RTD_10_Hi_Alarm_Relays$ = "Alarm"  'RTD #10 Hi Alarm Relays
RTD_10_Hi_Alarm_Level = 80  'RTD #10 Hi Alarm Level
RTD_11_Application$ = "None"  'RTD #11 Application
RTD_11_Name = 0  'RTD #11 Name
RTD_11_Alarm$ = "Off"  'RTD #11 Alarm
RTD_11_Alarm_Relays$ = "Alarm"  'RTD #11 Alarm Relays
RTD_11_Alarm_Temperature = 80  'RTD #11 Alarm Temperature
RTD_11_Alarm_Events$ = "Off/No"  'RTD #11 Alarm Events
RTD_11_Trip$ = "Off"  'RTD #11 Trip
RTD_11_Trip_Voting$ = "RTD #11"  'RTD #11 Trip Voting
RTD_11_Trip_Relays$ = "Trip"  'RTD #11 Trip Relays
RTD_11_Trip_Temperature = 90  'RTD #11 Trip Temperature
RTD_11_Hi_Alarm$ = "Off"  'RTD #11 Hi Alarm
RTD_11_Hi_Alarm_Relays$ = "Alarm"  'RTD #11 Hi Alarm Relays
RTD_11_Hi_Alarm_Level = 80  'RTD #11 Hi Alarm Level
RTD_12_Application$ = "None"  'RTD #12 Application
RTD_12_Name = 0  'RTD #12  Name
RTD_12_Alarm$ = "Off"  'RTD #12 Alarm
RTD_12_Alarm_Relays$ = "Alarm"  'RTD #12 Alarm Relays
RTD_12_Alarm_Temperature = 60  'RTD #12 Alarm Temperature
RTD_12_Alarm_Events$ = "Off/No"  'RTD #12 Alarm Events
RTD_12_Trip$ = "Off"  'RTD #12 Trip
RTD_12_Trip_Voting$ = "RTD #12"  'RTD #12 Trip Voting
RTD_12_Trip_Relays$ = "Trip"  'RTD #12 Trip Relays
RTD_12_Trip_Temperature = 80  'RTD #12 Trip Temperature
RTD_12_Hi_Alarm$ = "Off"  'RTD #12 Hi Alarm
RTD_12_Hi_Alarm_Relays$ = "Alarm"  'RTD #12 Hi Alarm Relays
RTD_12_Hi_Alarm_Level = 60  'RTD #12 Hi Alarm Level
Open_RTD_Sensor_Alarm$ = "Off"  'Open RTD Sensor Alarm
Open_RTD_Sensor_Alarm_Relays$ = "Alarm"  'Open RTD Sensor Alarm Relays
Open_RTD_Sensor_Alarm_Events$ = "Off/No"  'Open RTD Sensor Alarm Events
RTD_Short_Low_Temp_Alarm$ = "Off"  'RTD Short/Low Temp Alarm
RTD_Short_Low_Temp_Alarm_Relays$ = "Alarm"  'RTD Short/Low Temp. Alarm Relays
RTD_Short_Low_Temp_Alarm_Events$ = "Off/No"  'RTD Short/Low Temp. Alarm Events
Undervoltage_Active_Only_If_Bus_Energized$ = "Off/No"  'Undervoltage Active Only
If Bus Energized
Undervoltage_Alarm$ = "Off"  'Undervoltage Alarm
Undervoltage_Alarm_Relays$ = "Alarm"  'Undervoltage Alarm Relays
Undervoltage_Alarm_Pickup = 0.85  'Undervoltage Alarm Pickup
Starting_Undervoltage_Alarm_Pickup = 0.85  'Starting Undervoltage Alarm Pickup
Undervoltage_Alarm_Delay = 3.0  'Undervoltage Alarm Delay
Undervoltage_Alarm_Events$ = "Off/No"  'Undervoltage Alarm Events
Undervoltage_Trip$ = "Off"  'Undervoltage Trip
Undervoltage_Trip_Mode$ = "1-Phase"  'Undervoltage Trip Mode
Undervoltage_Trip_Relays$ = "Trip"  'Undervoltage Trip Relays
Undervoltage_Trip_Pickup = 0.80  'Undervoltage Trip Pickup
Starting_Undervoltage_Trip_Pickup = 0.80  'Starting Undervoltage Trip Pickup
Undervoltage_Trip_Delay = 3.0  'Undervoltage Trip Delay
Overvoltage_Alarm$ = "Off"  'Overvoltage Alarm
Overvoltage_Relays$ = "Alarm"  'Overvoltage Relays
Overvoltage_Alarm_Pickup = 1.05  'Overvoltage Alarm Pickup
Overvoltage_Alarm_Delay = 3.0  'Overvoltage Alarm Delay
Overvoltage_Alarm_Events$ = "Off/No"  'Overvoltage Alarm Events
Overvoltage_Trip$ = "Off"  'Overvoltage Trip
Overvoltage_Trip_Relays$ = "Trip"  'Overvoltage Trip Relays
Overvoltage_Trip_Pickup = 1.10  'Overvoltage Trip Pickup
Overvoltage_Trip_Delay = 3.0  'Overvoltage Trip Delay
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Voltage_Phase_Reversal_Trip$ = "Off"  'Voltage Phase Reversal Trip
Voltage_Phase_Reversal_Trip_Relays$ = "Trip"  'Voltage Phase Reversal Trip Relays
Voltage_Frequency_Alarm$ = "Off"  'Voltage Frequency Alarm
Voltage_Frequency_Alarm_Relays$ = "Alarm"  'Voltage Frequency Alarm Relays
Overfrequency_Alarm_Level = 60.50  'Overfrequency Alarm Level
Underfrequency_Alarm_Level = 59.50  'Underfrequency Alarm Level
Voltage_Frequency_Alarm_Delay = 1.0  'Voltage Frequency Alarm Delay
Voltage_Frequency_Alarm_Events$ = "Off/No"  'Voltage Frequency Alarm Events
Voltage_Frequency_Trip$ = "Off"  'Voltage Frequency Trip
Voltage_Frequency_Trip_Relays$ = "Trip"  'Voltage Frequency Trip Relays
Overfrequency_Trip_Level = 60.50  'Overfrequency Trip Level
Underfrequency_Trip_Level = 59.50  'Underfrequency Trip Level
Voltage_Frequency_Trip_Delay = 1.0  'Voltage Frequency Trip Delay
Block_Power_Factor_Element_from_Start = 1  'Block Power Factor Element from Start
Power_Factor_Alarm$ = "Off"  'Power Factor Alarm
Power_Factor_Alarm_Relays$ = "Alarm"  'Power Factor Alarm Relays
Power_Factor_Lead_Alarm_Level = 1.00  'Power Factor Lead Alarm Level
Power_Factor_Lag_Alarm_Level = 1.00  'Power Factor Lag Alarm Level
Power_Factor_Alarm_Delay = 1.0  'Power Factor Alarm Delay
Power_Factor_Alarm_Events$ = "Off/No"  'Power Factor Alarm Events
Power_Factor_Trip$ = "Off"  'Power Factor Trip
Power_Factor_Trip_Relays$ = "Trip"  'Power Factor Trip Relays
Power_Factor_Lead_Trip_Level = 1.00  'Power Factor Lead Trip Level
Power_Factor_Lag_Trip_Level = 1.00  'Power Factor Lag Trip Level
Power_Factor_Trip_Delay = 1.0  'Power Factor Trip Delay
Block_kvar_Element_from_Start = 1  'Block kvar Element from Start
Reactive_Power_Alarm$ = "Off"  'Reactive Power Alarm
Reactive_Power_Alarm_Relays$ = "Alarm"  'Reactive Power Alarm Relays
Positive_Reactive_Power_Alarm_Level = 10  'Positive Reactive Power Alarm Level
Negative_Reactive_Power_Alarm_Level = 10  'Negative Reactive Power Alarm Level
Reactive_Power_Alarm_Delay = 1.0  'Reactive Power Alarm Delay
Reactive_Power_Alarm_Events$ = "Off/No"  'Reactive Power Alarm Events
Reactive_Power_Trip$ = "Off"  'Reactive Power Trip
Reactive_Power_Trip_Relays$ = "Trip"  'Reactive Power Trip Relays
Positive_Reactive_Power_Trip_Level = 25  'Positive Reactive Power Trip Level
Negative_Reactive_Power_Trip_Level = 25  'Negative Reactive Power Trip Level
Reactive_Power_Trip_Delay = 1.0  'Reactive Power Trip Delay
Block_Underpower_From_Start = 0  'Block Underpower From Start
Underpower_Alarm$ = "Off"  'Underpower Alarm
Underpower_Alarm_Relays$ = "Alarm"  'Underpower Alarm Relays
Underpower_Alarm_Level = 2  'Underpower Alarm Level
Underpower_Alarm_Delay = 1  'Underpower Alarm Delay
Underpower_Alarm_Events$ = "Off/No"  'Underpower Alarm Events
Underpower_Trip$ = "Off"  'Underpower Trip
Underpower_Trip_Relays$ = "Trip"  'Underpower Trip Relays
Underpower_Trip_Level = 1  'Underpower Trip Level
Underpower_Trip_Delay = 1  'Underpower Trip Delay
Block_Reverse_Power_From_Start = 0  'Block Reverse Power From Start
Reverse_Power_Alarm$ = "Off"  'Reverse Power Alarm
Reverse_Power_Alarm_Relays$ = "Alarm"  'Reverse Power Alarm Relays
Reverse_Power_Alarm_Level = 1  'Reverse Power Alarm Level
Reverse_Power_Alarm_Delay = 1.0  'Reverse Power Alarm Delay
Reverse_Power_Alarm_Events$ = "Off/No"  'Reverse Power Alarm Events
Reverse_Power_Trip$ = "Off"  'Reverse Power Trip
Reverse_Power_Trip_Relays$ = "Trip"  'Reverse Power Trip Relays
Reverse_Power_Trip_Level = 1  'Reverse Power Trip Level
Reverse_Power_Trip_Delay = 1.0  'Reverse Power Trip Delay
Torque_Metering$ = "Disabled"  'Torque Metering
Stator_Resistance = 0.004  'Stator Resistance
Pole_Pairs = 2  'Pole Pairs
Torque_Unit$ = "Newton-meter"  'Torque Unit
Overtorque_Alarm$ = "Off"  'Overtorque Alarm
Overtorque_Alarm_Relays$ = "Alarm"  'Overtorque Alarm Relays
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Overtorque_Alarm_Level = 4000.0  'Overtorque Alarm Level
Overtorque_Alarm_Delay = 1.0  'Overtorque Alarm Delay
Overtorque_Alarm_Events$ = "Off/No"  'Overtorque Alarm Events
Trip_Counter_Alarm$ = "Off"  'Trip Counter Alarm
Trip_Counter_Alarm_Relays$ = "Alarm"  'Trip Counter Alarm Relays
Trip_Counter_Alarm_Level = 25  'Trip Counter Alarm Level
Trip_Counter_Alarm_Events$ = "Off/No"  'Trip Counter Alarm Events
Starter_Failure_Alarm_Starter_Failure_$ = "Off"  'Starter Failure Alarm (Starter
Failure)
Starter_Type$ = "Breaker"  'Starter Type
Starter_Failure_Alarm_Relays$ = "Alarm"  'Starter Failure Alarm Relays
Starter_Failure_Alarm_Delay = 100  'Starter Failure Alarm Delay
Supervision_of_Trip_Coil$ = "Disabled"  'Supervision of Trip Coil
Starter_Failure_Alarm_Events$ = "Off/No"  'Starter Failure Alarm Events
Current_Demand_Period = 15  'Current Demand Period
Current_Demand_Alarm$ = "Off"  'Current Demand Alarm
Current_Demand_Alarm_Relays$ = "Alarm"  'Current Demand Alarm Relays
Current_Demand_Alarm_Level = 100  'Current Demand Alarm Level
Current_Demand_Alarm_Events$ = "Off/No"  'Current Demand Alarm Events
kW_Demand_Period = 15  'kW Demand Period
kW_Demand_Alarm$ = "Off"  'kW Demand Alarm
kW_Demand_Alarm_Relays$ = "Alarm"  'kW Demand Alarm Relays
kW_Demand_Alarm_Level = 100  'kW Demand Alarm Level
kW_Demand_Alarm_Events$ = "Off/No"  'kW Demand Alarm Events
kvar_Demand_Period = 15  'kvar Demand Period
kvar_Demand_Alarm$ = "Off"  'kvar Demand Alarm
kvar_Demand_Alarm_Relays$ = "Alarm"  'kvar Demand Alarm Relays
kvar_Demand_Alarm_Level = 100  'kvar Demand Alarm Level
kvar_Demand_Alarm_Events$ = "Off/No"  'kvar Demand Alarm Events
kVA_Demand_Period = 15  'kVA Demand Period
kVA_Demand_Alarm$ = "Off"  'kVA Demand Alarm
kVA_Demand_Alarm_Relays$ = "Alarm"  'kVA Demand Alarm Relays
kVA_Demand_Alarm_Level = 100  'kVA Demand Alarm Level
kVA_Demand_Alarm_Events$ = "Off/No"  'kVA Demand Alarm Events
Positive_kWh_Pulse_Output_Relay$ = "Off"  'Positive kWh Pulse Output Relay
Positive_kWh_Pulse_Output_Interval = 1  'Positive kWh Pulse Output Interval
Positive_kvarh_Pulse_Output_Relay$ = "Off"  'Positive kvarh Pulse Output Relay
Positive_kvarh_Pulse_Output_Interval = 1  'Positive kvarh Pulse Output Interval
Negative_kvarh_Pulse_Output_Relay$ = "Off"  'Negative kvarh Pulse Output Relay
Negative_kvarh_Pulse_Output_Interval = 1  'Negative kvarh Pulse Output Interval
Analog_Output_1_Selection$ = "Average Phase Current"  'Analog Output 1 Selection
Analog_Output_2_Selection$ = "None"  'Analog Output 2 Selection
Analog_Output_3_Selection$ = "None"  'Analog Output 3 Selection
Analog_Output_4_Selection$ = "None"  'Analog Output 4 Selection
RTD_1_Minimum = -50  'RTD #1 Minimum
RTD_1_Maximum = 250  'RTD #1 Maximum
RTD_2_Minimum = -50  'RTD #2 Minimum
RTD_2_Maximum = 250  'RTD #2 Maximum
RTD_3_Minimum = -50  'RTD #3 Minimum
RTD_3_Maximum = 250  'RTD #3 Maximum
RTD_4_Minimum = -50  'RTD #4 Minimum
RTD_4_Maximum = 250  'RTD #4 Maximum
RTD_5_Minimum = -50  'RTD #5 Minimum
RTD_5_Maximum = 250  'RTD #5 Maximum
RTD_6_Minimum = -50  'RTD #6 Minimum
RTD_6_Maximum = 250  'RTD #6 Maximum
RTD_7_Minimum = -50  'RTD #7 Minimum
RTD_7_Maximum = 250  'RTD #7 Maximum
RTD_8_Minimum = -50  'RTD #8 Minimum
RTD_8_Maximum = 250  'RTD #8 Maximum
RTD_9_Minimum = -50  'RTD #9 Minimum
RTD_9_Maximum = 250  'RTD #9 Maximum
RTD_10_Minimum = -50  'RTD #10 Minimum
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RTD_10_Maximum = 250  'RTD #10 Maximum
RTD_11_Minimum = -50  'RTD #11 Minimum
RTD_11_Maximum = 250  'RTD #11 Maximum
RTD_12_Minimum = -50  'RTD #12 Minimum
RTD_12_Maximum = 250  'RTD #12 Maximum
Power_Factor_Minimum = -0.80  'Power Factor Minimum
Power_Factor_Maximum = 0.80  'Power Factor Maximum
Reactive_Power_Minimum = 0  'Reactive Power Minimum
Reactive_Power_Maximum = 750  'Reactive Power Maximum
Real_Power_Minimum = 0  'Real Power Minimum
Real_Power_Maximum = 1000  'Real Power Maximum
Apparent_Power_Minimum = 0  'Apparent Power Minimum
Apparent_Power_Maximum = 1250  'Apparent Power Maximum
Thermal_Capacity_Used_Minimum = 0  'Thermal Capacity Used Minimum
Thermal_Capacity_Used_Maximum = 100  'Thermal Capacity Used Maximum
Relay_Lockout_Time_Minimum = 0  'Relay Lockout Time Minimum
Relay_Lockout_Time_Maximum = 150  'Relay Lockout Time Maximum
Current_Demand_Minimum = 0  'Current Demand Minimum
Current_Demand_Maximum = 700  'Current Demand Maximum
kvar_Demand_Minimum = 0  'kvar Demand Minimum
kvar_Demand_Maximum = 1000  'kvar Demand Maximum
kW_Demand_Minimum = 0  'kW Demand Minimum
kW_Demand_Maximum = 1250  'kW Demand Maximum
kVA_Demand_Minimum = 0  'kVA Demand Minimum
kVA_Demand_Maximum = 1500  'kVA Demand Maximum
Speed2_Standard_Overload_Curve_Number = 4  'Speed2 Standard Overload Curve Number
Speed2_Undercurrent_Alarm$ = "Off"  'Speed2 Undercurrent Alarm
Speed2_Undercurrent_Alarm_Pickup = 0.70  'Speed2 Undercurrent Alarm Pickup
Speed2_Undercurrent_Alarm_Delay = 1  'Speed2 Undercurrent Alarm Delay
Speed2_Undercurrent_Alarm_Events$ = "Off/No"  'Speed2 Undercurrent Alarm Events
Speed2_Undercurrent_Trip$ = "Off"  'Speed2 Undercurrent Trip
Speed2_Undercurrent_Trip_Pickup = 0.70  'Speed2 Undercurrent Trip Pickup
Speed2_Undercurrent_Trip_Delay = 1  'Speed2 Undercurrent Trip Delay
Speed2_Acceleration_Timer_From_Start = 10.0  'Speed2 Acceleration Timer From
Start
Acceleration_Timer_From_Speed_One_to_Two = 10.0  'Acceleration Timer From Speed
One to Two
Ground_CT_Primary = 100  'Ground CT Primary
Phase_Differential_CT_Primary = 100  'Phase Differential CT Primary
Speed_2_Phase_Sequence$ = "ABC"  'Speed 2 Phase Sequence
Remote_Alarm_Name = 0  'Remote Alarm Name
Remote_Alarm_Function$ = "Unlatched"  'Remote Alarm Function
Remote_Alarm_Relays$ = "Alarm"  'Remote Alarm Relays
Remote_Alarm_Events$ = "Off/No"  'Remote Alarm Events
Remote_Trip_Name = 0  'Remote Trip Name
Remote_Trip_Relays$ = "Trip"  'Remote Trip Relays
Speed_Switch_Trip_Relays$ = "Trip"  'Speed Switch Trip Relays
Speed_Switch_Trip_Delays = 5.0  'Speed Switch Trip Delays
Load_Shed_Trip_Relays$ = "Trip"  'Load Shed Trip Relays
Block_Pressure_Switch_Alarm_from_Start = 0  'Block Pressure Switch Alarm from
Start
Pressure_Switch_Alarm_Function$ = "Unlatched"  'Pressure Switch Alarm Function
Pressure_Switch_Alarm_Relays$ = "Alarm"  'Pressure Switch Alarm Relays
Pressure_Switch_Alarm_Delay = 5.0  'Pressure Switch Alarm Delay
Pressure_Switch_Alarm_Events$ = "Off/No"  'Pressure Switch Alarm Events
Block_Pressure_Switch_Trip_from_Start = 0  'Block Pressure Switch Trip from Start
Pressure_Switch_Trip_Relays$ = "Trip"  'Pressure Switch Trip Relays
Pressure_Switch_Trip_Delay = 5.0  'Pressure Switch Trip Delay
Vibration_Switch_Alarm_Function$ = "Unlatched"  'Vibration Switch Alarm Function
Vibration_Switch_Alarm_Relays$ = "Alarm"  'Vibration Switch Alarm Relays
Vibration_Switch_Alarm_Delay = 5.0  'Vibration Switch Alarm Delay
Vibration_Switch_Alarm_Events$ = "Off/No"  'Vibration Switch Alarm Events
Vibration_Switch_Trip_Relays$ = "Trip"  'Vibration Switch Trip Relays
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Vibration_Switch_Trip_Delay = 5.0  'Vibration Switch Trip Delay
Counter_Units_Name = 0  'Counter Units Name
Counter_Preset_Value = 0  'Counter Preset Value
Counter_Type$ = "Increment"  'Counter Type
Counter_Alarm$ = "Off"  'Counter Alarm
Counter_Alarm_Relays$ = "Alarm"  'Counter Alarm Relays
Counter_Alarm_Level = 100  'Counter Alarm Level
Counter_Alarm_Pickup$ = "Over"  'Counter Alarm Pickup
Time_to_Trip_at_1_01_FLA = 17414.5  'Time to Trip at 1.01 x FLA
Time_to_Trip_at_1_05_FLA = 3414.9  'Time to Trip at 1.05 x FLA
Time_to_Trip_at_1_10_FLA = 1666.7  'Time to Trip at 1.10 x FLA
Time_to_Trip_at_1_20_FLA = 795.4  'Time to Trip at 1.20 x FLA
Time_to_Trip_at_1_30_FLA = 507.2  'Time to Trip at 1.30 x FLA
Time_to_Trip_at_1_40_FLA = 364.6  'Time to Trip at 1.40 x FLA
Time_to_Trip_at_1_50_FLA = 280.0  'Time to Trip at 1.50 x FLA
Time_to_Trip_at_1_75_FLA = 169.7  'Time to Trip at 1.75 x FLA
Time_to_Trip_at_2_00_FLA = 116.6  'Time to Trip at 2.00 x FLA
Time_to_Trip_at_2_25_FLA = 86.1  'Time to Trip at 2.25 x FLA
Time_to_Trip_at_2_50_FLA = 66.6  'Time to Trip at 2.50 x FLA
Time_to_Trip_at_2_75_FLA = 53.3  'Time to Trip at 2.75 x FLA
Time_to_Trip_at_3_00_FLA = 43.7  'Time to Trip at 3.00 x FLA
Time_to_Trip_at_3_25_FLA = 36.6  'Time to Trip at 3.25 x FLA
Time_to_Trip_at_3_50_FLA = 31.1  'Time to Trip at 3.50 x FLA
Time_to_Trip_at_3_75_FLA = 26.8  'Time to Trip at 3.75 x FLA
TIme_to_Trip_at_4_00_FLA = 23.3  'TIme to Trip at 4.00 x FLA
Time_to_Trip_at_4_25_FLA = 20.5  'Time to Trip at 4.25 x FLA
Time_to_Trip_at_4_50_FLA = 18.2  'Time to Trip at 4.50 x FLA
Time_to_Trip_at_4_75_FLA = 16.2  'Time to Trip at 4.75 x FLA
Time_to_Trip_at_5_00_FLA = 14.6  'Time to Trip at 5.00 x FLA
Time_to_Trip_at_5_50_FLA = 12.0  'Time to Trip at 5.50 x FLA
Time_to_Trip_at_6_00_FLA = 10.0  'Time to Trip at 6.00 x FLA
Time_to_Trip_at_6_50_FLA = 8.5  'Time to Trip at 6.50 x FLA
Time_to_Trip_at_7_00_FLA = 7.3  'Time to Trip at 7.00 x FLA
Time_to_Trip_at_7_50_FLA = 6.3  'Time to Trip at 7.50 x FLA
Time_to_Trip_at_8_00_FLA = 5.6  'Time to Trip at 8.00 x FLA
Time_to_Trip_at_10_0_FLA = 5.6  'Time to Trip at 10.0 x FLA
Time_to_Trip_at_15_0_FLA = 5.6  'Time to Trip at 15.0 x FLA
Time_to_Trip_at_20_0_FLA = 5.6  'Time to Trip at 20.0 x FLA
Overreach_Filter$ = "Off/No"  'Overreach Filter
Short_Circuit_Trip_Relays$ = "Trip"  'Short Circuit Trip Relays
Short_Circuit_Trip_Pickup = 7.5  'Short Circuit Trip Pickup
Intentional_Short_Circuit_Trip_Delay = 210  'Intentional Short Circuit Trip Delay
Ground_Fault_Trip_Backup_Relays$ = "Aux2"  'Ground Fault Trip Backup Relays
Ground_FaultTrip_Backup_Delay = 200  'Ground FaultTrip Backup Delay
Running_Time_Pulse_Relay$ = "Off"  'Running Time Pulse Relay
Running_Time_Pulse_Interval = 1  'Running Time Pulse Interval
Loss_Of_Comms_Function$ = "Off"  'Loss Of Comms Function
Loss_Of_Comms_Function_Type$ = "Alarm"  'Loss Of Comms Function Type
Loss_Of_Comms_Port$ = "COMP_RS485"  'Loss Of Comms Port
Assign_Loss_Of_Comms_Alarm_Relay$ = "Alarm"  'Assign Loss Of Comms Alarm Relay
Assign_Loss_Of_Comms_Trip_Relay$ = "Trip"  'Assign Loss Of Comms Trip Relay
Loss_Of_Comms_Delay = 1  'Loss Of Comms Delay
Loss_Of_Comms_Alarm_Event$ = "Off/No"  'Loss Of Comms Alarm Event
Phase_A_Current_Minimum = 0  'Phase A Current Minimum
Phase_A_Current_Maximum = 100  'Phase A Current Maximum
Phase_B_Current_Minimum = 0  'Phase B Current Minimum
Phase_B_Current_Maximum = 100  'Phase B Current Maximum
Phase_C_Current_Minimum = 0  'Phase C Current Minimum
Phase_C_Current_Maximum = 100  'Phase C Current Maximum
Average_Phase_Current_Minimum = 0  'Average Phase Current Minimum
Average_Phase_Current_Maximum = 496  'Average Phase Current Maximum
AB_Line_Voltage_Minimum = 3200  'AB Line Voltage Minimum
AB_Line_Voltage_Maximum = 4500  'AB Line Voltage Maximum
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BC_Line_Voltage_Minimum = 3200  'BC Line Voltage Minimum
BC_Line_Voltage_Maximum = 4500  'BC Line Voltage Maximum
CA_Line_Voltage_Minimum = 3200  'CA Line Voltage Minimum
CA_Line_Voltage_Maximum = 4500  'CA Line Voltage Maximum
Average_Line_Voltage_Minimum = 3200  'Average Line Voltage Minimum
Average_Line_Voltage_Maximum = 4500  'Average Line Voltage Maximum
Phase_AN_Voltage_Minimum = 1900  'Phase AN Voltage Minimum
Phase_AN_Voltage_Maximum = 2500  'Phase AN Voltage Maximum
Phase_BN_Voltage_Minimum = 1900  'Phase BN Voltage Minimum
Phase_BN_Voltage_Maximum = 2500  'Phase BN Voltage Maximum
Phase_CN_Voltage_Minimum = 1900  'Phase CN Voltage Minimum
Phase_CN_Voltage_Maximum = 2500  'Phase CN Voltage Maximum
Average_Phase_Voltage_Minimum = 1900  'Average Phase Voltage Minimum
Average_Phase_Voltage_Maximum = 2500  'Average Phase Voltage Maximum
Hottest_Stator_RTD_Minimum = 0  'Hottest Stator RTD Minimum
Hottest_Stator_RTD_Maximum = 200  'Hottest Stator RTD Maximum
Hottest_Bearing_RTD_Minimum = 0  'Hottest Bearing RTD Minimum
Hottest_Bearing_RTD_Maximum = 200  'Hottest Bearing RTD Maximum
Hottest_Ambient_RTD_Minimum = -50  'Hottest Ambient RTD Minimum
Hottest_Ambient_RTD_Maximum = 60  'Hottest Ambient RTD Maximum
Analog_Input_1_Minimum = 0  'Analog Input 1 Minimum
Analog_Input_1_Maximum = 50000  'Analog Input 1 Maximum
Analog_Input_2_Minimum = 0  'Analog Input 2 Minimum
Analog_Input_2_Maximum = 50000  'Analog Input 2 Maximum
Analog_Input_3_Minimum = 0  'Analog Input 3 Minimum
Analog_Input_3_Maximum = 50000  'Analog Input 3 Maximum
Analog_Input_4_Minimum = 0  'Analog Input 4 Minimum
Analog_Input_4_Maximum = 50000  'Analog Input 4 Maximum
Tachometer_Min = 3500  'Tachometer Min
Tachometer_Max = 3700  'Tachometer Max
MWh_Minimum = 50.000  'MWh Minimum
MWh_Maximum = 100.000  'MWh Maximum
Torque_Minimum = 0.0  'Torque Minimum
Torque_Maximum = 0.0  'Torque Maximum
Analog_Input_Diff_1_2_Minimum = 0  'Analog Input Diff 1-2 Minimum
Analog_Input_Diff_1_2_Maximum = 100  'Analog Input Diff 1-2 Maximum
Analog_Input_Diff_3_4_Minimum = 0  'Analog Input Diff 3-4 Minimum
Analog_Input_Diff_3_4_Maximum = 100  'Analog Input Diff 3-4 Maximum
Analog_Input_1_Setup$ = "Disabled"  'Analog Input 1 Setup
Analog_Input_1_Units = 0  'Analog Input 1 Units
Analog_Input_1_Minimum_analog_in_1_ = 0  'Analog Input 1 Minimum (analog in 1)
Analog_Input_1_Maximum_analog_in_1_ = 100  'Analog Input 1 Maximum (analog in 1)
Block_Analog_Input_1_From_Start = 0  'Block Analog Input 1 From Start
Analog_Input_1_Alarm$ = "Off"  'Analog Input 1 Alarm
Analog_Input_1_Alarm_Relays$ = "Alarm"  'Analog Input 1 Alarm Relays
Analog_Input_1_Alarm_Level = 10  'Analog Input 1 Alarm Level
Analog_Input_1_Alarm_Pickup$ = "Over"  'Analog Input 1 Alarm Pickup
Analog_Input_1_Alarm_Delay = 0.1  'Analog Input 1 Alarm Delay
Analog_Input_1_Alarm_Events$ = "Off/No"  'Analog Input 1 Alarm Events
Analog_Input_1_Trip$ = "Off"  'Analog Input 1 Trip
Analog_Input_1_Trip_Relays$ = "Trip"  'Analog Input 1 Trip Relays
Analog_Input_1_Trip_Level = 20  'Analog Input 1 Trip Level
Analog_Input_1_Trip_Pickup$ = "Over"  'Analog Input 1 Trip Pickup
Analog_Input_1_Trip_Delay = 0.1  'Analog Input 1 Trip Delay
Analog_Input_1_Name = 0  'Analog Input 1 Name
Analog_Input_2_Setup$ = "Disabled"  'Analog Input 2 Setup
Analog_Input_2_Units = 0  'Analog Input 2 Units
Analog_Input_2_Minimum_analog_in_2_ = 0  'Analog Input 2 Minimum (analog in 2)
Analog_Input_2_Maximum_analog_in_2_ = 100  'Analog Input 2 Maximum (analog in 2)
Block_Analog_Input_2_From_Start = 0  'Block Analog Input 2 From Start
Analog_Input_2_Alarm$ = "Off"  'Analog Input 2 Alarm
Analog_Input_2_Alarm_Relays$ = "Alarm"  'Analog Input 2 Alarm Relays
Analog_Input_2_Alarm_Level = 10  'Analog Input 2 Alarm Level
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Analog_Input_2_Alarm_Pickup$ = "Over"  'Analog Input 2 Alarm Pickup
Analog_Input_2_Alarm_Delay = 0.1  'Analog Input 2 Alarm Delay
Analog_Input_2_Alarm_Events$ = "Off/No"  'Analog Input 2 Alarm Events
Analog_Input_2_Trip$ = "Off"  'Analog Input 2 Trip
Analog_Input_2_Trip_Relays$ = "Trip"  'Analog Input 2 Trip Relays
Analog_Input_2_Trip_Level = 20  'Analog Input 2 Trip Level
Analog_Input_2_Trip_Pickup$ = "Over"  'Analog Input 2 Trip Pickup
Analog_Input_2_Trip_Delay = 0.1  'Analog Input 2 Trip Delay
Analog_Input_2_Name = 0  'Analog Input 2 Name
Analog_Input_3_Setup$ = "Disabled"  'Analog Input 3 Setup
Analog_Input_3_Units = 0  'Analog Input 3 Units
Analog_Input_3_Minimum_analog_in_3_ = 0  'Analog Input 3 Minimum (analog in 3)
Analog_Input_3_Maximum_analog_in_3_ = 100  'Analog Input 3 Maximum (analog in 3)
Block_Analog_Input_3_From_Start = 0  'Block Analog Input 3 From Start
Analog_Input_3_Alarm$ = "Off"  'Analog Input 3 Alarm
Analog_Input_3_Alarm_Relays$ = "Alarm"  'Analog Input 3 Alarm Relays
Analog_Input_3_Alarm_Level = 10  'Analog Input 3 Alarm Level
Analog_Input_3_Alarm_Pickup$ = "Over"  'Analog Input 3 Alarm Pickup
Analog_Input_3_Alarm_Delay = 0.1  'Analog Input 3 Alarm Delay
Analog_Input_3_Alarm_Events$ = "Off/No"  'Analog Input 3 Alarm Events
Analog_Input_3_Trip$ = "Off"  'Analog Input 3 Trip
Analog_Input_3_Trip_Relays$ = "Trip"  'Analog Input 3 Trip Relays
Analog_Input_3_Trip_Level = 20  'Analog Input 3 Trip Level
Analog_Input_3_Trip_Pickup$ = "Over"  'Analog Input 3 Trip Pickup
Analog_Input_3_Trip_Delay = 0.1  'Analog Input 3 Trip Delay
Analog_Input_3_Name = 0  'Analog Input 3 Name
Analog_Input_4_Setup$ = "Disabled"  'Analog Input 4 Setup
Analog_Input_4_Units = 0  'Analog Input 4 Units
Analog_Input_4_Minimum_analog_in_4_ = 0  'Analog Input 4 Minimum (analog in 4)
Analog_Input_4_Maximum_analog_in_4_ = 100  'Analog Input 4 Maximum (analog in 4)
Block_Analog_Input_4_From_Start = 0  'Block Analog Input 4 From Start
Analog_Input_4_Alarm$ = "Off"  'Analog Input 4 Alarm
Analog_Input_4_Alarm_Relays$ = "Alarm"  'Analog Input 4 Alarm Relays
Analog_Input_4_Alarm_Level = 10  'Analog Input 4 Alarm Level
Analog_Input_4_Alarm_Pickup$ = "Over"  'Analog Input 4 Alarm Pickup
Analog_Input_4_Alarm_Delay = 0.1  'Analog Input 4 Alarm Delay
Analog_Input_4_Alarm_Events$ = "Off/No"  'Analog Input 4 Alarm Events
Analog_Input_4_Trip$ = "Off"  'Analog Input 4 Trip
Analog_Input_4_Trip_Relays$ = "Trip"  'Analog Input 4 Trip Relays
Analog_Input_4_Trip_Level = 20  'Analog Input 4 Trip Level
Analog_Input_4_Trip_Pickup$ = "Over"  'Analog Input 4 Trip Pickup
Analog_Input_4_Trip_Delay = 0.1  'Analog Input 4 Trip Delay
Analog_Input_4_Name = 0  'Analog Input 4 Name
Speed2_Time_to_Trip_at_1_01_FLA = 17414.5  'Speed2 Time to Trip at 1.01 x FLA
Speed2_Time_to_Trip_at_1_05_FLA = 3414.9  'Speed2 Time to Trip at 1.05 x FLA
Speed2_Time_to_Trip_at_1_10_FLA = 1666.7  'Speed2 Time to Trip at 1.10 x FLA
Speed2_Time_to_Trip_at_1_20_FLA = 795.4  'Speed2 Time to Trip at 1.20 x FLA
Speed2_Time_to_Trip_at_1_30_FLA = 507.2  'Speed2 Time to Trip at 1.30 x FLA
Speed2_Time_to_Trip_at_1_40_FLA = 364.6  'Speed2 Time to Trip at 1.40 x FLA
Speed2_Time_to_Trip_at_1_50_FLA = 280.0  'Speed2 Time to Trip at 1.50 x FLA
Speed2_Time_to_Trip_at_1_75_FLA = 169.7  'Speed2 Time to Trip at 1.75 x FLA
Speed2_Time_to_Trip_at_2_00_FLA = 116.6  'Speed2 Time to Trip at 2.00 x FLA
Speed2_Time_to_Trip_at_2_25_FLA = 86.1  'Speed2 Time to Trip at 2.25 x FLA
Speed2_Time_to_Trip_at_2_50_FLA = 66.6  'Speed2 Time to Trip at 2.50 x FLA
Speed2_Time_to_Trip_at_2_75_FLA = 53.3  'Speed2 Time to Trip at 2.75 x FLA
Speed2_Time_to_Trip_at_3_00_FLA = 43.7  'Speed2 Time to Trip at 3.00 x FLA
Speed2_Time_to_Trip_at_3_25_FLA = 36.6  'Speed2 Time to Trip at 3.25 x FLA
Speed2_Time_to_Trip_at_3_50_FLA = 31.1  'Speed2 Time to Trip at 3.50 x FLA
Speed2_Time_to_Trip_at_3_75_FLA = 26.8  'Speed2 Time to Trip at 3.75 x FLA
Speed2_Time_to_Trip_at_4_00_FLA = 23.3  'Speed2 Time to Trip at 4.00 x FLA
Speed2_Time_to_Trip_at_4_25_FLA = 20.5  'Speed2 Time to Trip at 4.25 x FLA
Speed2_Time_to_Trip_at_4_50_FLA = 18.2  'Speed2 Time to Trip at 4.50 x FLA
Speed2_Time_to_Trip_at_4_75_FLA = 16.2  'Speed2 Time to Trip at 4.75 x FLA
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Speed2_Time_to_Trip_at_5_00_FLA = 14.6  'Speed2 Time to Trip at 5.00 x FLA
Speed2_Time_to_Trip_at_5_50_FLA = 12.0  'Speed2 Time to Trip at 5.50 x FLA
Speed2_Time_to_Trip_at_6_00_FLA = 10.0  'Speed2 Time to Trip at 6.00 x FLA
Speed2_Time_to_Trip_at_6_50_FLA = 8.5  'Speed2 Time to Trip at 6.50 x FLA
Speed2_Time_to_Trip_at_7_00_FLA = 7.3  'Speed2 Time to Trip at 7.00 x FLA
Speed2_Time_to_Trip_at_7_50_FLA = 6.3  'Speed2 Time to Trip at 7.50 x FLA
Speed2_Time_to_Trip_at_8_00_FLA = 5.6  'Speed2 Time to Trip at 8.00 x FLA
Speed2_Time_to_Trip_at_10_0_FLA = 5.6  'Speed2 Time to Trip at 10.0 x FLA
Speed2_Time_to_Trip_at_15_0_FLA = 5.6  'Speed2 Time to Trip at 15.0 x FLA
Speed2_Time_to_Trip_at_20_0_FLA = 5.6  'Speed2 Time to Trip at 20.0 x FLA
Speed2_Minimum_Allowable_Line_Voltage = 80  'Speed2 Minimum Allowable Line
Voltage
Speed2_Stall_Current_at_Min_Vline = 4.80  'Speed2 Stall Current at Min Vline
Speed2_Safe_Stall_Time_at_Min_Vline = 20.0  'Speed2 Safe Stall Time at Min Vline
Speed2_Accel_Intersect_at_Min_Vline = 3.80  'Speed2 Accel. Intersect at Min Vline
Speed2_Stall_Current_at_100_Vline = 6.00  'Speed2 Stall Current at 100% Vline
Speed2_Safe_Stall_Time_at_100_Vline = 10.0  'Speed2 Safe Stall Time at 100% Vline
Speed2_Accel_Intersect_at_100_Vline = 5.00  'Speed2 Accel. Intersect at 100%
Vline
Block_Speed2_Undercurrent_from_Start = 0  'Block Speed2 Undercurrent from Start
Speed_Switch_Trip_Speed2_Delay = 5.0  'Speed Switch Trip Speed2 Delay
Speed2_Rated_Speed = 3600  'Speed2 Rated Speed
Analog_In_Differential_1_2_Enable$ = "Disabled"  'Analog In Differential 1-2
Enable
Analog_In_Diff_1_2_Name = 0  'Analog In Diff 1-2 Name
Analog_In_Differential_1_2_Comparison$ = "% Difference"  'Analog In Differential
1-2 Comparison
Analog_In_Differential_1_2_Logic$ = "1>2 (or 3>4)"  'Analog In Differential 1-2
Logic
Analog_In_Differential_1_2_Active_When$ = "Always"  'Analog In Differential 1-2
Active When
Analog_In_Differential_1_2_Block_from_Start = 0  'Analog In Differential 1-2
Block from Start
Analog_In_Differential_1_2_Alarm$ = "Off"  'Analog In Differential 1-2 Alarm
Analog_In_Differential_1_2_Alarm_Relays$ = "Alarm"  'Analog In Differential 1-2
Alarm Relays
Analog_In_Differential_1_2_Percent_Alarm = 10  'Analog In Differential 1-2
Percent Alarm
Analog_In_Differential_1_2_Absolute_Alarm = 10  'Analog In Differential 1-2
Absolute Alarm
Analog_In_Differential_1_2_Alarm_Delay = 0.1  'Analog In Differential 1-2 Alarm
Delay
Analog_In_Differential_1_2_Alarm_Events$ = "Off/No"  'Analog In Differential 1-2
Alarm Events
Analog_In_Differential_1_2_Trip$ = "Off"  'Analog In Differential 1-2 Trip
Analog_In_Differential_1_2_Trip_Relays$ = "Trip"  'Analog In Differential 1-2
Trip Relays
Analog_In_Differential_1_2_Percent_Trip = 10  'Analog In Differential 1-2
Percent Trip
Analog_In_Differential_1_2_Absolute_Trip = 10  'Analog In Differential 1-2
Absolute Trip
Analog_In_Differential_1_2_Trip_Delay = 0.1  'Analog In Differential 1-2 Trip
Delay
Analog_In_Differential_3_4_Enable$ = "Disabled"  'Analog In Differential 3-4
Enable
Analog_In_Diff_3_4_Name = 0  'Analog In Diff. 3-4 Name
Analog_In_Differential_3_4_Comparison$ = "% Difference"  'Analog In Differential
3-4 Comparison
Analog_In_Differential_3_4_Logic$ = "1>2 (or 3>4)"  'Analog In Differential 3-4
Logic
Analog_In_Differential_3_4_Active_When$ = "Always"  'Analog In Differential 3-4
Active When
Analog_In_Differential_3_4_Block_from_Start = 0  'Analog In Differential 3-4
```

```
Block from Start
Analog_In_Differential_3_4_Alarm$ = "Off"  'Analog In Differential 3-4 Alarm
Analog_In_Differential_3_4_Alarm_Relays$ = "Alarm"  'Analog In Differential 3-4
Alarm Relays
Analog_In_Differential_3_4_Percent_Alarm = 10  'Analog In Differential 3-4
Percent Alarm
Analog_In_Differential_3_4_Absolute_Alarm = 10  'Analog In Differential 3-4
Absolute Alarm
Analog_In_Differential_3_4_Alarm_Delay = 0.1  'Analog In Differential 3-4 Alarm
Delay
Analog_In_Differential_3_4_Alarm_Events$ = "Off/No"  'Analog In Differential 3-4
Alarm Events
Analog_In_Differential_3_4_Trip$ = "Off"  'Analog In Differential 3-4 Trip
Analog_In_Differential_3_4_Trip_Relays$ = "Trip"  'Analog In Differential 3-4
Trip Relays
Analog_In_Differential_3_4_Percent_Trip = 10  'Analog In Differential 3-4
Percent Trip
Analog_In_Differential_3_4_Absolute_Trip = 10  'Analog In Differential 3-4
Absolute Trip
Analog_In_Differential_3_4_Trip_Delay = 0.1  'Analog In Differential 3-4 Trip
Delay
Ground_Fault_Overreach_Filter$ = "Off/No"  'Ground Fault Overreach Filter
User_Map_Address_1 = 512  'User Map Address #1
User_Map_Address_2 = 528  'User Map Address #2
User_Map_Address_3 = 529  'User Map Address #3
User_Map_Address_4 = 551  'User Map Address #4
User_Map_Address_5 = 552  'User Map Address #5
User_Map_Address_6 = 553  'User Map Address #6
User_Map_Address_7 = 554  'User Map Address #7
User_Map_Address_8 = 555  'User Map Address #8
User_Map_Address_9 = 556  'User Map Address #9
User_Map_Address_10 = 720  'User Map Address #10
User_Map_Address_11 = 721  'User Map Address #11
User_Map_Address_12 = 722  'User Map Address #12
User_Map_Address_13 = 723  'User Map Address #13
User_Map_Address_14 = 724  'User Map Address #14
User_Map_Address_15 = 729  'User Map Address #15
User_Map_Address_16 = 768  'User Map Address #16
User_Map_Address_17 = 769  'User Map Address #17
User_Map_Address_18 = 770  'User Map Address #18
User_Map_Address_19 = 771  'User Map Address #19
User_Map_Address_20 = 772  'User Map Address #20
User_Map_Address_21 = 773  'User Map Address #21
User_Map_Address_22 = 774  'User Map Address #22
User_Map_Address_23 = 775  'User Map Address #23
User_Map_Address_24 = 779  'User Map Address #24
User_Map_Address_25 = 780  'User Map Address #25
User_Map_Address_26 = 801  'User Map Address #26
User_Map_Address_27 = 802  'User Map Address #27
User_Map_Address_28 = 803  'User Map Address #28
User_Map_Address_29 = 804  'User Map Address #29
User_Map_Address_30 = 805  'User Map Address #30
User_Map_Address_31 = 806  'User Map Address #31
User_Map_Address_32 = 807  'User Map Address #32
User_Map_Address_33 = 808  'User Map Address #33
User_Map_Address_34 = 809  'User Map Address #34
User_Map_Address_35 = 810  'User Map Address #35
User_Map_Address_36 = 811  'User Map Address #36
User_Map_Address_37 = 812  'User Map Address #37
User_Map_Address_38 = 832  'User Map Address #38
User_Map_Address_39 = 833  'User Map Address #39
User_Map_Address_40 = 834  'User Map Address #40
User_Map_Address_41 = 835  'User Map Address #41
```

```
User_Map_Address_42 = 840  'User Map Address #42
User_Map_Address_43 = 880  'User Map Address #43
User_Map_Address_44 = 881  'User Map Address #44
User_Map_Address_45 = 882  'User Map Address #45
User_Map_Address_46 = 884  'User Map Address #46
User_Map_Address_47 = 885  'User Map Address #47
User_Map_Address_48 = 886  'User Map Address #48
User_Map_Address_49 = 781  'User Map Address #49
User_Map_Address_50 = 782  'User Map Address #50
User_Map_Address_51 = 783  'User Map Address #51
User_Map_Address_52 = 725  'User Map Address #52
User_Map_Address_53 = 726  'User Map Address #53
User_Map_Address_54 = 727  'User Map Address #54
User_Map_Address_55 = 728  'User Map Address #55
User_Map_Address_56 = 0  'User Map Address #56
User_Map_Address_57 = 0  'User Map Address #57
User_Map_Address_58 = 0  'User Map Address #58
User_Map_Address_59 = 0  'User Map Address #59
User_Map_Address_60 = 0  'User Map Address #60
User_Map_Address_61 = 0  'User Map Address #61
User_Map_Address_62 = 0  'User Map Address #62
User_Map_Address_63 = 0  'User Map Address #63
User_Map_Address_64 = 0  'User Map Address #64
User_Map_Address_65 = 0  'User Map Address #65
User_Map_Address_66 = 0  'User Map Address #66
User_Map_Address_67 = 0  'User Map Address #67
User_Map_Address_68 = 0  'User Map Address #68
User_Map_Address_69 = 0  'User Map Address #69
User_Map_Address_70 = 0  'User Map Address #70
User_Map_Address_71 = 0  'User Map Address #71
User_Map_Address_72 = 0  'User Map Address #72
User_Map_Address_73 = 0  'User Map Address #73
User_Map_Address_74 = 0  'User Map Address #74
User_Map_Address_75 = 0  'User Map Address #75
User_Map_Address_76 = 0  'User Map Address #76
User_Map_Address_77 = 0  'User Map Address #77
User_Map_Address_78 = 0  'User Map Address #78
User_Map_Address_79 = 0  'User Map Address #79
User_Map_Address_80 = 0  'User Map Address #80
User_Map_Address_81 = 0  'User Map Address #81
User_Map_Address_82 = 0  'User Map Address #82
User_Map_Address_83 = 0  'User Map Address #83
User_Map_Address_84 = 0  'User Map Address #84
User_Map_Address_85 = 0  'User Map Address #85
User_Map_Address_86 = 0  'User Map Address #86
User_Map_Address_87 = 0  'User Map Address #87
User_Map_Address_88 = 0  'User Map Address #88
User_Map_Address_89 = 0  'User Map Address #89
User_Map_Address_90 = 0  'User Map Address #90
User_Map_Address_91 = 0  'User Map Address #91
User_Map_Address_92 = 0  'User Map Address #92
User_Map_Address_93 = 0  'User Map Address #93
User_Map_Address_94 = 0  'User Map Address #94
User_Map_Address_95 = 0  'User Map Address #95
User_Map_Address_96 = 0  'User Map Address #96
User_Map_Address_97 = 0  'User Map Address #97
User_Map_Address_98 = 0  'User Map Address #98
User_Map_Address_99 = 0  'User Map Address #99
User_Map_Address_100 = 0  'User Map Address #100
User_Map_Address_101 = 0  'User Map Address #101
User_Map_Address_102 = 0  'User Map Address #102
User_Map_Address_103 = 0  'User Map Address #103
User_Map_Address_104 = 0  'User Map Address #104
```

```
User_Map_Address_105 = 0  'User Map Address #105
User_Map_Address_106 = 0  'User Map Address #106
User_Map_Address_107 = 0  'User Map Address #107
User_Map_Address_108 = 0  'User Map Address #108
User_Map_Address_109 = 0  'User Map Address #109
User_Map_Address_110 = 0  'User Map Address #110
User_Map_Address_111 = 0  'User Map Address #111
User_Map_Address_112 = 0  'User Map Address #112
User_Map_Address_113 = 0  'User Map Address #113
User_Map_Address_114 = 0  'User Map Address #114
User_Map_Address_115 = 0  'User Map Address #115
User_Map_Address_116 = 0  'User Map Address #116
User_Map_Address_117 = 0  'User Map Address #117
User_Map_Address_118 = 0  'User Map Address #118
User_Map_Address_119 = 0  'User Map Address #119
User_Map_Address_120 = 0  'User Map Address #120
User_Map_Address_121 = 0  'User Map Address #121
User_Map_Address_122 = 0  'User Map Address #122
User_Map_Address_123 = 0  'User Map Address #123
User_Map_Address_124 = 0  'User Map Address #124
User_Map_Address_125 = 0  'User Map Address #125
Motor_Load_Minimum = 0.00  'Motor Load Minimum
Motor_Load_Maximum = 1.25  'Motor Load Maximum
```

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: **READ TEST NOTES**

OK?
RAN

Relay Test Results for: **TURN ON BATTERY SIMULATOR**

OK?
RAN

Relay Test Results for: *** GET SETTINGS FILE FROM DEVICE ***

OK?
RAN

Relay Test Results for: ***RELAY SETTINGS TO SETTINGS TAB***

OK?
RAN

Relay Test Results for: MODIFY RELAY TRIP SETTINGS

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: ***CURRENT CONNECTIONS***

OK?
RAN

Relay Test Results for: CURRENT METER TEST

	EXPECTED CURRENT	CURRENT READ	RANGE	OK?
A PHASE	300.0	298.0	285.0 TO 315.0	PASS
B PHASE	300.0	298.0	285.0 TO 315.0	PASS
C PHASE	300.0	299.0	285.0 TO 315.0	PASS

Relay Test Results for: OVERLOAD PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	3.204	3.172	1.00	PASS

Relay Test Results for: OVERLOAD TIMING TEST

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
3.00	8.275	1320.88	22.015	21.864	0.69	PASS
4.00	11.033	701.62	11.694	11.660	0.29	PASS

Relay Test Results for: OVERLOAD TIMING TEST

5.00	13.792	441.27	7.354	7.287	0.93	PASS

Relay Test Results for: SHORT CIRCUIT TRIP PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	37.880	37.500	1.01	PASS

Relay Test Results for: SHORT CIRCUIT TRIP DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	45.000	13.33	0.222	0.160 TO 0.260	PASS

Relay Test Results for: UNDERCURRENT TRIP PICKUP

OK?
RAN

Relay Test Results for: MECHANICAL JAM PICKUP

OK?
RAN

Relay Test Results for: MECHANICAL JAM DELAY

OK?
RAN

Relay Test Results for: CURRENT UNBALANCE PICKUP

UNBALANCE% PU	RANGE	OK?
0.00	0.00 TO 0.00	RAN

Relay Test Results for: CURRENT UNBALANCE DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
0.34	13.517	53.17	0.886	0.500 TO 1.500	PASS

Relay Test Results for: ACCELERATION TIMER

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
1.20	3.806	597.82	9.964	10.000	-0.36	PASS

Relay Test Results for: ***VOLTAGE INPUT TEST***

	EXPECTED VOLTAGE	VOLATGE READ	RANGE	OK?
APH-BPH	460.0	459.0	450.8 TO 469.2	PASS
BPH-CPH	460.0	459.0	450.8 TO 469.2	PASS
CPH-APH	460.0	459.0	450.8 TO 469.2	PASS

Relay Test Results for: UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: UNDERVOLTAGE DELAY

OK?
RAN

Relay Test Results for: OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: OVERVOLTAGE DELAY

OK?
RAN

Relay Test Results for: VOLTAGE PHASE REVERSAL

OK?
RAN

Relay Test Results for: UNDERFREQUENCY PICKUP

OK?
RAN

Relay Test Results for: UNDERFREQUENCY DELAY

OK?
RAN

Relay Test Results for: OVERFREQUENCY PICKUP

OK?
RAN

Relay Test Results for: OVERFREQUENCY DELAY

OK?
RAN

Relay Test Results for: ***POWER INPUT TEST***

EXPECTED POWER FACTOR	POWER FACTOR READ	EXPECTED KILOWATTS	KILOWATTS READ	RANGE	OK?
0.951	0.950	434.4	434.0	425.3 TO 443.6	PASS

Relay Test Results for: POWER FACTOR LEAD PICKUP

ANG(LAG)	VOLTAGE	CURRENT	POWER FACTOR	RANGE	OK?
0.00	0.00	0.000	0.000	0.000 TO 0.000	RAN

Relay Test Results for: POWER FACTOR LAG PICKUP

ANG(LAG)	VOLTAGE	CURRENT	POWER FACTOR	RANGE	OK?
0.00	0.00	0.000	0.000	0.000 TO 0.000	RAN

Relay Test Results for: REACTIVE POS KVAR TRIP PU

OK?
RAN

Relay Test Results for: REACTIVE NEG KVAR TRIP PU

OK?
RAN

Relay Test Results for: REACTIVE KVAR TRIP DELAY

OK?
RAN

Relay Test Results for: REVERSE POWER TRIP PU

OK?
RAN

Relay Test Results for: REVERSE POWER TRIP DELAY

OK?
RAN

Relay Test Results for: UNDERPOWER TRIP PU

OK?
RAN

Relay Test Results for: UNDERPOWER TRIP DELAY

OK?
RAN

Relay Test Results for: ***GROUND(50/025) INPUT TEST***

EXPECTED CURRENT	CURRENT READ	RANGE	OK?
30.0	30.0	27.0 TO 33.0	PASS

Relay Test Results for: GROUND(50/025) FAULT PICKUP

PICKUP CURRENT	IDEAL	%ERROR	OK?
0.0010	0.0010	0.0000	PASS

Relay Test Results for: GROUND(50/025) FAULT DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.10	0.011	22.66	0.378	0.000 TO 0.900	PASS

Relay Test Results for: ***DIFFERENTIAL INPUT TEST***

0.0	0.0	0.0 TO 0.0	RAN

Relay Test Results for: DIFFERENTIAL PICKUP PH A

OK?
RAN

Relay Test Results for: DIFFERENTIAL PICKUP PH B

OK?
RAN

Relay Test Results for: DIFFERENTIAL PICKUP PH C

Relay Test Results for:	DIFFERENTIAL PICKUP PH C	
		OK? RAN
Relay Test Results for:	DIFFERENTIAL FAULT DELAY	
		OK? RAN
Relay Test Results for:	RETURN RELAY SETTING	
		OK? RAN
Relay Test Results for:	**TURN OFF BATTERY SIMULATOR**	
		OK? RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-551.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 8.2 **Test Date:** 02/24/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	13.2 KV	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	CENTRAL ELECTRICAL BUILDING
POSITION:	52F11 UNIT SUB 1-RSLS	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	SEL-551
SERIAL_NUMBER:	1132620128	FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408
RELAY_ID:	AACI207024	CURRENT_TESTDATE:	2/24/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
CONTACT$="4"          'OUTPUT CONTACT TO MASK
SEL_AUTO=1            '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1            'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1              'NO ERROR MESSAGE IF NO OPERATION
```

Routine Notes:

Relay Settings Used for Testing:

```
RID$ = "52F11"
TID$ = "SUB 1 RSLS"
CTR = 120
CTRN = 120
TDURD = 9.000
s50P1P = 13.0
s50P2P = 1.8
s50P3P$ = "OFF"
s50P4P$ = "OFF"
s50P5P$ = "OFF"
s50P6P$ = "OFF"
s50ABCP$ = "OFF"
s51P1P = 0.7
s51P1C$ = "C3"
s51P1TD = 1.00
s51P1RS$ = "N"
s51P2P$ = "OFF"
s51P2C$ = "U3"
s51P2TD = 15.00
s51P2RS$ = "N"
s50N1P$ = "OFF"
s50N2P$ = "OFF"
s51N1P$ = "OFF"
s51N1C$ = "U4"
s51N1TD = 3.00
s51N1RS$ = "N"
s50G1P = 5.4
s50G2P$ = "OFF"
s51G1P = 0.5
s51G1C$ = "U1"
s51G1TD = 0.50
```

```
s51G1RS$ = "N"
s50Q1P$ = "OFF"
s50Q2P$ = "OFF"
s51Q1P$ = "OFF"
s51Q1C$ = "U3"
s51Q1TD = 15.00
s51Q1RS$ = "N"
s51Q2P$ = "OFF"
s51Q2C$ = "U3"
s51Q2TD = 15.00
s51Q2RS$ = "N"
s79OI1 = 0.000
s79OI2 = 600.000
s79OI3 = 0.000
s79OI4 = 0.000
s79RSD = 1800.000
s79RSLD = 300.000
CFD = 60.000
DMTC = 5
PDEMP = 5.00
NDEMP = 1.50
GDEMP = 1.50
QDEMP = 1.50
SV5PU = 0.000
SV5DO = 0.000
SV6PU = 0.000
SV6DO = 0.000
SV7PU = 0.000
SV7DO = 0.000
SV8PU = 0.000
SV8DO = 0.000
SV9PU = 0.000
SV9DO = 0.000
SV10PU = 0.000
SV10DO = 0.000
SV11PU = 0.000
SV11DO = 0.000
SV12PU = 0.000
SV12DO = 0.000
SV13PU = 0.000
SV13DO = 0.000
SV14PU = 0.000
SV14DO = 0.000
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
TR$ = "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "
ULTR$ = "!(51P1 + 51G1)"
s51P1TC = 1
s51P2TC = 1
s51N1TC = 1
s51G1TC = 1
s51Q1TC = 1
s51Q2TC = 1
s52A$ = "IN1"
CL$ = "LB4"
ULCL$ = "TRIP"
s79RI$ = "TRIP"
s79RIS$ = "IN1"
s79DTL$ = "!LB1 + LB3"
s79DLS$ = "79LO"
s79SKP$ = "50P2 * SH0"
s79STL$ = "TRIP"
```

```
s79BRS$ = "(51P1 + 51G1) * (79RS + 79CY)"
s79SEQ = 0
ER1$ = "51P1 + 51G1 + 51N1"
ER2 = 0
SV1 = 0
SV2 = 0
SV3 = 0
SV4 = 0
SV5 = 0
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
OUT1$ = "TRIP"
OUT2 = 0
OUT3 = 0
OUT4 = 0
DP1$ = "IN1"
DP2$ = "LB2"
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
```

Relay Test Results for: ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for: LOG INTO THE RELAY

OK?
RAN

Relay Test Results for: DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for: SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

Relay Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

52F11                              Date: 02/24/20    Time: 06:48:33.107
SUB 1 RSLS

FID=SEL-551-R514-Vf-Z002002-D20110408      CID=CCFD

SELF TESTS

W=Warn    F=Fail

       IA        IB        IC        IN        MOF
OS      3         3         3         3         0

       +5V_PS    +5V_REG   -5V_REG   +10V_PS   -10V_PS   VBAT
PS      4.98      5.03     -4.96      9.92     -9.95      3.47

       TEMP      RAM       ROM       CR_RAM    EEPROM
        30.7     OK        OK        OK        OK

 Relay Enabled

=>>
```

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR ELEMENT TEST

OK?
RAN

Relay Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	215.0	-0.5	PASS
B-N	0.0	0.0	0.0	240.0	239.0	-0.4	PASS
C-N	0.0	0.0	0.0	264.0	262.0	-0.8	PASS

Relay Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		13.000	13.000	0.00	PASS
B-N		13.000	13.000	0.00	PASS
C-N		13.130	13.000	1.00	PASS

Relay Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		1.796	1.800	-0.22	PASS
B-N		1.814	1.800	0.78	PASS
C-N		1.814	1.800	0.78	PASS

Relay Test Results for: 50P3P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P4P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P5P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P6P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE A OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE B OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE C OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.398	5.400	-0.04	PASS

Relay Test Results for: 50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		0.699	0.700	-0.14	PASS
B-N		0.692	0.700	-1.14	PASS
C-N		0.699	0.700	-0.14	PASS

Relay Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

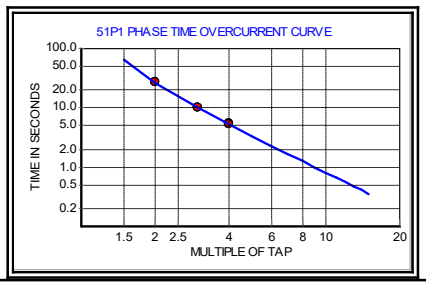
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.400	1654.21	27.570	26.667	3.39	PASS
3.00	2.100	610.38	10.173	10.000	1.73	PASS
4.00	2.800	325.88	5.431	5.333	1.84	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.400	1621.50	27.025	26.667	1.34	PASS
3.00	2.100	603.41	10.057	10.000	0.57	PASS
4.00	2.800	322.82	5.380	5.333	0.88	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.400	1614.73	26.912	26.667	0.92	PASS
3.00	2.100	599.92	9.999	10.000	-0.01	PASS
4.00	2.800	325.17	5.420	5.333	1.62	PASS



Relay Test Results for: 51P2P PHASE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P2 PHASE TIME OVERCURRENT CURVE

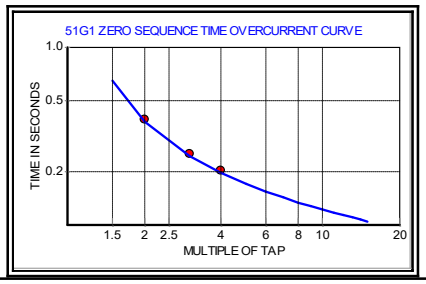
OK?
RAN

Relay Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.515	0.500	3.00	PASS

Relay Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.000	23.51	0.392	0.384	2.08	PASS
3.00	1.500	15.16	0.253	0.245	2.95	PASS
4.00	2.000	12.07	0.201	0.196	2.46	PASS



Relay Test Results for: 51Q1P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q1 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51Q2P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q2 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: NEUTRAL TEST CONNECTIONS

OK?
RAN

Relay Test Results for: 50N1P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N2P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1P NEUTRAL TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1 NEUTRAL TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: RESTORE LOGIC SETTINGS

OK?
RAN

Relay Test Results for: RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

```
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE
```

Relay Test Results for: LOG OUT OF THE RELAY

OK?
RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-551.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 8.2 **Test Date:** 02/18/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	13.2 KV	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	CENTRAL ELECTRICAL BUILDING
POSITION:	52F12 UNIT SUB 2-EQ	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	SEL-551
SERIAL_NUMBER:	1132620134	FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408
RELAY_ID:	AACI207024	CURRENT_TESTDATE:	2/18/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
CONTACT$="4"          'OUTPUT CONTACT TO MASK
SEL_AUTO=1            '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1            'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1              'NO ERROR MESSAGE IF NO OPERATION
```

Routine Notes:

Relay Settings Used for Testing:

```
RID$ = "52F12"
TID$ = "SUB 2 EQ"
CTR = 120
CTRN = 120
TDURD = 9.000
s50P1P = 13.0
s50P2P = 1.3
s50P3P$ = "OFF"
s50P4P$ = "OFF"
s50P5P$ = "OFF"
s50P6P$ = "OFF"
s50ABCP$ = "OFF"
s51P1P = 0.6
s51P1C$ = "C3"
s51P1TD = 1.00
s51P1RS$ = "N"
s51P2P$ = "OFF"
s51P2C$ = "U3"
s51P2TD = 15.00
s51P2RS$ = "N"
s50N1P$ = "OFF"
s50N2P$ = "OFF"
s51N1P$ = "OFF"
s51N1C$ = "U4"
s51N1TD = 3.00
s51N1RS$ = "N"
s50G1P = 5.4
s50G2P$ = "OFF"
s51G1P = 0.5
s51G1C$ = "U1"
s51G1TD = 0.50
```

```
s51G1RS$ = "N"
s50Q1P$ = "OFF"
s50Q2P$ = "OFF"
s51Q1P$ = "OFF"
s51Q1C$ = "U3"
s51Q1TD = 15.00
s51Q1RS$ = "N"
s51Q2P$ = "OFF"
s51Q2C$ = "U3"
s51Q2TD = 15.00
s51Q2RS$ = "N"
s79OI1 = 0.000
s79OI2 = 600.000
s79OI3 = 0.000
s79OI4 = 0.000
s79RSD = 1800.000
s79RSLD = 300.000
CFD = 60.000
DMTC = 5
PDEMP = 5.00
NDEMP = 1.50
GDEMP = 1.50
QDEMP = 1.50
SV5PU = 0.000
SV5DO = 0.000
SV6PU = 0.000
SV6DO = 0.000
SV7PU = 0.000
SV7DO = 0.000
SV8PU = 0.000
SV8DO = 0.000
SV9PU = 0.000
SV9DO = 0.000
SV10PU = 0.000
SV10DO = 0.000
SV11PU = 0.000
SV11DO = 0.000
SV12PU = 0.000
SV12DO = 0.000
SV13PU = 0.000
SV13DO = 0.000
SV14PU = 0.000
SV14DO = 0.000
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
TR$ = "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "
ULTR$ = "!(51P1 + 51G1)"
s51P1TC = 1
s51P2TC = 1
s51N1TC = 1
s51G1TC = 1
s51Q1TC = 1
s51Q2TC = 1
s52A$ = "IN1"
CL$ = "LB4"
ULCL$ = "TRIP"
s79RI$ = "TRIP"
s79RIS$ = "IN1"
s79DTL$ = "!LB1 + LB3"
s79DLS$ = "79LO"
s79SKP$ = "50P2 * SH0"
s79STL$ = "TRIP"
```

```
s79BRS$ = "(51P1 + 51G1) * (79RS + 79CY)"
s79SEQ = 0
ER1$ = "51P1 + 51G1 + 51N1"
ER2 = 0
SV1 = 0
SV2 = 0
SV3 = 0
SV4 = 0
SV5 = 0
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
OUT1$ = "TRIP"
OUT2 = 0
OUT3 = 0
OUT4 = 0
DP1$ = "IN1"
DP2$ = "LB2"
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
```

Relay Test Results for: ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for: LOG INTO THE RELAY

OK?
RAN

Relay Test Results for: DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for: SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

Relay Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

52F12                              Date: 02/18/20    Time: 07:38:53.830
SUB 2 EQ

FID=SEL-551-R514-Vf-Z002002-D20110408      CID=CCFD

SELF TESTS

W=Warn    F=Fail

       IA       IB       IC       IN       MOF
OS      3        3        3        3        0

       +5V_PS   +5V_REG  -5V_REG  +10V_PS  -10V_PS  VBAT
PS      5.03     5.06    -4.91     10.02   -9.97     3.46

       TEMP     RAM      ROM      CR_RAM   EEPROM
        29.6    OK       OK       OK       OK

 Relay Enabled

=>>
```

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR ELEMENT TEST

OK?
RAN

Relay Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	213.0	-1.4	PASS
B-N	0.0	0.0	0.0	240.0	238.0	-0.8	PASS
C-N	0.0	0.0	0.0	264.0	263.0	-0.4	PASS

Relay Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		13.000	13.000	0.00	PASS
B-N		13.000	13.000	0.00	PASS
C-N		13.000	13.000	0.00	PASS

Relay Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		1.314	1.300	1.08	PASS
B-N		1.314	1.300	1.08	PASS
C-N		1.314	1.300	1.08	PASS

Relay Test Results for: 50P3P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P4P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P5P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P6P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE A OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE B OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE C OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.398	5.400	-0.04	PASS

Relay Test Results for: 50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		0.602	0.600	0.33	PASS
B-N		0.608	0.600	1.33	PASS
C-N		0.620	0.600	3.33	PASS

Relay Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

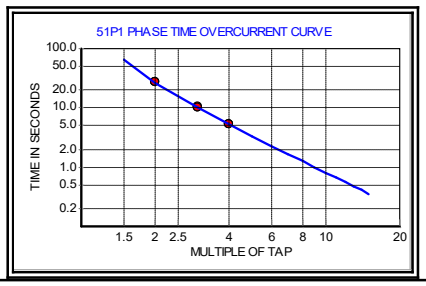
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1649.70	27.495	26.667	3.11	PASS
3.00	1.800	605.11	10.085	10.000	0.85	PASS
4.00	2.400	323.09	5.385	5.333	0.96	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1661.98	27.700	26.667	3.87	PASS
3.00	1.800	622.19	10.370	10.000	3.70	PASS
4.00	2.400	323.72	5.395	5.333	1.16	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1643.30	27.388	26.667	2.71	PASS
3.00	1.800	612.84	10.214	10.000	2.14	PASS
4.00	2.400	323.50	5.392	5.333	1.09	PASS



Relay Test Results for: 51P2P PHASE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P2 PHASE TIME OVERCURRENT CURVE

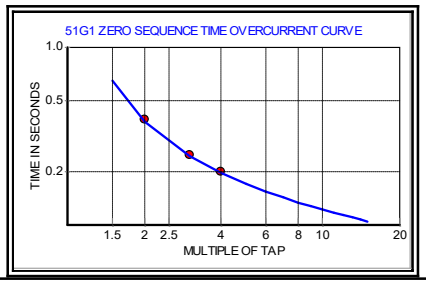
OK?
RAN

Relay Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.510	0.500	2.00	PASS

Relay Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.000	23.48	0.391	0.384	1.98	PASS
3.00	1.500	14.88	0.248	0.245	1.07	PASS
4.00	2.000	11.99	0.200	0.196	1.80	PASS



Relay Test Results for: 51Q1P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q1 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51Q2P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q2 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: NEUTRAL TEST CONNECTIONS

OK?
RAN

Relay Test Results for: 50N1P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N2P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1P NEUTRAL TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1 NEUTRAL TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: RESTORE LOGIC SETTINGS

OK?
RAN

Relay Test Results for: RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

```
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE
```

Relay Test Results for: LOG OUT OF THE RELAY

OK?
RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-551.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 8.2 **Test Date:** 02/26/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	13.2 KV	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	CENTRAL ELECTRICAL BUILDING
POSITION:	52F13 UNIT SUB 3-WBB	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	SEL-551
SERIAL_NUMBER:	1132620136	FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408
RELAY_ID:	AACI207024	CURRENT_TESTDATE:	2/26/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
CONTACT$="4"          'OUTPUT CONTACT TO MASK
SEL_AUTO=1            '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1            'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1              'NO ERROR MESSAGE IF NO OPERATION
```

Routine Notes:

Relay Settings Used for Testing:

```
RID$ = "52F13"
TID$ = "SUB 3 WBB"
CTR = 120
CTRN = 120
TDURD = 9.000
s50P1P = 16.5
s50P2P = 3.7
s50P3P$ = "OFF"
s50P4P$ = "OFF"
s50P5P$ = "OFF"
s50P6P$ = "OFF"
s50ABCP$ = "OFF"
s51P1P = 1.2
s51P1C$ = "C3"
s51P1TD = 1.00
s51P1RS$ = "N"
s51P2P$ = "OFF"
s51P2C$ = "U3"
s51P2TD = 15.00
s51P2RS$ = "N"
s50N1P$ = "OFF"
s50N2P$ = "OFF"
s51N1P$ = "OFF"
s51N1C$ = "U4"
s51N1TD = 3.00
s51N1RS$ = "N"
s50G1P = 5.4
s50G2P$ = "OFF"
s51G1P = 0.5
s51G1C$ = "U1"
s51G1TD = 0.50
```

```
s51G1RS$ = "N"
s50Q1P$ = "OFF"
s50Q2P$ = "OFF"
s51Q1P$ = "OFF"
s51Q1C$ = "U3"
s51Q1TD = 15.00
s51Q1RS$ = "N"
s51Q2P$ = "OFF"
s51Q2C$ = "U3"
s51Q2TD = 15.00
s51Q2RS$ = "N"
s79OI1 = 0.000
s79OI2 = 600.000
s79OI3 = 0.000
s79OI4 = 0.000
s79RSD = 1800.000
s79RSLD = 300.000
CFD = 60.000
DMTC = 5
PDEMP = 5.00
NDEMP = 1.50
GDEMP = 1.50
QDEMP = 1.50
SV5PU = 0.000
SV5DO = 0.000
SV6PU = 0.000
SV6DO = 0.000
SV7PU = 0.000
SV7DO = 0.000
SV8PU = 0.000
SV8DO = 0.000
SV9PU = 0.000
SV9DO = 0.000
SV10PU = 0.000
SV10DO = 0.000
SV11PU = 0.000
SV11DO = 0.000
SV12PU = 0.000
SV12DO = 0.000
SV13PU = 0.000
SV13DO = 0.000
SV14PU = 0.000
SV14DO = 0.000
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
TR$ = "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "
ULTR$ = "!(51P1 + 51G1)"
s51P1TC = 1
s51P2TC = 1
s51N1TC = 1
s51G1TC = 1
s51Q1TC = 1
s51Q2TC = 1
s52A$ = "IN1"
CL$ = "LB4"
ULCL$ = "TRIP"
s79RI$ = "TRIP"
s79RIS$ = "IN1"
s79DTL$ = "!LB1 + LB3"
s79DLS$ = "79LO"
s79SKP$ = "50P2 * SH0"
s79STL$ = "TRIP"
```

```
s79BRS$ = "(51P1 + 51G1) * (79RS + 79CY)"
s79SEQ = 0
ER1$ = "51P1 + 51G1 + 51N1"
ER2 = 0
SV1 = 0
SV2 = 0
SV3 = 0
SV4 = 0
SV5 = 0
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
OUT1$ = "TRIP"
OUT2 = 0
OUT3 = 0
OUT4 = 0
DP1$ = "IN1"
DP2$ = "LB2"
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
```

Relay Test Results for: ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for: LOG INTO THE RELAY

OK?
RAN

Relay Test Results for: DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for: SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

Relay Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

52F13                              Date: 02/26/20    Time: 07:00:09.182
SUB 3 WBB

FID=SEL-551-R514-Vf-Z002002-D20110408      CID=CCFD

SELF TESTS

W=Warn    F=Fail

       IA       IB       IC       IN       MOF
OS      3        3        3        3        0

       +5V_PS   +5V_REG  -5V_REG  +10V_PS  -10V_PS  VBAT
PS      4.99     5.03    -4.96     9.94    -9.90     3.45

       TEMP     RAM      ROM      CR_RAM   EEPROM
        29.6    OK       OK       OK       OK

 Relay Enabled

=>>
```

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR ELEMENT TEST

OK?
RAN

Relay Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	214.0	-0.9	PASS
B-N	0.0	0.0	0.0	240.0	238.0	-0.8	PASS
C-N	0.0	0.0	0.0	264.0	261.0	-1.1	PASS

Relay Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		16.670	16.500	1.03	PASS
B-N		16.505	16.500	0.03	PASS
C-N		16.505	16.500	0.03	PASS

Relay Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		3.699	3.700	-0.03	PASS
B-N		3.736	3.700	0.97	PASS
C-N		3.699	3.700	-0.03	PASS

Relay Test Results for: 50P3P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P4P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P5P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P6P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE A OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE B OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE C OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.452	5.400	0.96	PASS

Relay Test Results for: 50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		1.216	1.200	1.33	PASS
B-N		1.216	1.200	1.33	PASS
C-N		1.204	1.200	0.33	PASS

Relay Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

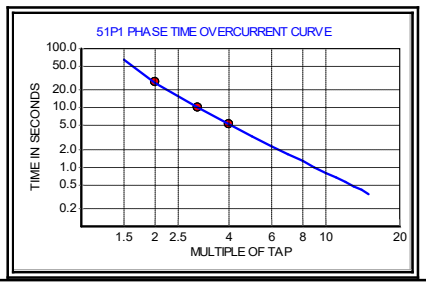
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.400	1621.90	27.032	26.667	1.37	PASS
3.00	3.600	603.75	10.062	10.000	0.62	PASS
4.00	4.800	322.18	5.370	5.333	0.68	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.400	1627.61	27.127	26.667	1.73	PASS
3.00	3.600	603.50	10.058	10.000	0.58	PASS
4.00	4.800	321.26	5.354	5.333	0.40	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.400	1629.12	27.152	26.667	1.82	PASS
3.00	3.600	601.55	10.026	10.000	0.26	PASS
4.00	4.800	320.31	5.338	5.333	0.10	PASS



Relay Test Results for: 51P2P PHASE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P2 PHASE TIME OVERCURRENT CURVE

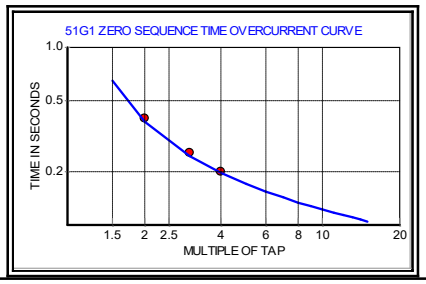
OK?
RAN

Relay Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.495	0.500	-1.00	PASS

Relay Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.000	24.04	0.401	0.384	4.40	PASS
3.00	1.500	15.21	0.254	0.245	3.31	PASS
4.00	2.000	11.91	0.198	0.196	1.14	PASS



Relay Test Results for: 51Q1P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q1 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51Q2P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q2 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: NEUTRAL TEST CONNECTIONS

OK?
RAN

Relay Test Results for: 50N1P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N2P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1P NEUTRAL TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1 NEUTRAL TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: RESTORE LOGIC SETTINGS

OK?
RAN

Relay Test Results for: RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

```
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE
```

Relay Test Results for: LOG OUT OF THE RELAY

OK?
RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-551.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 8.2 **Test Date:** 02/20/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	13.2 KV	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	CENTRAL ELECTRICAL BUILDING
POSITION:	52F14 UNIT SUB 4-TF	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	SEL-551
SERIAL_NUMBER:	1121500410	FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408
RELAY_ID:	AACI207024	CURRENT_TESTDATE:	2/20/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
CONTACT$="4"          'OUTPUT CONTACT TO MASK
SEL_AUTO=1            '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1            'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1              'NO ERROR MESSAGE IF NO OPERATION
```

Routine Notes:

Relay Settings Used for Testing:

```
RID$ = "52F14"
TID$ = "SUB 4 TF"
CTR = 120
CTRN = 120
TDURD = 9.000
s50P1P = 13.0
s50P2P = 1.8
s50P3P$ = "OFF"
s50P4P$ = "OFF"
s50P5P$ = "OFF"
s50P6P$ = "OFF"
s50ABCP$ = "OFF"
s51P1P = 0.7
s51P1C$ = "C3"
s51P1TD = 1.00
s51P1RS$ = "N"
s51P2P$ = "OFF"
s51P2C$ = "U3"
s51P2TD = 15.00
s51P2RS$ = "N"
s50N1P$ = "OFF"
s50N2P$ = "OFF"
s51N1P$ = "OFF"
s51N1C$ = "U4"
s51N1TD = 3.00
s51N1RS$ = "N"
s50G1P = 5.4
s50G2P$ = "OFF"
s51G1P = 0.5
s51G1C$ = "U1"
s51G1TD = 0.50
```

```
s51G1RS$ = "N"
s50Q1P$ = "OFF"
s50Q2P$ = "OFF"
s51Q1P$ = "OFF"
s51Q1C$ = "U3"
s51Q1TD = 15.00
s51Q1RS$ = "N"
s51Q2P$ = "OFF"
s51Q2C$ = "U3"
s51Q2TD = 15.00
s51Q2RS$ = "N"
s79OI1 = 0.000
s79OI2 = 600.000
s79OI3 = 0.000
s79OI4 = 0.000
s79RSD = 1800.000
s79RSLD = 300.000
CFD = 60.000
DMTC = 5
PDEMP = 5.00
NDEMP = 1.50
GDEMP = 1.50
QDEMP = 1.50
SV5PU = 0.000
SV5DO = 0.000
SV6PU = 0.000
SV6DO = 0.000
SV7PU = 0.000
SV7DO = 0.000
SV8PU = 0.000
SV8DO = 0.000
SV9PU = 0.000
SV9DO = 0.000
SV10PU = 0.000
SV10DO = 0.000
SV11PU = 0.000
SV11DO = 0.000
SV12PU = 0.000
SV12DO = 0.000
SV13PU = 0.000
SV13DO = 0.000
SV14PU = 0.000
SV14DO = 0.000
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
TR$ = "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "
ULTR$ = "!(51P1 + 51G1)"
s51P1TC = 1
s51P2TC = 1
s51N1TC = 1
s51G1TC = 1
s51Q1TC = 1
s51Q2TC = 1
s52A$ = "IN1"
CL$ = "LB4"
ULCL$ = "TRIP"
s79RI$ = "TRIP"
s79RIS$ = "IN1"
s79DTL$ = "!LB1 + LB3"
s79DLS$ = "79LO"
s79SKP$ = "50P2 * SH0"
s79STL$ = "TRIP"
```

```
s79BRS$ = "(51P1 + 51G1) * (79RS + 79CY)"
s79SEQ = 0
ER1$ = "51P1 + 51G1 + 51N1"
ER2 = 0
SV1 = 0
SV2 = 0
SV3 = 0
SV4 = 0
SV5 = 0
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
OUT1$ = "TRIP"
OUT2 = 0
OUT3 = 0
OUT4 = 0
DP1$ = "IN1"
DP2$ = "LB2"
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
```

Relay Test Results for: ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for: LOG INTO THE RELAY

OK?
RAN

Relay Test Results for: DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for: SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

Relay Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

52F14                              Date: 02/20/20    Time: 09:30:02.791
SUB 4 TF

FID=SEL-551-R514-Vf-Z002002-D20110408      CID=CCFD

SELF TESTS

W=Warn    F=Fail

       IA       IB       IC       IN       MOF
OS      3        2        3        3        0

       +5V_PS   +5V_REG  -5V_REG  +10V_PS  -10V_PS  VBAT
PS      4.98     4.99    -4.98     9.97    -10.04    3.44

       TEMP     RAM      ROM      CR_RAM   EEPROM
        29.6    OK       OK       OK       OK

 Relay Enabled

=>>
```

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR ELEMENT TEST

OK?
RAN

Relay Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	216.0	0.0	PASS
B-N	0.0	0.0	0.0	240.0	243.0	1.2	PASS
C-N	0.0	0.0	0.0	264.0	265.0	0.4	PASS

Relay Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		13.130	13.000	1.00	PASS
B-N		13.000	13.000	0.00	PASS
C-N		13.130	13.000	1.00	PASS

Relay Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		1.796	1.800	-0.22	PASS
B-N		1.814	1.800	0.78	PASS
C-N		1.814	1.800	0.78	PASS

Relay Test Results for: 50P3P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P4P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P5P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P6P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE A OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE B OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE C OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.398	5.400	-0.04	PASS

Relay Test Results for: 50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		0.706	0.700	0.86	PASS
B-N		0.685	0.700	-2.14	PASS
C-N		0.692	0.700	-1.14	PASS

Relay Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

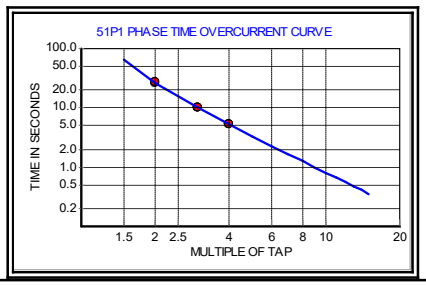
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.400	1644.76	27.413	26.667	2.80	PASS
3.00	2.100	607.15	10.119	10.000	1.19	PASS
4.00	2.800	323.41	5.390	5.333	1.06	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.400	1590.28	26.505	26.667	-0.61	PASS
3.00	2.100	604.08	10.068	10.000	0.68	PASS
4.00	2.800	318.55	5.309	5.333	-0.45	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.400	1612.19	26.870	26.667	0.76	PASS
3.00	2.100	611.45	10.191	10.000	1.91	PASS
4.00	2.800	320.26	5.338	5.333	0.08	PASS



Relay Test Results for: 51P2P PHASE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P2 PHASE TIME OVERCURRENT CURVE

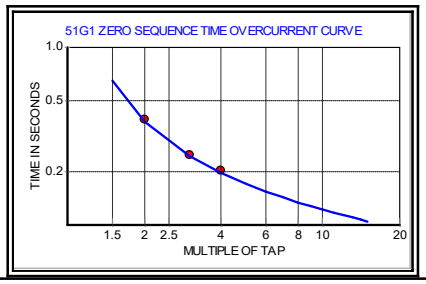
OK?
RAN

Relay Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.485	0.500	-3.00	PASS

Relay Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.000	23.68	0.395	0.384	2.84	PASS
3.00	1.500	14.95	0.249	0.245	1.52	PASS
4.00	2.000	12.16	0.203	0.196	3.28	PASS



Relay Test Results for: 51Q1P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q1 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51Q2P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q2 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: NEUTRAL TEST CONNECTIONS

OK?
RAN

Relay Test Results for: 50N1P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N2P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1P NEUTRAL TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1 NEUTRAL TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: RESTORE LOGIC SETTINGS

OK?
RAN

Relay Test Results for: RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

```
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE
```

Relay Test Results for: LOG OUT OF THE RELAY

OK?
RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-551.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 8.2 **Test Date:** 02/21/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	13.2 KV	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	CENTRAL ELECTRICAL BUILDING
POSITION:	52F24 UNIT SUB 4-TF	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	SEL-551
SERIAL_NUMBER:	1132620139	FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408
RELAY_ID:	AACI207024	CURRENT_TESTDATE:	2/21/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
CONTACT$="4"          'OUTPUT CONTACT TO MASK
SEL_AUTO=1            '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1            'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1              'NO ERROR MESSAGE IF NO OPERATION
```

Routine Notes:

Relay Settings Used for Testing:

```
RID$ = "52F24"
TID$ = "SUB 4 TF"
CTR = 120
CTRN = 120
TDURD = 9.000
s50P1P = 13.0
s50P2P = 1.8
s50P3P$ = "OFF"
s50P4P$ = "OFF"
s50P5P$ = "OFF"
s50P6P$ = "OFF"
s50ABCP$ = "OFF"
s51P1P = 0.7
s51P1C$ = "C3"
s51P1TD = 1.00
s51P1RS$ = "N"
s51P2P$ = "OFF"
s51P2C$ = "U3"
s51P2TD = 15.00
s51P2RS$ = "N"
s50N1P$ = "OFF"
s50N2P$ = "OFF"
s51N1P$ = "OFF"
s51N1C$ = "U4"
s51N1TD = 3.00
s51N1RS$ = "N"
s50G1P = 5.4
s50G2P$ = "OFF"
s51G1P = 0.5
s51G1C$ = "U1"
s51G1TD = 0.50
```

```
s51G1RS$ = "N"
s50Q1P$ = "OFF"
s50Q2P$ = "OFF"
s51Q1P$ = "OFF"
s51Q1C$ = "U3"
s51Q1TD = 15.00
s51Q1RS$ = "N"
s51Q2P$ = "OFF"
s51Q2C$ = "U3"
s51Q2TD = 15.00
s51Q2RS$ = "N"
s79OI1 = 0.000
s79OI2 = 600.000
s79OI3 = 0.000
s79OI4 = 0.000
s79RSD = 1800.000
s79RSLD = 300.000
CFD = 60.000
DMTC = 5
PDEMP = 5.00
NDEMP = 1.50
GDEMP = 1.50
QDEMP = 1.50
SV5PU = 0.000
SV5DO = 0.000
SV6PU = 0.000
SV6DO = 0.000
SV7PU = 0.000
SV7DO = 0.000
SV8PU = 0.000
SV8DO = 0.000
SV9PU = 0.000
SV9DO = 0.000
SV10PU = 0.000
SV10DO = 0.000
SV11PU = 0.000
SV11DO = 0.000
SV12PU = 0.000
SV12DO = 0.000
SV13PU = 0.000
SV13DO = 0.000
SV14PU = 0.000
SV14DO = 0.000
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
TR$ = "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "
ULTR$ = "!(51P1 + 51G1)"
s51P1TC = 1
s51P2TC = 1
s51N1TC = 1
s51G1TC = 1
s51Q1TC = 1
s51Q2TC = 1
s52A$ = "IN1"
CL$ = "LB4"
ULCL$ = "TRIP"
s79RI$ = "TRIP"
s79RIS$ = "IN1"
s79DTL$ = "!LB1 + LB3"
s79DLS$ = "79LO"
s79SKP$ = "50P2 * SH0"
s79STL$ = "TRIP"
```

```
s79BRS$ = "(51P1 + 51G1) * (79RS + 79CY)"
s79SEQ = 0
ER1$ = "51P1 + 51G1 + 51N1"
ER2 = 0
SV1 = 0
SV2 = 0
SV3 = 0
SV4 = 0
SV5 = 0
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
OUT1$ = "TRIP"
OUT2 = 0
OUT3 = 0
OUT4 = 0
DP1$ = "IN1"
DP2$ = "LB2"
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
```

Relay Test Results for: ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for: LOG INTO THE RELAY

OK?
RAN

Relay Test Results for: DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for: SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

Relay Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

52F24                              Date: 02/21/20    Time: 06:34:44.844
SUB 4 TF

FID=SEL-551-R514-Vf-Z002002-D20110408      CID=CCFD

SELF TESTS

W=Warn    F=Fail

       IA       IB       IC       IN       MOF
OS      3        3        3        3        0

       +5V_PS   +5V_REG  -5V_REG  +10V_PS  -10V_PS  VBAT
PS      4.98     5.01    -5.09     9.90    -9.97     3.48

       TEMP     RAM      ROM      CR_RAM   EEPROM
        26.5    OK       OK       OK       OK

 Relay Enabled

=>>
```

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR ELEMENT TEST

OK?
RAN

Relay Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	217.0	0.5	PASS
B-N	0.0	0.0	0.0	240.0	241.0	0.4	PASS
C-N	0.0	0.0	0.0	264.0	263.0	-0.4	PASS

Relay Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	13.000	13.000	0.00	PASS
B-N	13.000	13.000	0.00	PASS
C-N	13.000	13.000	0.00	PASS

Relay Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP CURRENT	IDEAL	%ERROR	OK?
A-N	1.796	1.800	-0.22	PASS
B-N	1.796	1.800	-0.22	PASS
C-N	1.796	1.800	-0.22	PASS

Relay Test Results for: 50P3P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P4P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P5P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P6P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE A OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE B OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE C OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.398	5.400	-0.04	PASS

Relay Test Results for: 50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		0.685	0.700	-2.14	PASS
B-N		0.699	0.700	-0.14	PASS
C-N		0.685	0.700	-2.14	PASS

Relay Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

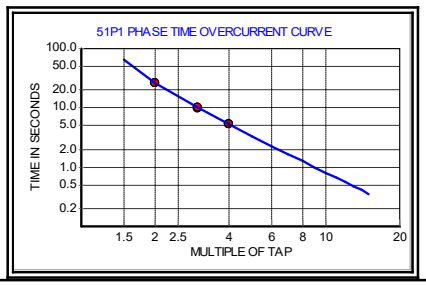
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.400	1576.44	26.274	26.667	-1.47	PASS
3.00	2.100	591.47	9.858	10.000	-1.42	PASS
4.00	2.800	318.57	5.310	5.333	-0.45	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.400	1605.69	26.762	26.667	0.36	PASS
3.00	2.100	602.90	10.048	10.000	0.48	PASS
4.00	2.800	316.63	5.277	5.333	-1.05	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.400	1596.33	26.606	26.667	-0.23	PASS
3.00	2.100	597.55	9.959	10.000	-0.41	PASS
4.00	2.800	318.74	5.312	5.333	-0.39	PASS



Relay Test Results for: 51P2P PHASE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P2 PHASE TIME OVERCURRENT CURVE

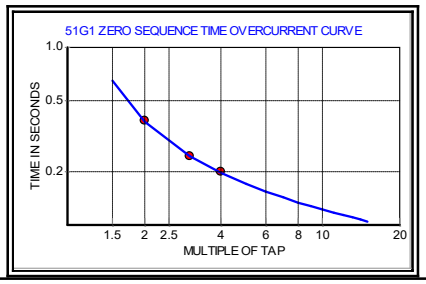
OK?
RAN

Relay Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.490	0.500	-2.00	PASS

Relay Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.000	23.05	0.384	0.384	0.08	PASS
3.00	1.500	14.74	0.246	0.245	0.09	PASS
4.00	2.000	12.05	0.201	0.196	2.36	PASS



Relay Test Results for: 51Q1P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q1 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51Q2P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q2 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: NEUTRAL TEST CONNECTIONS

OK?
RAN

Relay Test Results for: 50N1P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N2P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1P NEUTRAL TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1 NEUTRAL TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: RESTORE LOGIC SETTINGS

OK?
RAN

Relay Test Results for: RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

```
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE
```

Relay Test Results for: LOG OUT OF THE RELAY

OK?
RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-551.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 8.2 **Test Date:** 02/28/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	13.2 KV	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	CENTRAL ELECTRICAL BUILDING
POSITION:	52F15 UNIT SUB 5-SH	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	SEL-551
SERIAL_NUMBER:	1132620127	FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408
RELAY_ID:	AACI207024	CURRENT_TESTDATE:	2/28/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
CONTACT$="4"          'OUTPUT CONTACT TO MASK
SEL_AUTO=1            '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1            'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1              'NO ERROR MESSAGE IF NO OPERATION
```

Routine Notes:

Relay Settings Used for Testing:

```
RID$ = "52F15"
TID$ = "SUB 5 SH"
CTR = 120
CTRN = 120
TDURD = 9.000
s50P1P = 16.5
s50P2P = 3.5
s50P3P$ = "OFF"
s50P4P$ = "OFF"
s50P5P$ = "OFF"
s50P6P$ = "OFF"
s50ABCP$ = "OFF"
s51P1P = 1.2
s51P1C$ = "C3"
s51P1TD = 1.00
s51P1RS$ = "N"
s51P2P$ = "OFF"
s51P2C$ = "U3"
s51P2TD = 15.00
s51P2RS$ = "N"
s50N1P$ = "OFF"
s50N2P$ = "OFF"
s51N1P$ = "OFF"
s51N1C$ = "U4"
s51N1TD = 3.00
s51N1RS$ = "N"
s50G1P = 5.4
s50G2P$ = "OFF"
s51G1P = 0.5
s51G1C$ = "U1"
s51G1TD = 0.50
```

```
s51G1RS$ = "N"
s50Q1P$ = "OFF"
s50Q2P$ = "OFF"
s51Q1P$ = "OFF"
s51Q1C$ = "U3"
s51Q1TD = 15.00
s51Q1RS$ = "N"
s51Q2P$ = "OFF"
s51Q2C$ = "U3"
s51Q2TD = 15.00
s51Q2RS$ = "N"
s79OI1 = 0.000
s79OI2 = 600.000
s79OI3 = 0.000
s79OI4 = 0.000
s79RSD = 1800.000
s79RSLD = 300.000
CFD = 60.000
DMTC = 5
PDEMP = 5.00
NDEMP = 1.50
GDEMP = 1.50
QDEMP = 1.50
SV5PU = 0.000
SV5DO = 0.000
SV6PU = 0.000
SV6DO = 0.000
SV7PU = 0.000
SV7DO = 0.000
SV8PU = 0.000
SV8DO = 0.000
SV9PU = 0.000
SV9DO = 0.000
SV10PU = 0.000
SV10DO = 0.000
SV11PU = 0.000
SV11DO = 0.000
SV12PU = 0.000
SV12DO = 0.000
SV13PU = 0.000
SV13DO = 0.000
SV14PU = 0.000
SV14DO = 0.000
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
TR$ = "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "
ULTR$ = "!(51P1 + 51G1)"
s51P1TC = 1
s51P2TC = 1
s51N1TC = 1
s51G1TC = 1
s51Q1TC = 1
s51Q2TC = 1
s52A$ = "IN1"
CL$ = "LB4"
ULCL$ = "TRIP"
s79RI$ = "TRIP"
s79RIS$ = "IN1"
s79DTL$ = "!LB1 + LB3"
s79DLS$ = "79LO"
s79SKP$ = "50P2 * SH0"
s79STL$ = "TRIP"
```

```
s79BRS$ = "(51P1 + 51G1) * (79RS + 79CY)"
s79SEQ = 0
ER1$ = "51P1 + 51G1 + 51N1"
ER2 = 0
SV1 = 0
SV2 = 0
SV3 = 0
SV4 = 0
SV5 = 0
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
OUT1$ = "TRIP"
OUT2 = 0
OUT3 = 0
OUT4 = 0
DP1$ = "IN1"
DP2$ = "LB2"
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
```

Relay Test Results for: ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for: LOG INTO THE RELAY

OK?
RAN

Relay Test Results for: DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for: SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

Relay Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

52F15                              Date: 02/28/20    Time: 07:41:56.584
SUB 5 SH

FID=SEL-551-R514-Vf-Z002002-D20110408      CID=CCFD

SELF TESTS

W=Warn    F=Fail

       IA        IB        IC        IN        MOF
OS      3         3         3         3         0

       +5V_PS    +5V_REG   -5V_REG   +10V_PS   -10V_PS   VBAT
PS      4.98      5.03     -4.96      9.94     -10.00     3.48

       TEMP      RAM       ROM       CR_RAM    EEPROM
        27.6     OK        OK        OK        OK

 Relay Enabled

=>>
```

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR ELEMENT TEST

OK?
RAN

Relay Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	217.0	0.5	PASS
B-N	0.0	0.0	0.0	240.0	238.0	-0.8	PASS
C-N	0.0	0.0	0.0	264.0	263.0	-0.4	PASS

Relay Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		16.505	16.500	0.03	PASS
B-N		16.505	16.500	0.03	PASS
C-N		16.505	16.500	0.03	PASS

Relay Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		3.505	3.500	0.14	PASS
B-N		3.505	3.500	0.14	PASS
C-N		3.505	3.500	0.14	PASS

Relay Test Results for: 50P3P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P4P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P5P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P6P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE A OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE B OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE C OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.398	5.400	-0.04	PASS

Relay Test Results for: 50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		1.216	1.200	1.33	PASS
B-N		1.192	1.200	-0.67	PASS
C-N		1.204	1.200	0.33	PASS

Relay Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

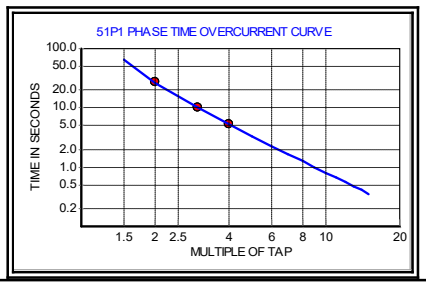
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.400	1614.49	26.908	26.667	0.91	PASS
3.00	3.600	601.12	10.019	10.000	0.19	PASS
4.00	4.800	321.55	5.359	5.333	0.48	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.400	1632.34	27.206	26.667	2.02	PASS
3.00	3.600	603.10	10.052	10.000	0.52	PASS
4.00	4.800	323.38	5.390	5.333	1.06	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.400	1613.34	26.889	26.667	0.83	PASS
3.00	3.600	599.06	9.984	10.000	-0.16	PASS
4.00	4.800	318.50	5.308	5.333	-0.47	PASS



Relay Test Results for: 51P2P PHASE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P2 PHASE TIME OVERCURRENT CURVE

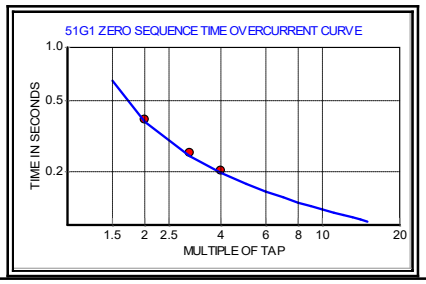
OK?
RAN

Relay Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.495	0.500	-1.00	PASS

Relay Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.000	23.51	0.392	0.384	2.11	PASS
3.00	1.500	15.25	0.254	0.245	3.56	PASS
4.00	2.000	12.11	0.202	0.196	2.82	PASS



Relay Test Results for: 51Q1P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q1 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51Q2P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q2 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: NEUTRAL TEST CONNECTIONS

OK?
RAN

Relay Test Results for: 50N1P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N2P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1P NEUTRAL TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1 NEUTRAL TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: RESTORE LOGIC SETTINGS

OK?
RAN

Relay Test Results for: RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

```
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE
```

Relay Test Results for: LOG OUT OF THE RELAY

OK?
RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-551.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 8.2 **Test Date:** 03/02/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	13.2 KV	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	CENTRAL ELECTRICAL BUILDING
POSITION:	52F17 UNIT SUB 7-CEB	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	SEL-551
SERIAL_NUMBER:	1132620130	FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408
RELAY_ID:	AACI207024	CURRENT_TESTDATE:	3/2/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
CONTACT$="4"          'OUTPUT CONTACT TO MASK
SEL_AUTO=1            '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1            'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1              'NO ERROR MESSAGE IF NO OPERATION
```

Routine Notes:

Relay Settings Used for Testing:

```
RID$ = "FDR-52F17"
TID$ = "SUB 7 CEB"
CTR = 120
CTRN = 120
TDURD = 9.000
s50P1P = 13.0
s50P2P = 3.2
s50P3P$ = "OFF"
s50P4P$ = "OFF"
s50P5P$ = "OFF"
s50P6P$ = "OFF"
s50ABCP$ = "OFF"
s51P1P = 1.0
s51P1C$ = "C3"
s51P1TD = 1.00
s51P1RS$ = "N"
s51P2P$ = "OFF"
s51P2C$ = "U3"
s51P2TD = 15.00
s51P2RS$ = "N"
s50N1P$ = "OFF"
s50N2P$ = "OFF"
s51N1P$ = "OFF"
s51N1C$ = "U4"
s51N1TD = 3.00
s51N1RS$ = "N"
s50G1P = 5.4
s50G2P$ = "OFF"
s51G1P = 0.5
s51G1C$ = "U1"
s51G1TD = 0.50
```

```
s51G1RS$ = "N"
s50Q1P$ = "OFF"
s50Q2P$ = "OFF"
s51Q1P$ = "OFF"
s51Q1C$ = "U3"
s51Q1TD = 15.00
s51Q1RS$ = "N"
s51Q2P$ = "OFF"
s51Q2C$ = "U3"
s51Q2TD = 15.00
s51Q2RS$ = "N"
s79OI1 = 0.000
s79OI2 = 600.000
s79OI3 = 0.000
s79OI4 = 0.000
s79RSD = 1800.000
s79RSLD = 300.000
CFD = 60.000
DMTC = 5
PDEMP = 5.00
NDEMP = 1.50
GDEMP = 1.50
QDEMP = 1.50
SV5PU = 0.000
SV5DO = 0.000
SV6PU = 0.000
SV6DO = 0.000
SV7PU = 0.000
SV7DO = 0.000
SV8PU = 0.000
SV8DO = 0.000
SV9PU = 0.000
SV9DO = 0.000
SV10PU = 0.000
SV10DO = 0.000
SV11PU = 0.000
SV11DO = 0.000
SV12PU = 0.000
SV12DO = 0.000
SV13PU = 0.000
SV13DO = 0.000
SV14PU = 0.000
SV14DO = 0.000
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
TR$ = "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "
ULTR$ = "!(51P1 + 51G1)"
s51P1TC = 1
s51P2TC = 1
s51N1TC = 1
s51G1TC = 1
s51Q1TC = 1
s51Q2TC = 1
s52A$ = "IN1"
CL$ = "LB4"
ULCL$ = "TRIP"
s79RI$ = "TRIP"
s79RIS$ = "IN1"
s79DTL$ = "!LB1 + LB3"
s79DLS$ = "79LO"
s79SKP$ = "50P2 * SH0"
s79STL$ = "TRIP"
```

```
s79BRS$ = "(51P1 + 51G1) * (79RS + 79CY)"
s79SEQ = 0
ER1$ = "51P1 + 51G1 + 51N1"
ER2 = 0
SV1 = 0
SV2 = 0
SV3 = 0
SV4 = 0
SV5 = 0
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
OUT1$ = "TRIP"
OUT2 = 0
OUT3 = 0
OUT4 = 0
DP1$ = "IN1"
DP2$ = "LB2"
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
```

Relay Test Results for: ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for: LOG INTO THE RELAY

OK?
RAN

Relay Test Results for: DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for: SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

Relay Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

FDR-52F17                          Date: 03/02/20    Time: 06:49:29.704
SUB 7 CEB

FID=SEL-551-R514-Vf-Z002002-D20110408      CID=CCFD

SELF TESTS

W=Warn    F=Fail

       IA       IB       IC       IN       MOF
OS      3        3        3        3        0

       +5V_PS   +5V_REG  -5V_REG  +10V_PS  -10V_PS  VBAT
PS      4.96     5.01    -4.96     9.94    -9.95     3.44

       TEMP     RAM      ROM      CR_RAM   EEPROM
        29.6    OK       OK       OK       OK

 Relay Enabled

=>>
```

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR ELEMENT TEST

OK?
RAN

Relay Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	213.0	-1.4	PASS
B-N	0.0	0.0	0.0	240.0	238.0	-0.8	PASS
C-N	0.0	0.0	0.0	264.0	262.0	-0.8	PASS

Relay Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		13.000	13.000	0.00	PASS
B-N		13.000	13.000	0.00	PASS
C-N		13.000	13.000	0.00	PASS

Relay Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		3.204	3.200	0.12	PASS
B-N		3.204	3.200	0.12	PASS
C-N		3.204	3.200	0.12	PASS

Relay Test Results for: 50P3P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P4P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P5P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P6P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE A OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE B OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE C OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.398	5.400	-0.04	PASS

Relay Test Results for: 50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		1.020	1.000	2.00	PASS
B-N		0.990	1.000	-1.00	PASS
C-N		0.990	1.000	-1.00	PASS

Relay Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

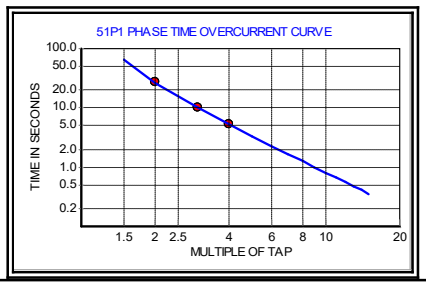
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.000	1635.80	27.263	26.667	2.24	PASS
3.00	3.000	604.82	10.080	10.000	0.80	PASS
4.00	4.000	319.79	5.330	5.333	-0.07	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.000	1619.19	26.986	26.667	1.20	PASS
3.00	3.000	600.46	10.008	10.000	0.08	PASS
4.00	4.000	319.96	5.333	5.333	-0.01	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.000	1639.82	27.330	26.667	2.49	PASS
3.00	3.000	600.37	10.006	10.000	0.06	PASS
4.00	4.000	321.13	5.352	5.333	0.35	PASS



Relay Test Results for: 51P2P PHASE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P2 PHASE TIME OVERCURRENT CURVE

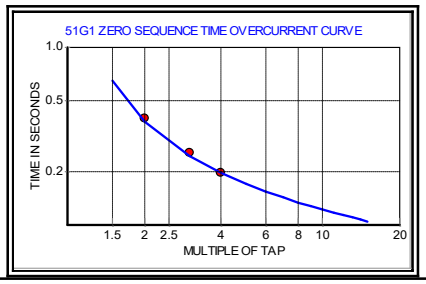
OK?
RAN

Relay Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.510	0.500	2.00	PASS

Relay Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.000	23.72	0.395	0.384	2.99	PASS
3.00	1.500	15.22	0.254	0.245	3.35	PASS
4.00	2.000	11.87	0.198	0.196	0.78	PASS



Relay Test Results for: 51Q1P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q1 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51Q2P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q2 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: NEUTRAL TEST CONNECTIONS

OK?
RAN

Relay Test Results for: 50N1P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N2P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1P NEUTRAL TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1 NEUTRAL TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: RESTORE LOGIC SETTINGS

OK?
RAN

Relay Test Results for: RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

```
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE
```

Relay Test Results for: LOG OUT OF THE RELAY

OK?
RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-551.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 8.2 **Test Date:** 05/08/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	13.2 KV	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	CENTRAL ELECTRICAL BUILDING
POSITION:	52F19 SPACE 6 TOP	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	SEL-551
SERIAL_NUMBER:	1132620129	FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408
RELAY_ID:	50/51	CURRENT_TESTDATE:	5/8/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
CONTACT$="4"          'OUTPUT CONTACT TO MASK
SEL_AUTO=1            '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1            'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1              'NO ERROR MESSAGE IF NO OPERATION
```

Routine Notes:

»Fri May 08, 2020
JOB # AACI207024

Relay Settings Used for Testing:

```
RID$ = "52F19"
TID$ = "SPACE 6-TOP"
CTR = 120
CTRN = 120
TDURD = 9.000
s50P1P = 13.0
s50P2P = 1.3
s50P3P$ = "OFF"
s50P4P$ = "OFF"
s50P5P$ = "OFF"
s50P6P$ = "OFF"
s50ABCP$ = "OFF"
s51P1P = 0.6
s51P1C$ = "C3"
s51P1TD = 1.00
s51P1RS$ = "N"
s51P2P$ = "OFF"
s51P2C$ = "U3"
s51P2TD = 15.00
s51P2RS$ = "N"
s50N1P$ = "OFF"
s50N2P$ = "OFF"
s51N1P$ = "OFF"
s51N1C$ = "U4"
s51N1TD = 3.00
s51N1RS$ = "N"
s50G1P = 5.4
s50G2P$ = "OFF"
s51G1P = 0.5
s51G1C$ = "U1"
s51G1TD = 0.50
```

```
s51G1RS$ = "N"
s50Q1P$ = "OFF"
s50Q2P$ = "OFF"
s51Q1P$ = "OFF"
s51Q1C$ = "U3"
s51Q1TD = 15.00
s51Q1RS$ = "N"
s51Q2P$ = "OFF"
s51Q2C$ = "U3"
s51Q2TD = 15.00
s51Q2RS$ = "N"
s79OI1 = 0.000
s79OI2 = 600.000
s79OI3 = 0.000
s79OI4 = 0.000
s79RSD = 1800.000
s79RSLD = 300.000
CFD = 60.000
DMTC = 5
PDEMP = 5.00
NDEMP = 1.50
GDEMP = 1.50
QDEMP = 1.50
SV5PU = 0.000
SV5DO = 0.000
SV6PU = 0.000
SV6DO = 0.000
SV7PU = 0.000
SV7DO = 0.000
SV8PU = 0.000
SV8DO = 0.000
SV9PU = 0.000
SV9DO = 0.000
SV10PU = 0.000
SV10DO = 0.000
SV11PU = 0.000
SV11DO = 0.000
SV12PU = 0.000
SV12DO = 0.000
SV13PU = 0.000
SV13DO = 0.000
SV14PU = 0.000
SV14DO = 0.000
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
TR$ = "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "
ULTR$ = "!(51P1 + 51G1)"
s51P1TC = 1
s51P2TC = 1
s51N1TC = 1
s51G1TC = 1
s51Q1TC = 1
s51Q2TC = 1
s52A$ = "IN1"
CL$ = "LB4"
ULCL$ = "TRIP"
s79RI$ = "TRIP"
s79RIS$ = "IN1"
s79DTL$ = "!LB1 + LB3"
s79DLS$ = "79LO"
s79SKP$ = "50P2 * SH0"
s79STL$ = "TRIP"
```

```
s79BRS$ = "(51P1 + 51G1) * (79RS + 79CY)"
s79SEQ = 0
ER1$ = "51P1 + 51G1 + 51N1"
ER2 = 0
SV1 = 0
SV2 = 0
SV3 = 0
SV4 = 0
SV5 = 0
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
OUT1$ = "TRIP"
OUT2 = 0
OUT3 = 0
OUT4 = 0
DP1$ = "IN1"
DP2$ = "LB2"
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
```

Relay Test Results for: ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for: LOG INTO THE RELAY

OK?
RAN

Relay Test Results for: DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for: SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

Relay Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

52F19                              Date: 05/08/20    Time: 08:06:05.470
SPACE 6-TOP

FID=SEL-551-R514-Vf-Z002002-D20110408      CID=CCFD

SELF TESTS

W=Warn    F=Fail

       IA       IB       IC       IN       MOF
OS      3        3        3        3        0

       +5V_PS   +5V_REG  -5V_REG  +10V_PS  -10V_PS  VBAT
PS      4.98     5.01    -4.98     9.90    -9.97     3.45

       TEMP     RAM      ROM      CR_RAM   EEPROM
        27.6    OK       OK       OK       OK

 Relay Enabled

=>>
```

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR ELEMENT TEST

OK?
RAN

Relay Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	213.0	-1.4	PASS
B-N	0.0	0.0	0.0	240.0	239.0	-0.4	PASS
C-N	0.0	0.0	0.0	264.0	264.0	0.0	PASS

Relay Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		13.000	13.000	0.00	PASS
B-N		13.000	13.000	0.00	PASS
C-N		13.130	13.000	1.00	PASS

Relay Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		1.314	1.300	1.08	PASS
B-N		1.301	1.300	0.08	PASS
C-N		1.301	1.300	0.08	PASS

Relay Test Results for: 50P3P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P4P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P5P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P6P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE A OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE B OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE C OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.398	5.400	-0.04	PASS

Relay Test Results for: 50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		0.608	0.600	1.33	PASS
B-N		0.608	0.600	1.33	PASS
C-N		0.608	0.600	1.33	PASS

Relay Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

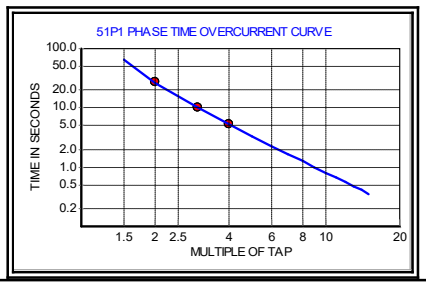
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1647.99	27.466	26.667	3.00	PASS
3.00	1.800	600.05	10.001	10.000	0.01	PASS
4.00	2.400	322.87	5.381	5.333	0.90	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1649.56	27.493	26.667	3.10	PASS
3.00	1.800	609.44	10.157	10.000	1.57	PASS
4.00	2.400	324.46	5.408	5.333	1.39	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1674.98	27.916	26.667	4.69	PASS
3.00	1.800	608.41	10.140	10.000	1.40	PASS
4.00	2.400	325.20	5.420	5.333	1.62	PASS



Relay Test Results for: 51P2P PHASE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P2 PHASE TIME OVERCURRENT CURVE

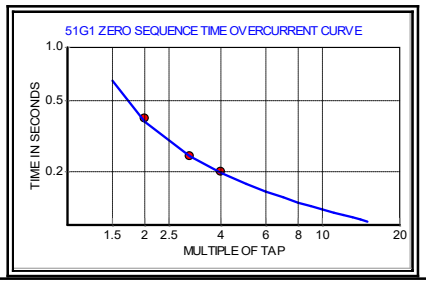
OK?
RAN

Relay Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.515	0.500	3.00	PASS

Relay Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.000	23.88	0.398	0.384	3.70	PASS
3.00	1.500	14.73	0.246	0.245	0.05	PASS
4.00	2.000	11.96	0.199	0.196	1.55	PASS



Relay Test Results for: 51Q1P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q1 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51Q2P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q2 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: NEUTRAL TEST CONNECTIONS

OK?
RAN

Relay Test Results for: 50N1P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N2P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1P NEUTRAL TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1 NEUTRAL TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: RESTORE LOGIC SETTINGS

OK?
RAN

Relay Test Results for: RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

```
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE
```

Relay Test Results for: LOG OUT OF THE RELAY

OK?
RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-551.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 8.2 **Test Date:** 02/25/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	13.2 KV	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	CENTRAL ELECTRICAL BUILDING
POSITION:	52F21 UNIT SUB 1-RSLS	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	SEL-551
SERIAL_NUMBER:	1132620135	FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408
RELAY_ID:	AACI207024	CURRENT_TESTDATE:	2/25/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
CONTACT$="4"          'OUTPUT CONTACT TO MASK
SEL_AUTO=1            '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1            'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1              'NO ERROR MESSAGE IF NO OPERATION
```

Routine Notes:

Relay Settings Used for Testing:

```
RID$ = "52F21"
TID$ = "SUB 1 RSLS"
CTR = 120
CTRN = 120
TDURD = 9.000
s50P1P = 13.0
s50P2P = 1.8
s50P3P$ = "OFF"
s50P4P$ = "OFF"
s50P5P$ = "OFF"
s50P6P$ = "OFF"
s50ABCP$ = "OFF"
s51P1P = 0.7
s51P1C$ = "C3"
s51P1TD = 1.00
s51P1RS$ = "N"
s51P2P$ = "OFF"
s51P2C$ = "U3"
s51P2TD = 15.00
s51P2RS$ = "N"
s50N1P$ = "OFF"
s50N2P$ = "OFF"
s51N1P$ = "OFF"
s51N1C$ = "U4"
s51N1TD = 3.00
s51N1RS$ = "N"
s50G1P = 5.4
s50G2P$ = "OFF"
s51G1P = 0.5
s51G1C$ = "U1"
s51G1TD = 0.50
```

```
s51G1RS$ = "N"
s50Q1P$ = "OFF"
s50Q2P$ = "OFF"
s51Q1P$ = "OFF"
s51Q1C$ = "U3"
s51Q1TD = 15.00
s51Q1RS$ = "N"
s51Q2P$ = "OFF"
s51Q2C$ = "U3"
s51Q2TD = 15.00
s51Q2RS$ = "N"
s79OI1 = 0.000
s79OI2 = 600.000
s79OI3 = 0.000
s79OI4 = 0.000
s79RSD = 1800.000
s79RSLD = 300.000
CFD = 60.000
DMTC = 5
PDEMP = 5.00
NDEMP = 1.50
GDEMP = 1.50
QDEMP = 1.50
SV5PU = 0.000
SV5DO = 0.000
SV6PU = 0.000
SV6DO = 0.000
SV7PU = 0.000
SV7DO = 0.000
SV8PU = 0.000
SV8DO = 0.000
SV9PU = 0.000
SV9DO = 0.000
SV10PU = 0.000
SV10DO = 0.000
SV11PU = 0.000
SV11DO = 0.000
SV12PU = 0.000
SV12DO = 0.000
SV13PU = 0.000
SV13DO = 0.000
SV14PU = 0.000
SV14DO = 0.000
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
TR$ = "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "
ULTR$ = "!(51P1 + 51G1)"
s51P1TC = 1
s51P2TC = 1
s51N1TC = 1
s51G1TC = 1
s51Q1TC = 1
s51Q2TC = 1
s52A$ = "IN1"
CL$ = "LB4"
ULCL$ = "TRIP"
s79RI$ = "TRIP"
s79RIS$ = "IN1"
s79DTL$ = "!LB1 + LB3"
s79DLS$ = "79LO"
s79SKP$ = "50P2 * SH0"
s79STL$ = "TRIP"
```

```
s79BRS$ = "(51P1 + 51G1) * (79RS + 79CY)"
s79SEQ = 0
ER1$ = "51P1 + 51G1 + 51N1"
ER2 = 0
SV1 = 0
SV2 = 0
SV3 = 0
SV4 = 0
SV5 = 0
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
OUT1$ = "TRIP"
OUT2 = 0
OUT3 = 0
OUT4 = 0
DP1$ = "IN1"
DP2$ = "LB2"
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
```

Relay Test Results for: ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for: LOG INTO THE RELAY

OK?
RAN

Relay Test Results for: DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for: SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

Relay Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

52F21                              Date: 02/25/20    Time: 06:57:41.977
SUB 1 RSLS

FID=SEL-551-R514-Vf-Z002002-D20110408      CID=CCFD

SELF TESTS

W=Warn    F=Fail

       IA       IB       IC       IN       MOF
OS      3        3        3        3        0

       +5V_PS   +5V_REG  -5V_REG  +10V_PS  -10V_PS  VBAT
PS      4.98     5.03    -4.96     9.90    -9.92     3.46

       TEMP     RAM      ROM      CR_RAM   EEPROM
        30.7    OK       OK       OK       OK

 Relay Enabled

=>>
```

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR ELEMENT TEST

OK?
RAN

Relay Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	213.0	-1.4	PASS
B-N	0.0	0.0	0.0	240.0	237.0	-1.2	PASS
C-N	0.0	0.0	0.0	264.0	265.0	0.4	PASS

Relay Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		13.130	13.000	1.00	PASS
B-N		13.000	13.000	0.00	PASS
C-N		13.000	13.000	0.00	PASS

Relay Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		1.814	1.800	0.78	PASS
B-N		1.814	1.800	0.78	PASS
C-N		1.796	1.800	-0.22	PASS

Relay Test Results for: 50P3P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P4P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P5P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P6P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE A OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE B OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE C OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.398	5.400	-0.04	PASS

Relay Test Results for: 50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		0.699	0.700	-0.14	PASS
B-N		0.699	0.700	-0.14	PASS
C-N		0.692	0.700	-1.14	PASS

Relay Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

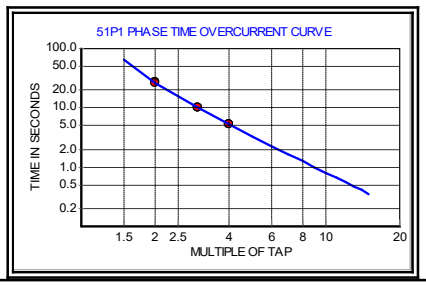
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.400	1670.33	27.839	26.667	4.40	PASS
3.00	2.100	606.70	10.112	10.000	1.12	PASS
4.00	2.800	325.12	5.419	5.333	1.60	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.400	1621.13	27.019	26.667	1.32	PASS
3.00	2.100	612.99	10.216	10.000	2.16	PASS
4.00	2.800	319.51	5.325	5.333	-0.15	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.400	1598.54	26.642	26.667	-0.09	PASS
3.00	2.100	599.99	10.000	10.000	-0.00	PASS
4.00	2.800	321.16	5.353	5.333	0.36	PASS



Relay Test Results for: 51P2P PHASE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P2 PHASE TIME OVERCURRENT CURVE

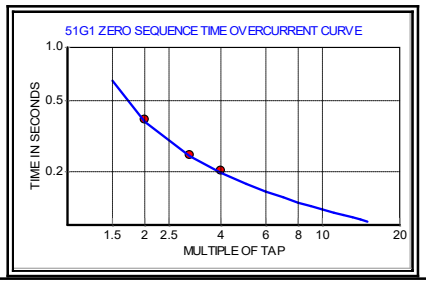
OK?
RAN

Relay Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.475	0.500	-5.00	PASS

Relay Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.000	23.60	0.393	0.384	2.50	PASS
3.00	1.500	14.93	0.249	0.245	1.44	PASS
4.00	2.000	12.07	0.201	0.196	2.52	PASS



Relay Test Results for: 51Q1P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q1 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51Q2P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q2 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: NEUTRAL TEST CONNECTIONS

OK?
RAN

Relay Test Results for: 50N1P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N2P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1P NEUTRAL TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1 NEUTRAL TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: RESTORE LOGIC SETTINGS

OK?
RAN

Relay Test Results for: RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

```
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE
```

Relay Test Results for: LOG OUT OF THE RELAY

OK?
RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-587Z.FST_LIB **AF/AL:** AL **Pass/Fail:** FAIL

Lib Version: 8.1 **Test Date:** 05/12/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	13.2 KV	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	CENTRAL ELECTRICAL BUILDING
POSITION:	BUS 1 DIFFERENTIAL	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-587Z	MODEL_STYLE:	0587Z0X325512XX
IEEE_DEVICE:	MF	IL_IB:	SEL-587Z
SERIAL_NUMBER:	1132880091	FIRMWARE:	SEL-587Z-R102-V0-Z001001-D20020903
RELAY_ID:	87B1	CURRENT_TESTDATE:	5/12/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
CONTACT$="4"          'OUTPUT CONTACT TO MASK
SEL_AUTO=1            '0=MANUAL, 1=AUTO MASK, 2=MANUAL W/MESSAGES
SKIP_TST=1            'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1              'NO ERROR MESSAGE IF NO OPERATION
```

Routine Notes:

»Tue May 12, 2020
JOB # AACI207024

CURRENT\VOLTAGE INJECTION METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
120.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	120.0	91.0	-24.2	480.0	478.0	-0.4	FAIL
B-N	120.0	122.0	1.7	480.0	480.0	0.0	PASS
C-N	120.0	122.0	1.7	480.0	480.0	0.0	PASS

CALCULATED MEGA WATT	MEASURED MEGA WATT	% ERROR	CALCULATED MEGA VAR	MEASURED MEGA VAR	% ERROR	OK?
0.0	0.0	0.0	0.0	0.0	0.0	PASS

Relay Settings Used for Testing:

```
RID$ = "BUS 1"
TID$ = "STATION A"
CTR = 240
TDURD = 9.000
s87A1P = 200
s87A2P = 90
s87B1P = 200
s87B2P = 90
s87C1P = 200
s87C2P = 90
s50P1P$ = "OFF"
s50P2P$ = "OFF"
s50P3P$ = "OFF"
s50A1P$ = "OFF"
s50A2P$ = "OFF"
s50B1P$ = "OFF"
s50B2P$ = "OFF"
```

```
s50C1P$ = "OFF"
s50C2P$ = "OFF"
s51PP$ = "OFF"
s51PC$ = "U3"
s51PTD = 15.00
s51PRS$ = "N"
s51AP$ = "OFF"
s51AC$ = "U3"
s51ATD = 15.00
s51ARS$ = "N"
s51BP$ = "OFF"
s51BC$ = "U3"
s51BTD = 15.00
s51BRS$ = "N"
s51CP$ = "OFF"
s51CC$ = "U3"
s51CTD = 15.00
s51CRS$ = "N"
s50G1P$ = "OFF"
s50G2P$ = "OFF"
s51GP$ = "OFF"
s51GC$ = "U3"
s51GTD = 15.00
s51GRS$ = "N"
s50Q1P$ = "OFF"
s50Q2P$ = "OFF"
s51QP$ = "OFF"
s51QC$ = "U3"
s51QTD = 15.00
s51QRS$ = "N"
CFD = 60.000
DMTC = 5
PDEMP = 5.00
GDEMP = 1.50
QDEMP = 1.50
SV5PU = 120.000
SV5DO = 0.000
SV6PU = 15.000
SV6DO = 0.000
SV7PU = 0.000
SV7DO = 0.000
SV8PU = 0.000
SV8DO = 0.000
SV9PU = 0.000
SV9DO = 0.000
SV10PU = 0.000
SV10DO = 0.000
SV11PU = 0.000
SV11DO = 0.000
SV12PU = 0.000
SV12DO = 0.000
SV13PU = 0.000
SV13DO = 0.000
SV14PU = 0.000
SV14DO = 0.000
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
TR1$ = "87A1 + 87B1 + 87C1 + 50A1 + 50B1 + 50C1"
TR2 = 0
TR3 = 0
ULTR1$ = "!87A2 * !87B2 * !87C2 * !50A2 * !50B2 * !50C2 "
ULTR2 = 1
```

```
ULTR3 = 1
s51PTC = 1
s51ATC = 1
s51BTC = 1
s51CTC = 1
s51GTC = 1
s51QTC = 1
s52A = 0
CL = 0
ULCL$ = "TRIP1"
ER1$ = "87A1 + 87B1 + 87C1"
ER2$ = "87A2 + 87B2 + 87C2"
SV1 = 0
SV2 = 0
SV3 = 0
SV4 = 0
SV5 = 0
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
OUT1$ = "TRIP1"
OUT2$ = "TRIP1"
OUT3 = 0
OUT4 = 0
DP1 = 0
DP2 = 0
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
P1_PROTO$ = "SEL"
P1_SPEED = 2400
P1_BITS = 8
P1_PARITY$ = "N"
P1_STOP = 1
P1_T_OUT = 15
P1_AUTO$ = "N"
P1_RTSCTS$ = "N"
P1_FASTOP$ = "N"
PF_PROTO$ = "SEL"
PF_SPEED = 19200
PF_BITS = 8
PF_PARITY$ = "N"
PF_STOP = 1
PF_T_OUT = 15
PF_AUTO$ = "N"
PF_RTSCTS$ = "N"
PF_FASTOP$ = "N"
```

Relay Test Results for: ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for: LOG INTO THE RELAY

OK?
RAN

Relay Test Results for: DOWNLOAD RELAY SETTINGS

Relay Test Results for: DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for: SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

N/A

Additional Data:
STA

BUS 1 Date: 05/12/2020 Time: 07:47:46.493
STATION A

FID=SEL-587Z-R102-V0-Z001001-D20020903 CID=0C9F

SELF TESTS

W=Warn F=Fail

	87A	87B	87C	IA	IB	IC	MOF
OS	3	3	3	3	3	3	0

	+5V_PS	+5V_REG	-5V_REG	+10V_PS	-10V_PS	VBAT
PS	4.99	5.03	-4.93	10.04	-10.00	3.45

TEMP	RAM	ROM	CR_RAM	EEPROM
28.6	OK	OK	OK	OK

Relay Enabled

=>>

Relay Test Results for: CURRENT\VOLTAGE INJECTION TEST CONNECTIONS

OK?
RAN

Relay Test Results for: CURRENT\VOLTAGE INJECTION METER TEST

OK?
RAN

Relay Test Results for: RELAY OUTPUT VERIFICATION

Verify operation of the RELAY OUTPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that OUTPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR ELEMENT TESTS

OK?
RAN

Relay Test Results for: 87A1P PHASE A VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
264.000	200.000	32.00	FAIL

Relay Test Results for: 87A2P PHASE A VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
119.700	90.000	33.00	FAIL

Relay Test Results for: 87B1P PHASE B VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
198.000	200.000	-1.00	PASS

Relay Test Results for: 87B2P PHASE B VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
89.100	90.000	-1.00	PASS

Relay Test Results for: 87C1P PHASE C VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
196.000	200.000	-2.00	PASS

Relay Test Results for: 87C2P PHASE C VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
89.100	90.000	-1.00	PASS

Relay Test Results for: RESTORE LOGIC SETTINGS

OK?
RAN

Relay Test Results for: RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

```
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE
```

Relay Test Results for: LOG OUT OF THE RELAY

OK?
RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-587Z.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 8.1 **Test Date:** 05/13/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	13.2 KV	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	CENTRAL ELECTRICAL BUILDING
POSITION:	BUS 2 DIFFERENTIAL	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-587Z	MODEL_STYLE:	0587Z0X325512XX
IEEE_DEVICE:	MF	IL_IB:	SEL-587Z
SERIAL_NUMBER:	1132480473	FIRMWARE:	SEL-587Z-R102-V0-Z001001-D20020903
RELAY_ID:	87B2	CURRENT_TESTDATE:	5/13/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
CONTACT$="4"          'OUTPUT CONTACT TO MASK
SEL_AUTO=1            '0=MANUAL, 1=AUTO MASK, 2=MANUAL W/MESSAGES
SKIP_TST=1            'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1              'NO ERROR MESSAGE IF NO OPERATION
```

Routine Notes:

»Wed May 13, 2020
JOB # AACI207024

CURRENT\VOLTAGE INJECTION METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
120.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	120.0	122.0	1.7	480.0	480.0	0.0	PASS
B-N	120.0	121.0	0.8	480.0	482.0	0.4	PASS
C-N	120.0	122.0	1.7	480.0	480.0	0.0	PASS

CALCULATED MEGA WATT	MEASURED MEGA WATT	% ERROR	CALCULATED MEGA VAR	MEASURED MEGA VAR	% ERROR	OK?
0.0	0.0	0.0	0.0	0.0	0.0	PASS

Relay Settings Used for Testing:

```
RID$ = "BUS 2"
TID$ = "STATION A"
CTR = 240
TDURD = 9.000
s87A1P = 200
s87A2P = 90
s87B1P = 200
s87B2P = 90
s87C1P = 200
s87C2P = 90
s50P1P$ = "OFF"
s50P2P$ = "OFF"
s50P3P$ = "OFF"
s50A1P$ = "OFF"
s50A2P$ = "OFF"
s50B1P$ = "OFF"
```

```
s50B2P$ = "OFF"
s50C1P$ = "OFF"
s50C2P$ = "OFF"
s51PP$ = "OFF"
s51PC$ = "U3"
s51PTD = 15.00
s51PRS$ = "N"
s51AP$ = "OFF"
s51AC$ = "U3"
s51ATD = 15.00
s51ARS$ = "N"
s51BP$ = "OFF"
s51BC$ = "U3"
s51BTD = 15.00
s51BRS$ = "N"
s51CP$ = "OFF"
s51CC$ = "U3"
s51CTD = 15.00
s51CRS$ = "N"
s50G1P$ = "OFF"
s50G2P$ = "OFF"
s51GP$ = "OFF"
s51GC$ = "U3"
s51GTD = 15.00
s51GRS$ = "N"
s50Q1P$ = "OFF"
s50Q2P$ = "OFF"
s51QP$ = "OFF"
s51QC$ = "U3"
s51QTD = 15.00
s51QRS$ = "N"
CFD = 60.000
DMTC = 5
PDEMP = 5.00
GDEMP = 1.50
QDEMP = 1.50
SV5PU = 120.000
SV5DO = 0.000
SV6PU = 15.000
SV6DO = 0.000
SV7PU = 0.000
SV7DO = 0.000
SV8PU = 0.000
SV8DO = 0.000
SV9PU = 0.000
SV9DO = 0.000
SV10PU = 0.000
SV10DO = 0.000
SV11PU = 0.000
SV11DO = 0.000
SV12PU = 0.000
SV12DO = 0.000
SV13PU = 0.000
SV13DO = 0.000
SV14PU = 0.000
SV14DO = 0.000
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
TR1$ = "87A1 + 87B1 + 87C1 + 50A1 + 50B1 + 50C1"
TR2 = 0
TR3 = 0
ULTR1$ = "!87A2 * !87B2 * !87C2 * !50A2 * !50B2 * !50C2 "
```

```
ULTR2 = 1
ULTR3 = 1
s51PTC = 1
s51ATC = 1
s51BTC = 1
s51CTC = 1
s51GTC = 1
s51QTC = 1
s52A = 0
CL = 0
ULCL$ = "TRIP1"
ER1$ = "87A1 + 87B1 + 87C1"
ER2$ = "87A2 + 87B2 + 87C2"
SV1 = 0
SV2 = 0
SV3 = 0
SV4 = 0
SV5 = 0
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
OUT1$ = "TRIP1"
OUT2 = 0
OUT3 = 0
OUT4 = 0
DP1 = 0
DP2 = 0
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
P1_PROTO$ = "SEL"
P1_SPEED = 2400
P1_BITS = 8
P1_PARITY$ = "N"
P1_STOP = 1
P1_T_OUT = 15
P1_AUTO$ = "N"
P1_RTSCTS$ = "N"
P1_FASTOP$ = "N"
PF_PROTO$ = "SEL"
PF_SPEED = 19200
PF_BITS = 8
PF_PARITY$ = "N"
PF_STOP = 1
PF_T_OUT = 15
PF_AUTO$ = "N"
PF_RTSCTS$ = "N"
PF_FASTOP$ = "N"
```

Relay Test Results for: ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for: LOG INTO THE RELAY

OK?
RAN

Relay Test Results for: DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for: SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

N/A

Additional Data:
STA

BUS 2 Date: 05/13/2020 Time: 05:54:52.677
STATION A

FID=SEL-587Z-R102-V0-Z001001-D20020903 CID=0C9F

SELF TESTS

W=Warn F=Fail

	87A	87B	87C	IA	IB	IC	MOF
OS	3	3	3	3	2	3	0

	+5V_PS	+5V_REG	-5V_REG	+10V_PS	-10V_PS	VBAT
PS	4.99	4.99	-5.01	9.97	-10.04	3.47

TEMP	RAM	ROM	CR_RAM	EEPROM
32.8	OK	OK	OK	OK

Relay Enabled

=>>

Relay Test Results for: RELAY INPUT VERIFICATION

Verify operation of the RELAY INPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that INPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Relay Test Results for: RELAY OUTPUT VERIFICATION

Relay Test Results for: RELAY OUTPUT VERIFICATION

Verify operation of the RELAY OUTPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that OUTPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR ELEMENT TESTS

OK?
RAN

Relay Test Results for: 87A1P PHASE A VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
198.000	200.000	-1.00	PASS

Relay Test Results for: 87A2P PHASE A VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
88.200	90.000	-2.00	PASS

Relay Test Results for: 87B1P PHASE B VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
198.000	200.000	-1.00	PASS

Relay Test Results for: 87B2P PHASE B VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
90.000	90.000	0.00	PASS

Relay Test Results for: 87C1P PHASE C VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
196.000	200.000	-2.00	PASS

Relay Test Results for: 87C2P PHASE C VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
89.100	90.000	-1.00	PASS

Relay Test Results for: RESTORE LOGIC SETTINGS

OK?
RAN

Relay Test Results for: RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

```
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE
```

Relay Test Results for: LOG OUT OF THE RELAY

OK?
RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-351A.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 8.3 **Test Date:** 05/08/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	13.2 KV	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	CENTRAL ELECTRICAL BUILDING
POSITION:	521B BUS1-BUS2 ISO BKR	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-351A	MODEL_STYLE:	0351A050X3A54X1
IEEE_DEVICE:	MF	IL_IB:	SEL-351A
SERIAL_NUMBER:	1132770404	FIRMWARE:	SEL-351A-R515-V0-Z105104-D20130620
RELAY_ID:	ISOLATION TIE BREAKER	CURRENT_TESTDATE:	5/8/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
SET_GROUP$="1"       'SET GROUP TO TEST
CONTACT$="107"       'OUTPUT CONTACT TO MASK
SEL_AUTO=1           '0=MANUAL, 1=AUTO MASK, 2=MANUAL W/MESSAGES
SKIP_TST=1           'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1             'NO ERROR MESSAGE IF NO OPERATION
DIR_TEST_VOLTS=30    'TEST VOLTAGE FOR DIRECTIONAL ELEMENTS
NORM_VOLTS=67        'NORM VOLTAGE
NORM_FREQ=60         'NORMAL VOLTAGE FREQUENCY
ZONE_TEST_AMPS=3   'TEST CURRENT FOR LOAD ENCHROACHMENT TESTS
```

Routine Notes:

»Fri May 08, 2020
JOB # AACI207024

Relay Settings Used for Testing:

```
RID$ = "TIE"
TID$ = "TEST SETTING"
CTR = 120
CTRN = 120
PTR = 110.00
PTRS = 110.00
VNOM = 69.29
Z1MAG = 2.14
Z1ANG = 68.86
Z0MAG = 6.38
Z0ANG = 72.47
LL = 4.84
E50P = 1
E50N$ = "N"
E50G = 1
E50Q$ = "N"
E51P = 1
E51N$ = "N"
E51G = 1
E51Q$ = "N"
EHBL2$ = "N"
E32$ = "N"
ELOAD$ = "N"
ESOTF$ = "N"
EVOLT$ = "Y"
E25$ = "Y"
EFLOC$ = "Y"
```

```
ELOP$ = "N"
E81$ = "N"
E81R$ = "N"
E79$ = "N"
ESV = 10
EDEM$ = "THM"
s50P1P = 90.00
s67P1D = 0.00
s50PP1P$ = "OFF"
s50G1P = 8.760
s67G1D = 6.00
s51PP = 2.20
s51PC$ = "C3"
s51PTD = 0.40
s51PRS$ = "N"
s51GP = 0.60
s51GC$ = "U1"
s51GTD = 0.86
s51GRS$ = "N"
s27P1P = 62.00
s27P2P$ = "OFF"
s59P1P = 76.00
s59P2P$ = "OFF"
s59N1P$ = "OFF"
s59N2P$ = "OFF"
s59QP$ = "OFF"
s59V1P$ = "OFF"
s27SP = 10.00
s59S1P = 55.00
s59S2P$ = "OFF"
s27PP$ = "OFF"
s59PP$ = "OFF"
s25VLO = 62.00
s25VHI = 76.00
s25RCF = 1.00
s25SF = 0.050
s25ANG1 = 15
s25ANG2 = 15
SYNCP$ = "VA"
TCLOSD = 3.00
DMTC = 5
PDEMP = 5.00
NDEMP = 1.500
GDEMP = 1.50
QDEMP = 1.50
TDURD = 9.00
CFD = 60.00
s3POD = 1.50
s50LP = 0.25
SV1PU = 0.00
SV1DO = 0.00
SV2PU = 0.00
SV2DO = 0.00
SV3PU = 0.00
SV3DO = 0.00
SV4PU = 0.00
SV4DO = 0.00
SV5PU = 0.00
SV5DO = 0.00
SV6PU = 0.00
SV6DO = 0.00
SV7PU = 0.00
SV7DO = 0.00
```

```
SV8PU = 0.00
SV8DO = 0.00
SV9PU = 0.00
SV9DO = 0.00
SV10PU = 0.00
SV10DO = 0.00
TR$ = "50P1 + 51PT + 51GT + 50G1 + 67G1T"
TRQUAL = 0
TRSOTF = 0
DTT = 0
ULTR$ = "!(51P + 51G)"
s52A$ = "IN101"
CL$ = "CC + LB4"
ULCL$ = "TRIP"
s79RI$ = "TRIP"
s79RIS$ = "52A + 79CY"
s79DTL$ = "OC + !IN102 + LB3"
s79DLS$ = "79LO"
s79SKP = 0
s79STL$ = "TRIP"
s79BRS = 0
s79SEQ = 0
s79CLS = 1
SET1 = 0
RST1 = 0
SET2 = 0
RST2 = 0
SET3 = 0
RST3 = 0
SET4 = 0
RST4 = 0
SET5 = 0
RST5 = 0
SET6 = 0
RST6 = 0
SET7 = 0
RST7 = 0
SET8 = 0
RST8 = 0
SET9 = 0
RST9 = 0
SET10 = 0
RST10 = 0
SET11 = 0
RST11 = 0
SET12 = 0
RST12 = 0
SET13 = 0
RST13 = 0
SET14 = 0
RST14 = 0
SET15 = 0
RST15 = 0
SET16 = 0
RST16 = 0
s67P1TC = 1
s67P2TC = 1
s67P3TC = 1
s67P4TC = 1
s67N1TC = 1
s67N2TC = 1
s67N3TC = 1
s67N4TC = 1
```

```
s67G1TC = 1
s67G2TC = 1
s67G3TC = 1
s67G4TC = 1
s67Q1TC = 1
s67Q2TC = 1
s67Q3TC = 1
s67Q4TC = 1
s51ATC = 1
s51BTC = 1
s51CTC = 1
s51PTC = 1
s51NTC = 1
s51GTC = 1
s51G2TC = 1
s51QTC = 1
HBL2TC = 1
s81RTC$ = "!27B81"
LV1 = 0
LV2 = 0
LV3 = 0
LV4 = 0
LV5 = 0
LV6 = 0
LV7 = 0
LV8 = 0
LV9 = 0
LV10 = 0
LV11 = 0
LV12 = 0
LV13 = 0
LV14 = 0
LV15 = 0
LV16 = 0
LV17 = 0
LV18 = 0
LV19 = 0
LV20 = 0
LV21 = 0
LV22 = 0
LV23 = 0
LV24 = 0
LV25 = 0
LV26 = 0
LV27 = 0
LV28 = 0
LV29 = 0
LV30 = 0
LV31 = 0
LV32 = 0
SV1$ = "IN101 * IN102 * IN103"
SV2$ = "27A1 + 27B1 + 27C1"
SV3$ = "27A1 * 27B1 * 27C1"
SV4$ = "(27S * !SV2) + (!27S * SV2)"
SV5 = 0
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
```

```
SV14 = 0
SV15 = 0
SV16 = 0
OUT101$ = "TRIP"
OUT102 = 0
OUT103 = 0
OUT104 = 1
OUT105 = 1
OUT106 = 0
OUT107 = 0
ALRMOUT$ = "!(SALARM + HALARM)"
DP1$ = "IN101"
DP2 = 0
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
DP9 = 0
DP10 = 0
DP11 = 0
DP12 = 0
DP13 = 0
DP14 = 0
DP15 = 0
DP16 = 0
SS1 = 1
SS2 = 0
SS3 = 0
SS4 = 0
SS5 = 0
SS6 = 0
ER$ = "51P + 51G + 51N + 50P1 + 50G1 + 50N1"
FAULT$ = "51P + 51G"
BSYNCH$ = "52A"
CLMON = 0
BKMON$ = "TRIP"
BKCLS$ = "CLOSE"
E32IV = 1
LOPBLK = 0
SALARM$ = "BADPASS + CHGPASS + SETCHG + GRPSW + ACCESSP + PASNVAL "
RSTTRGT = 0
RST_DEM = 0
RST_PDM = 0
RST_BK = 0
RST_HIS = 0
RST_ENE = 0
RST_MML = 0
RST_HAL = 0
RSTDNPE = 0
PMTRIG = 0
TREA1 = 0
TREA2 = 0
TREA3 = 0
TREA4 = 0
PTCONN$ = "WYE"
VSCONN$ = "VS"
TGR = 0.00
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
FP_TO = 15
```

```
SCROLD = 2
FPNGD$ = "IG"
METHRES$ = "Y"
LER = 15
PRE = 4
FLTDISP$ = "MAX"
DCLOP$ = "OFF"
DCHIP$ = "OFF"
IN101D = 0.50
IN102D = 0.50
IN103D = 0.50
IN104D = 0.50
IN105D = 0.50
IN106D = 0.50
EBMON$ = "Y"
COSP1 = 10000
COSP2 = 150
COSP3 = 12
KASP1 = 1.20
KASP2 = 8.00
KASP3 = 20.00
ESTRT = 50
ESCLT = 120
MSTRT = 50
MSCLT = 120
EPMU$ = "N"
EVELOCK = 0
DNPSRC$ = "UTC"
BOOPTCC$ = "SET"
BOOPPUL$ = "SET"
IRIGC$ = "NONE"
UTC_OFF = 0.00
DST_BEGM$ = "NA"
P2_EPORT$ = "Y"
P2_PROTO$ = "SEL"
P2_MAXACC = 2
P2_SPEED = 2400
P2_BITS = 8
P2_PARITY$ = "N"
P2_STOP = 1
P2_RTSCTS$ = "N"
P2_T_OUT = 15
P2_AUTO$ = "N"
P2_FASTOP$ = "N"
P3_EPORT$ = "Y"
P3_PROTO$ = "SEL"
P3_MAXACC = 2
P3_SPEED = 2400
P3_BITS = 8
P3_PARITY$ = "N"
P3_STOP = 1
P3_RTSCTS$ = "N"
P3_T_OUT = 0
P3_AUTO$ = "N"
P3_FASTOP$ = "N"
PF_EPORT$ = "Y"
PF_PROTO$ = "SEL"
PF_MAXACC$ = "C"
PF_SPEED = 19200
PF_BITS = 8
PF_PARITY$ = "N"
PF_STOP = 1
PF_RTSCTS$ = "N"
```

```
PF_T_OUT = 15
PF_AUTO$ = "N"
PF_FASTOP$ = "N"
```

Relay Test Results for: ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for: LOG INTO THE RELAY

OK?
RAN

Relay Test Results for: DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for: SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

N/A

```
Additional Data:
STA

TIE                                Date: 05/08/20    Time: 05:10:58.658
TEST SETTING

FID=SEL-351A-R515-V0-Z105104-D20130620       CID=F6EC

SELF TESTS

W=Warn    F=Fail

      IA      IB      IC      IN      VA      VB      VC      VS      MOF
OS   -1      -1      -1      -1      -1      -1      -1      -1      -1
OSH   0      -0      -0      -0

      15V_PS  5V_REG  3.3V_REG
PS    14.83   4.98    3.32

      RAM     ROM     FPGA    EEPROM  FLASH   A/D     USB_BRD COM_BRD
      OK      OK      OK      OK      OK      OK      NA      NA

      TEMP    RTC     HMI
      26.8    OK      OK


 Relay Enabled

=>>
```

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: SEL 351A SPECIFIC TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: MODIFY RELAY SETTINGS

OK?
RAN

Relay Test Results for: POTENTIAL TESTING ISSUES CHECK

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR ELEMENT TESTS

OK?
RAN

Relay Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
67.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	7.2	7.1	-0.1	216.0	215.7	-0.1	PASS
B-N	7.4	7.4	-0.1	240.0	239.6	-0.2	PASS
C-N	7.6	7.6	-0.1	264.0	263.6	-0.1	PASS

CALCULATED MEGA WATT	MEASURED MEGA WATT	% ERROR	CALCULATED MEGA VAR	MEASURED MEGA VAR	% ERROR	OK?
4.6	4.6	-0.2	2.7	2.6	-0.4	PASS

Relay Test Results for: ZLF FORWARD LOAD IMPEDANCE

OK?
RAN

Relay Test Results for: ZLF FORWARD LOAD ANGLE

OK?
RAN

Relay Test Results for: ZLR REVERSE LOAD IMPEDANCE

OK?
RAN

Relay Test Results for: ZLR REVERSE LOAD ANGLE

OK?
RAN

Relay Test Results for: 27P1P PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.000	62.000	0.00	PASS

Relay Test Results for: 27P1P THREE PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.000	62.000	0.00	PASS

Relay Test Results for: 27P2P PHASE UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 27PP PHASE TO PHASE UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 27PP2P PHASE TO PHASE UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 50QFP FORWARD DIRECTIONAL NEGATIVE SEQUENCE OVERCURRENT P

Relay Test Results for: 50QFP FORWARD DIRECTIONAL NEGATIVE SEQUENCE OVERCURRENT P

OK?
RAN

Relay Test Results for: Z2F FORWARD DIRECTIONAL NEGATIVE SEQUENCE IMPEDANCE

OK?
RAN

Relay Test Results for: 50QRP REVERSE DIRECTIONAL NEGATIVE SEQUENCE OVERCURRENT P

OK?
RAN

Relay Test Results for: Z2R REVERSE DIRECTIONAL NEGATIVE SEQUENCE IMPEDANCE

OK?
RAN

Relay Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		89.100	90.000	-1.00	PASS
B-N		90.000	90.000	0.00	PASS
C-N		89.100	90.000	-1.00	PASS

Relay Test Results for: 50P2P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P3P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P4P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P5P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P6P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 67P1D PHASE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67P2D PHASE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67P3D PHASE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67P4D PHASE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 50PP1P PHASE TO PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50PP2P PHASE TO PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50PP3P PHASE TO PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50PP4P PHASE TO PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q3P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q4P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q5P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q6P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 67Q1D NEGATIVE SEQUENCE DIRECTIONAL OVERCURRENT TIME DELA

OK?
RAN

Relay Test Results for: 67Q2D NEGATIVE SEQUENCE DIRECTIONAL OVERCURRENT TIME DELA

OK?
RAN

Relay Test Results for: 67Q3D NEGATIVE SEQUENCE DIRECTIONAL OVERCURRENT TIME DELA

OK?
RAN

Relay Test Results for: 67Q4D NEGATIVE SEQUENCE DIRECTIONAL OVERCURRENT TIME DELA

OK?
RAN

Relay Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	8.763	8.760	0.04	PASS

Relay Test Results for: 50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G3P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G4P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G5P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G6P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 67G1D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(SEC)	TIME(CY)	RANGE	OK?
1.20	10.512	0.121	7.28	4.20 TO 7.80	PASS

Relay Test Results for: 67G2D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67G3D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

Relay Test Results for: 67G3D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67G4D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 51PP PHASE TO PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		2.204	2.200	0.18	PASS
B-N		2.204	2.200	0.18	PASS
C-N		2.204	2.200	0.18	PASS

Relay Test Results for: 51P PHASE TIME OVERCURRENT CURVE

51P PHASE TIME OVERCURRENT CURVE (PHASE A-N)

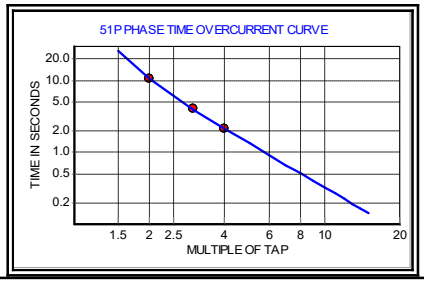
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.400	642.44	10.707	10.667	0.38	PASS
3.00	6.600	241.06	4.018	4.000	0.44	PASS
4.00	8.800	128.53	2.142	2.133	0.41	PASS

51P PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.400	641.15	10.686	10.667	0.18	PASS
3.00	6.600	240.63	4.011	4.000	0.26	PASS
4.00	8.800	128.83	2.147	2.133	0.65	PASS

51P PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.400	642.79	10.713	10.667	0.44	PASS
3.00	6.600	241.34	4.022	4.000	0.56	PASS
4.00	8.800	128.83	2.147	2.133	0.65	PASS



Relay Test Results for: 51AP PHASE A TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51A PHASE A TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51BP PHASE B TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51B PHASE B TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51CP PHASE C TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51C PHASE C TIME OVERCURRENT CURVE

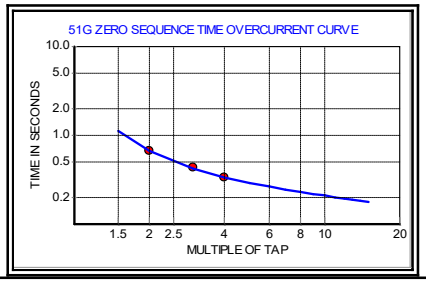
OK?
RAN

Relay Test Results for: 51GP ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.596	0.600	-0.67	PASS

Relay Test Results for: 51G ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	40.35	0.672	0.660	1.87	PASS
3.00	1.800	25.84	0.431	0.422	2.05	PASS
4.00	2.400	20.20	0.337	0.338	-0.26	PASS



Relay Test Results for: 51G2P ZERO SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51G2 ZERO SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51QP NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR NEUTRAL TESTS

OK?
RAN

Relay Test Results for: 50N1P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N2P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N3P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N4P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N5P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N6P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 67N1D NEUTRAL DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67N2D NEUTRAL DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67N3D NEUTRAL DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 67N4D NEUTRAL DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 51NP NEUTRAL TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N NEUTRAL TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 59P1P PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.000	76.000	0.00	PASS

Relay Test Results for: 59P1P THREE PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.760	76.000	1.00	PASS

Relay Test Results for: 59P2P PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59PP PHASE TO PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59PP2P PHASE TO PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59N1P ZERO SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59N2P ZERO SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59QP NEGATIVE SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59Q2P NEGATIVE SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59V1P POSITIVE SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 27B81P UNDERVOLTAGE FRQEUENCY BLOCK

OK?
RAN

Relay Test Results for: 81D1P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for: 81D1D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for: 81D2P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for: 81D2D FRQEUENCY TIME DELAY

Relay Test Results for: 81D2D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for: 81D3P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for: 81D3D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for: 81D4P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for: 81D4D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for: 81D5P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for: 81D5D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for: 81D6P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for: 81D6D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for: 25VLO SOURCE VP SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.620	62.000	1.00	PASS

Relay Test Results for: 25VHI SOURCE VP SYNCHRONIZING PHASE HIGH VOLTAGE THRESHOLI

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.000	76.000	-0.00	PASS

Relay Test Results for: <SYNCHRONIZING TEST CONNECTIONS>

OK?
RAN

Relay Test Results for: 27SP SYNCHRONIZING PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
10.000	10.000	0.00	PASS

Relay Test Results for: 59S1P SYNCHRONIZING PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
55.000	55.000	-0.00	PASS

Relay Test Results for: 59S2P SYNCHRONIZING PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 25VLO SOURCE VS SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.620	62.000	1.00	PASS

Relay Test Results for: 25VHI SOURCE VS SYNCHRONIZING PHASE HIGH VOLTAGE THRESHOLI

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.000	76.000	-0.00	PASS

Relay Test Results for: 25ANG1 SYNCHRONIZING ANGLE 1

LAGGING ANGLE	IDEAL	RANGE	OK?
15.00	15.00	11.00 TO 19.00	PASS

Relay Test Results for: 25ANG1 SYNCHRONIZING ANGLE 1

LEADING ANGLE	IDEAL	RANGE		OK?
346.00	345.00	341.00	TO 349.00	PASS

Relay Test Results for: 25ANG2 SYNCHRONIZING ANGLE 2

LAGGING ANGLE	IDEAL	RANGE		OK?
15.00	15.00	11.00	TO 19.00	PASS
LEADING ANGLE	IDEAL	RANGE		OK?
346.00	345.00	341.00	TO 349.00	PASS

Relay Test Results for: 25SF SYNCHRONIZING SLIP FREQUENCY

DROPOUT HZ	IDEAL	RANGE		OK?
59.950	59.950	59.900	TO 60.000	PASS

Relay Test Results for: RESTORE RELAY SETTINGS

OK?
RAN

Relay Test Results for: RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

```
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE
```

Relay Test Results for: LOG OUT OF THE RELAY

OK?
RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-587Z.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 8.1 **Test Date:** 05/12/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	13.2 KV	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	CENTRAL ELECTRICAL BUILDING
POSITION:	BUS 1 DIFFERENTIAL	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-587Z	MODEL_STYLE:	0587Z0X325512XX
IEEE_DEVICE:	MF	IL_IB:	SEL-587Z
SERIAL_NUMBER:	1133470571	FIRMWARE:	SEL-587Z-R102-V0-Z001001-D20020903
RELAY_ID:	87B1	CURRENT_TESTDATE:	5/12/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
CONTACT$="4"          'OUTPUT CONTACT TO MASK
SEL_AUTO=1            '0=MANUAL, 1=AUTO MASK, 2=MANUAL W/MESSAGES
SKIP_TST=1            'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1              'NO ERROR MESSAGE IF NO OPERATION
```

Routine Notes:

»Tue May 12, 2020
JOB # AACI207024

TEST REPLACEMENT RELAY SUPPLIED BY CUSTOMER.

CURRENT\VOLTAGE INJECTION METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
120.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	120.0	121.0	0.8	480.0	481.0	0.2	PASS
B-N	120.0	122.0	1.7	480.0	477.0	-0.6	PASS
C-N	120.0	121.0	0.8	480.0	479.0	-0.2	PASS

CALCULATED MEGA WATT	MEASURED MEGA WATT	% ERROR	CALCULATED MEGA VAR	MEASURED MEGA VAR	% ERROR	OK?
0.0	0.0	0.0	0.0	0.0	0.0	PASS

Relay Settings Used for Testing:

```
RID$ = "BUS 1"
TID$ = "STATION A"
CTR = 240
TDURD = 9.000
s87A1P = 200
s87A2P = 90
s87B1P = 200
s87B2P = 90
s87C1P = 200
s87C2P = 90
s50P1P$ = "OFF"
s50P2P$ = "OFF"
s50P3P$ = "OFF"
s50A1P$ = "OFF"
```

```
s50A2P$ = "OFF"
s50B1P$ = "OFF"
s50B2P$ = "OFF"
s50C1P$ = "OFF"
s50C2P$ = "OFF"
s51PP$ = "OFF"
s51PC$ = "U3"
s51PTD = 15.00
s51PRS$ = "N"
s51AP$ = "OFF"
s51AC$ = "U3"
s51ATD = 15.00
s51ARS$ = "N"
s51BP$ = "OFF"
s51BC$ = "U3"
s51BTD = 15.00
s51BRS$ = "N"
s51CP$ = "OFF"
s51CC$ = "U3"
s51CTD = 15.00
s51CRS$ = "N"
s50G1P$ = "OFF"
s50G2P$ = "OFF"
s51GP$ = "OFF"
s51GC$ = "U3"
s51GTD = 15.00
s51GRS$ = "N"
s50Q1P$ = "OFF"
s50Q2P$ = "OFF"
s51QP$ = "OFF"
s51QC$ = "U3"
s51QTD = 15.00
s51QRS$ = "N"
CFD = 60.000
DMTC = 5
PDEMP = 5.00
GDEMP = 1.50
QDEMP = 1.50
SV5PU = 120.000
SV5DO = 0.000
SV6PU = 15.000
SV6DO = 0.000
SV7PU = 0.000
SV7DO = 0.000
SV8PU = 0.000
SV8DO = 0.000
SV9PU = 0.000
SV9DO = 0.000
SV10PU = 0.000
SV10DO = 0.000
SV11PU = 0.000
SV11DO = 0.000
SV12PU = 0.000
SV12DO = 0.000
SV13PU = 0.000
SV13DO = 0.000
SV14PU = 0.000
SV14DO = 0.000
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
TR1$ = "87A1 + 87B1 + 87C1 + 50A1 + 50B1 + 50C1"
TR2 = 0
```

```
TR3 = 0
ULTR1$ = "!87A2 * !87B2 * !87C2 * !50A2 * !50B2 * !50C2 "
ULTR2 = 1
ULTR3 = 1
s51PTC = 1
s51ATC = 1
s51BTC = 1
s51CTC = 1
s51GTC = 1
s51QTC = 1
s52A = 0
CL = 0
ULCL$ = "TRIP1"
ER1$ = "87A1 + 87B1 + 87C1"
ER2$ = "87A2 + 87B2 + 87C2"
SV1 = 0
SV2 = 0
SV3 = 0
SV4 = 0
SV5 = 0
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
OUT1$ = "TRIP1"
OUT2$ = "TRIP1"
OUT3 = 0
OUT4 = 0
DP1 = 0
DP2 = 0
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
P1_PROTO$ = "SEL"
P1_SPEED = 2400
P1_BITS = 8
P1_PARITY$ = "N"
P1_STOP = 1
P1_T_OUT = 15
P1_AUTO$ = "N"
P1_RTSCTS$ = "N"
P1_FASTOP$ = "N"
PF_PROTO$ = "SEL"
PF_SPEED = 19200
PF_BITS = 8
PF_PARITY$ = "N"
PF_STOP = 1
PF_T_OUT = 15
PF_AUTO$ = "N"
PF_RTSCTS$ = "N"
PF_FASTOP$ = "N"
```

Relay Test Results for: ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for: LOG INTO THE RELAY

Relay Test Results for: LOG INTO THE RELAY

OK?
RAN

Relay Test Results for: DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for: SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

N/A

Additional Data:
STA

BUS 1 Date: 05/12/2020 Time: 12:48:04.302
STATION A

FID=SEL-587Z-R102-V0-Z001001-D20020903 CID=0C9F

SELF TESTS

W=Warn F=Fail

	87A	87B	87C	IA	IB	IC	MOF
OS	2	2	3	2	2	3	0

	+5V_PS	+5V_REG	-5V_REG	+10V_PS	-10V_PS	VBAT
PS	4.96	5.03	-4.99	9.95	-10.04	2.89

TEMP	RAM	ROM	CR_RAM	EEPROM
24.4	OK	OK	OK	OK

Relay Enabled

=>>

Relay Test Results for: CURRENT\VOLTAGE INJECTION TEST CONNECTIONS

OK?
RAN

Relay Test Results for: CURRENT\VOLTAGE INJECTION METER TEST

OK?
RAN

Relay Test Results for: RELAY INPUT VERIFICATION

Verify operation of the RELAY INPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that INPUTS
on this relay essential to proper functioning of
the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Relay Test Results for: RELAY OUTPUT VERIFICATION

Verify operation of the RELAY OUTPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that OUTPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR ELEMENT TESTS

OK?
RAN

Relay Test Results for: 87A1P PHASE A VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
198.000	200.000	-1.00	PASS

Relay Test Results for: 87A2P PHASE A VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
90.000	90.000	0.00	PASS

Relay Test Results for: 87B1P PHASE B VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
196.000	200.000	-2.00	PASS

Relay Test Results for: 87B2P PHASE B VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
89.100	90.000	-1.00	PASS

Relay Test Results for: 87C1P PHASE C VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
198.000	200.000	-1.00	PASS

Relay Test Results for: 87C2P PHASE C VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
90.000	90.000	0.00	PASS

Relay Test Results for: RESTORE LOGIC SETTINGS

OK?
RAN

Relay Test Results for: RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

```
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE
```

Relay Test Results for: LOG OUT OF THE RELAY

OK?
RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SR-469.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 2.7 **Test Date:** 03/11/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	8	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	EAST BLOWER BUILDING
POSITION:	PAB-E1	RELAY_MANF:	GE MULTILIN
RELAY_TYPE:	SR-469	MODEL_STYLE:	469-P5-HI-A20-T
IEEE_DEVICE:	MF	IL_IB:	SR469-RELAY
SERIAL_NUMBER:	B3043942	FIRMWARE:	30I520A8.000
RELAY_ID:	AACI207024	CURRENT_TESTDATE:	3/11/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
RELAY_ADDRESS=1                              'SPECIFIC RELAY ADDRESS USED FOR
MODBUS COMMUNICATIONS (DEFAULT=1)
TRIP_OUTPUT$="F1-E2"                         'OUTPUT CONTACT TO SENSE A TRIP
AUTO_MASK=1                                  'SET TO 2 TO DISPLAY FLEX PROGRAMMING
SKIP_TST=1                                   'SET TO 1 TO SKIP MESSAGES FOR TESTS
SKIPPED
PRINT_RAN_TESTS=1                            'MARKS TESTS IF THEY WERE ATTEMPTED
BUT NOT APPLICABLE
Phase_CT_Secondary=5                         'THIS IS THE RELAYS PHASE NOMINAL CT
INPUT
VTR=Voltage_Transformer_Ratio                'VT RATIO
CTR=Phase_CT_Primary/Phase_CT_Secondary      'CALCULATED CT RATIO
FLA=(MOTOR_Full_load_Amps)/CTR               'SECONDARY FULL LOAD CURRENT
MTR_START_MULT=0.5                           'MULT OF FULL LOAD AMPS
MTR_START_DELAY=120                          'WAIT TIME IN CYCLES FOR START
```

Routine Notes:

Relay Settings Used for Testing:

```
SR_PART_NUM$ = "469-P5-HI-A20-T"  'Information acquired from Settings file
SR_FIRMWARE$ = "5200"  'Information acquired from Settings file
Default_Message_Cycle_Time = 2.0  'Default Message Cycle Time
Default_Message_Timeout = 300  'Default Message Timeout
Average_Motor_Load_Calculation_Period = 15  'Average Motor Load Calculation
Period
Temperature_Display_Units$ = "Celsius"  'Temperature Display Units
Trace_Memory_Trigger_Position = 25  'Trace Memory Trigger Position
Trace_Memory_Buffers$ = "8 x 28 cycles"  'Trace Memory Buffers
Display_Update_Interval = 0.4  'Display Update Interval
Motor_Load_Filter_Interval = 0  'Motor Load Filter Interval
Communication_Port_Passcode = 0  'Communication Port Passcode
Passcode_write_Only_ = 0  'Passcode (write Only)
First_Scratchpad_Message$ = "Text 1"  'First Scratchpad Message
Second_Scratchpad_Message$ = "Text 2"  'Second Scratchpad Message
Third_Scratchpad_Message$ = "Text 3"  'Third Scratchpad Message
Fourth_Scratchpad_Message$ = "Text 4"  'Fourth Scratchpad Message
Fifth_Scratchpad_Message$ = "GE MULTILIN       469 Motor Relay"  'Fifth
Scratchpad Message
Phase_CT_Primary = 150  'Phase CT Primary
Motor_Full_Load_Amps = 72  'Motor Full Load Amps
Ethernet_IP_Address = 0  'Ethernet IP Address
Ethernet_Subnet_Mask = 4294966272  'Ethernet Subnet Mask
```

```
Ethernet_Gateway_Address = 0  'Ethernet Gateway Address
DeviceNet_MAC_ID = 63  'DeviceNet MAC ID
DeviceNet_Baud_Rate$ = "125 kbps"  'DeviceNet Baud Rate
Front_RS232_baud_rate$ = "19200 baud"  'Front RS232 baud rate
Slave_Address = 1  'Slave Address
Computer_RS485_Baud_Rate$ = "19200 baud"  'Computer RS485 Baud Rate
Computer_RS485_Parity$ = "None"  'Computer RS485 Parity
Auxiliary_RS485_Baud_Rate$ = "9600 baud"  'Auxiliary RS485 Baud Rate
Auxiliary_RS485_Parity$ = "None"  'Auxiliary RS485 Parity
Ground_CT_Type$ = "5 A Secondary"  'Ground CT Type
Phase_Differential_CT_Type$ = "None"  'Phase Differential CT Type
Enable_Two_Speed_Motor_Option$ = "Off/No"  'Enable Two Speed Motor Option
Speed_Two_Phase_CT_Primary = 100  'Speed Two Phase CT Primary
Speed_Two_Motor_Full_Load_Amps = 1  'Speed Two Motor Full Load Amps
VoltageTransformer_Connection_Type$ = "Open Delta"  'VoltageTransformer
Connection Type
Enable_Single_VT_Connection$ = "Off"  'Enable Single VT Connection
Voltage_Transformer_Ratio = 35.00  'Voltage Transformer Ratio
Motor_Nameplate_Voltage = 4200  'Motor Nameplate Voltage
Nominal_System_Frequency$ = "60 Hz"  'Nominal System Frequency
System_Phase_Sequence$ = "ABC"  'System Phase Sequence
Serial_Communication_Control$ = "Off/No"  'Serial Communication Control
Assign_Start_Control_Relays$ = "Auxiliary 2"  'Assign Start Control Relays
Reduced_Voltage_Starting$ = "Off/No"  'Reduced Voltage Starting
Control_Relays_for_Reduced_Voltage_Starting$ = "Auxiliary 3"  'Control Relays
for Reduced Voltage Starting
Transition_On$ = "Current Only"  'Transition On
Reduced_Voltage_Start_Level = 100  'Reduced Voltage Start Level
Reduced_Voltage_Start_Timer = 200  'Reduced Voltage Start Timer
Incomplete_Sequence_Trip_Relays$ = "Trip"  'Incomplete Sequence Trip Relays
Starter_Status_Switch$ = "Start Aux a"  'Starter Status Switch
Assignable_Input_1_Function$ = "Off"  'Assignable Input 1 Function
Counter_Alarm_Events$ = "Off/No"  'Counter Alarm Events
Rated_Speed = 3600  'Rated Speed
Tachometer_Alarm$ = "Off"  'Tachometer Alarm
Tachometer_Alarm_Relays$ = "Alarm"  'Tachometer Alarm Relays
Tachometer_Alarm_Speed = 10  'Tachometer Alarm Speed
Tachometer_Alarm_Delay = 1  'Tachometer Alarm Delay
Tachometer_Alarm_Events$ = "Off/No"  'Tachometer Alarm Events
Tachometer_Trip$ = "Off"  'Tachometer Trip
Tachometer_Trip_Relays$ = "Trip"  'Tachometer Trip Relays
Tachometer_Trip_Speed = 10  'Tachometer Trip Speed
Tachometer_Trip_Delay = 1  'Tachometer Trip Delay
General_Switch_A_Name = 0  'General Switch A Name
General_Switch_A_Normal_State$ = "Normally Open"  'General Switch A Normal State
General_Switch_A_Block_Input_From_Start = 0  'General Switch A Block Input From
Start
General_Switch_A_Alarm$ = "Off"  'General Switch A Alarm
General_Switch_A_Alarm_Relays$ = "Alarm"  'General Switch A Alarm Relays
General_Switch_A_Alarm_Delay = 5.0  'General Switch A Alarm Delay
General_Switch_A_Alarm_Events$ = "Off/No"  'General Switch A Alarm Events
General_Switch_A_Trip$ = "Off"  'General Switch A Trip
General_Switch_A_Trip_Relays$ = "Trip"  'General Switch A Trip Relays
General_Switch_A_Trip_Delay = 5.0  'General Switch A Trip Delay
General_Switch_B_Name = 0  'General Switch B Name
General_Switch_B_Normal_State$ = "Normally Open"  'General Switch B Normal State
General_Switch_B_Block_Input_From_Start = 0  'General Switch B Block Input From
Start
General_Switch_B_Alarm$ = "Off"  'General Switch B Alarm
General_Switch_B_Alarm_Relays$ = "Alarm"  'General Switch B Alarm Relays
General_Switch_B_Alarm_Delay = 5.0  'General Switch B Alarm Delay
General_Switch_B_Alarm_Events$ = "Off/No"  'General Switch B Alarm Events
General_Switch_B_Trip$ = "Off"  'General Switch B Trip
```

```
General_Switch_B_Trip_Relays$ = "Trip"  'General Switch B Trip Relays
General_Switch_B_Trip_Delay = 5.0  'General Switch B Trip Delay
General_Switch_C_Name = 0  'General Switch C Name
General_Switch_C_Normal_State$ = "Normally Open"  'General Switch C Normal State
General_Switch_C_Block_Input_From_Start = 0  'General Switch C Block Input From
Start
General_Switch_C_Alarm$ = "Off"  'General Switch C Alarm
General_Switch_C_Alarm_Relays$ = "Alarm"  'General Switch C Alarm Relays
General_Switch_C_Alarm_Delay = 5.0  'General Switch C Alarm Delay
General_Switch_C_Alarm_Events$ = "Off/No"  'General Switch C Alarm Events
General_Switch_C_Trip$ = "Off"  'General Switch C Trip
General_Switch_C_Trip_Relays$ = "Trip"  'General Switch C Trip Relays
General_Switch_C_Trip_Delay = 5.0  'General Switch C Trip Delay
General_Switch_D_Name = 0  'General Switch D Name
General_Switch_D_Normal_State$ = "Normally Open"  'General Switch D Normal State
General_Switch_D_Block_Input_From_Start = 0  'General Switch D Block Input From
Start
General_Switch_D_Alarm$ = "Off"  'General Switch D Alarm
General_Switch_D_Alarm_Relays$ = "Alarm"  'General Switch D Alarm Relays
General_Switch_D_Alarm_Delay = 5.0  'General Switch D Alarm Delay
General_Switch_D_Alarm_Events$ = "Off/No"  'General Switch D Alarm Events
General_Switch_D_Trip$ = "Off"  'General Switch D Trip
General_Switch_D_Trip_Relays$ = "Trip"  'General Switch D Trip Relays
General_Switch_D_Trip_Delay = 5.0  'General Switch D Trip Delay
Assignable_Input_2_Function$ = "Off"  'Assignable Input 2 Function
Assignable_Input_3_Function$ = "Off"  'Assignable Input 3 Function
Assignable_Input_4_Function$ = "Off"  'Assignable Input 4 Function
Reset_Mode_R1_Trip$ = "All Resets"  'Reset Mode R1 Trip
Force_R1_Output_Relay$ = "Enabled"  'Force R1 Output Relay
Force_R1_Operate_Time = 3  'Force R1 Operate Time
Reset_Mode_R4_Auxiliary$ = "All Resets"  'Reset Mode R4 Auxiliary
Force_R4_Output_Relay$ = "Disabled"  'Force R4 Output Relay
Force_R4_Operate_Time = 0  'Force R4 Operate Time
Reset_Mode_R2_Auxiliary$ = "All Resets"  'Reset Mode R2 Auxiliary
Force_R2_Output_Relay$ = "Disabled"  'Force R2 Output Relay
Force_R2_Output_Operate_Time = 3  'Force R2 Output Operate Time
Reset_Mode_R3_Auxiliary$ = "All Resets"  'Reset Mode R3 Auxiliary
Force_R3_Output_Relay$ = "Disabled"  'Force R3 Output Relay
Force_R3_Operate_Time = 0  'Force R3 Operate Time
Force_R5_Output_Relay$ = "Disabled"  'Force R5 Output Relay
Force_R5_Operate_Time = 0  'Force R5 Operate Time
Reset_Mode_R6_Service$ = "All Resets"  'Reset Mode R6 Service
Curve_Style$ = "Standard"  'Curve Style
Overload_Pickup_Level = 1.15  'Overload Pickup Level
Unbalance_k_Factor = 0  'Unbalance k Factor
Cool_Time_Constant_Running = 15  'Cool Time Constant Running
Cool_Time_Constant_Stopped = 30  'Cool Time Constant Stopped
Hot_Cold_Safe_Stall_Ratio = 1.00  'Hot/Cold Safe Stall Ratio
RTD_Blasing$ = "Off/No"  'RTD Blasing
RTD_Blas_Minimum = 40  'RTD Blas Minimum
RTD_Blas_Center_Point = 130  'RTD Blas Center Point
RTD_Blas_Maximum = 155  'RTD Blas Maximum
Thermal_Capacity_Alarm$ = "Off"  'Thermal Capacity Alarm
Thermal_Capacity_Alarm_Relays$ = "Alarm"  'Thermal Capacity Alarm Relays
Thermal_Capacity_Alarm_Level = 75  'Thermal Capacity Alarm Level
Thermal_Capacity_Alarm_Events$ = "Off/No"  'Thermal Capacity Alarm Events
Overload_Trip_Relays$ = "Trip"  'Overload Trip Relays
Standard_Overload_Curve_Number = 4  'Standard Overload Curve Number
Minimum_Allowable_Line_Voltage = 80  'Minimum Allowable Line Voltage
Stall_Current_at_Min_Vline = 4.80  'Stall Current at Min Vline
Safe_Stall_Time_at_Min_Vline = 20.0  'Safe Stall Time at Min Vline
Accel_Intersect_at_Min_Vline = 3.80  'Accel. Intersect at Min Vline
Stall_Current_at_100_Vline = 6.00  'Stall Current at 100% Vline
```

```
Safe_Stall_Time_at_100_Vline = 10.0  'Safe Stall Time at 100% Vline
Accel_Intersect_at_100_Vline = 5.00  'Accel. Intersect at 100% Vline
Short_Circuit_Trip$ = "Latched"  'Short Circuit Trip
Short_Circuit_Trip_Backup$ = "Off/No"  'Short Circuit Trip Backup
Short_Circuit_Backup_Relays$ = "Aux2"  'Short Circuit Backup Relays
Short_Circuit_Trip_Backup_Delay = 200  'Short Circuit Trip Backup Delay
Overload_Alarm$ = "Off"  'Overload Alarm
Overload_Alarm_Relays$ = "Alarm"  'Overload Alarm Relays
Overload_Alarm_Events$ = "Off/No"  'Overload Alarm Events
Overload_Alarm_Delay = 0.1  'Overload Alarm Delay
Mechanical_Jam_Trip$ = "Off"  'Mechanical Jam Trip
Mechanical_Jam_Trip_Relays$ = "Trip"  'Mechanical Jam Trip Relays
Mechanical_Jam_Pickup = 1.50  'Mechanical Jam Pickup
Mechanical_Jam_Delay = 1  'Mechanical Jam Delay
Block_Undercurrent_from_Start = 0  'Block Undercurrent from Start
Undercurrent_Alarm$ = "Off"  'Undercurrent Alarm
Undercurrent_Alarm_Relays$ = "Alarm"  'Undercurrent Alarm Relays
Undercurrent_Alarm_Pickup = 0.70  'Undercurrent Alarm Pickup
Undercurrent_Alarm_Delay = 1  'Undercurrent Alarm Delay
Undercurrent_Alarm_Events$ = "Off/No"  'Undercurrent Alarm Events
Undercurrent_Trip$ = "Off"  'Undercurrent Trip
Undercurrent_Trip_Relays$ = "Trip"  'Undercurrent Trip Relays
Undercurrent_Trip_Pickup = 0.70  'Undercurrent Trip Pickup
Undercurrent_Trip_Delay = 1  'Undercurrent Trip Delay
Current_Unbalance_Alarm$ = "Off"  'Current Unbalance Alarm
Current_Unbalance_Alarm_Relays$ = "Alarm"  'Current Unbalance Alarm Relays
Current_Unbalance_Alarm_Pickup = 15  'Current Unbalance Alarm Pickup
Current_Unbalance_Alarm_Delay = 1  'Current Unbalance Alarm Delay
Current_Unbalance_Alarm_Events$ = "Off/No"  'Current Unbalance Alarm Events
Current_Unbalance_Trip$ = "Off"  'Current Unbalance Trip
Current_Unbalance_Trip_Relays$ = "Trip"  'Current Unbalance Trip Relays
Current_Unbalance_Trip_Pickup = 20  'Current Unbalance Trip Pickup
Current_Unbalance_Trip_Delay = 1  'Current Unbalance Trip Delay
Ground_Fault_Alarm$ = "Off"  'Ground Fault Alarm
Ground_Fault_Alarm_Relays$ = "Alarm"  'Ground Fault Alarm Relays
Ground_Fault_Alarm_Pickup = 0.10  'Ground Fault Alarm Pickup
Alarm_Pickup_for_Multlin_CT_50_025 = 1.00  'Alarm Pickup for Multlin CT 50/.025
Intentional_GF_Alarm_Delay = 0  'Intentional GF Alarm Delay
Ground_Fault_Alarm_Events$ = "Off/No"  'Ground Fault Alarm Events
Ground_Fault_Trip$ = "Latched"  'Ground Fault Trip
Ground_Fault_Trip_Relays$ = "Trip"  'Ground Fault Trip Relays
Ground_Fault_Trip_Pickup = 0.50  'Ground Fault Trip Pickup
Trip_Pickup_for_Multlin_CT_50_025 = 1.00  'Trip Pickup for Multlin CT 50/.025
Intentional_GF_Trip_Delay = 200  'Intentional GF Trip Delay
Ground_Fault_Trip_Backup$ = "Off/No"  'Ground Fault Trip Backup
Phase_Differential_Trip$ = "Off"  'Phase Differential Trip
Phase_Differential_Trip_Relays$ = "Trip"  'Phase Differential Trip Relays
Differential_Trip_Pickup_While_Starting = 0.10  'Differential Trip Pickup While
Starting
Differential_Trip_Delay_While_Starting = 0  'Differential Trip Delay While
Starting
Differential_Trip_Pickup_While_Running = 0.10  'Differential Trip Pickup While
Running
Differential_Trip_Delay_While_Running = 0  'Differential Trip Delay While Running
Accleration_Timer_Trip$ = "Off"  'Accleration Timer Trip
Acceleration_Timer_Trip_Relays$ = "Trip"  'Acceleration Timer Trip Relays
Acceleration_Timer_from_Start = 10.0  'Acceleration Timer from Start
Start_Inhibit_Block$ = "Off/No"  'Start Inhibit Block
Thermal_Capacity_Used_Margin = 25  'Thermal Capacity Used Margin
Jogging_Block$ = "Off/No"  'Jogging Block
Maximum_Starts_Hour_Permissible = 3  'Maximum Starts/Hour Permissible
Time_Between_Starts = 10  'Time Between Starts
Restart_Block$ = "Off/No"  'Restart Block
```

```
Restart_Block_Time = 1  'Restart Block Time
Stator_RTD_Type$ = "100 Ohm Platinum"  'Stator RTD Type
Bearing_RTD_Type$ = "100 Ohm Platinum"  'Bearing RTD Type
Ambient_RTD_Type$ = "100 Ohm Platinum"  'Ambient RTD Type
Other_RTD_Type$ = "100 Ohm Platinum"  'Other RTD Type
RTD_1_Application$ = "Stator"  'RTD #1 Application
RTD_1_Name = 0  'RTD #1 Name
RTD_1_Alarm$ = "Off"  'RTD #1 Alarm
RTD_1_Alarm_Relays$ = "Alarm"  'RTD #1 Alarm Relays
RTD_1_Alarm_Temperature = 130  'RTD #1 Alarm Temperature
RTD_1_Alarm_Events$ = "Off/No"  'RTD #1 Alarm Events
RTD_1_Trip$ = "Off"  'RTD #1 Trip
RTD_1_Trip_Voting$ = "RTD #1"  'RTD #1 Trip Voting
RTD_1_Trip_Relays$ = "Trip"  'RTD #1 Trip Relays
RTD_1_Trip_Temperature = 155  'RTD #1 Trip Temperature
RTD_1_Hi_Alarm$ = "Off"  'RTD #1 Hi Alarm
RTD_1_Hi_Alarm_Relays$ = "Alarm"  'RTD #1 Hi Alarm Relays
RTD_1_Hi_Alarm_Level = 130  'RTD #1 Hi Alarm Level
RTD_2_Application$ = "Stator"  'RTD #2 Application
RTD_2_Name = 0  'RTD #2 Name
RTD_2_Alarm$ = "Off"  'RTD #2 Alarm
RTD_2_Alarm_Relays$ = "Alarm"  'RTD #2 Alarm Relays
RTD_2_Alarm_Temperature = 130  'RTD #2 Alarm Temperature
RTD_2_Alarm_Events$ = "Off/No"  'RTD #2 Alarm Events
RTD_2_Trip$ = "Off"  'RTD #2 Trip
RTD_2_Trip_Voting$ = "RTD #2"  'RTD #2 Trip Voting
RTD_2_Trip_Relays$ = "Trip"  'RTD #2 Trip Relays
RTD_2_Trip_Temperature = 155  'RTD #2 Trip Temperature
RTD_2_Hi_Alarm$ = "Off"  'RTD #2 Hi Alarm
RTD_2_Hi_Alarm_Relays$ = "Alarm"  'RTD #2 Hi Alarm Relays
RTD_2_Hi_Alarm_Level = 130  'RTD #2 Hi Alarm Level
RTD_3_Application$ = "Stator"  'RTD #3 Application
RTD_3_Name = 0  'RTD #3 Name
RTD_3_Alarm$ = "Off"  'RTD #3 Alarm
RTD_3_Alarm_Relays$ = "Alarm"  'RTD #3 Alarm Relays
RTD_3_Alarm_Temperature = 130  'RTD #3 Alarm Temperature
RTD_3_Alarm_Events$ = "Off/No"  'RTD #3 Alarm Events
RTD_3_Trip$ = "Off"  'RTD #3 Trip
RTD_3_Trip_Voting$ = "RTD #3"  'RTD #3 Trip Voting
RTD_3_Trip_Relays$ = "Trip"  'RTD #3 Trip Relays
RTD_3_Trip_Temperature = 155  'RTD #3 Trip Temperature
RTD_3_Hi_Alarm$ = "Off"  'RTD #3 Hi Alarm
RTD_3_Hi_Alarm_Relays$ = "Alarm"  'RTD #3 Hi Alarm Relays
RTD_3_Hi_Alarm_Level = 130  'RTD #3 Hi Alarm Level
RTD_4_Application$ = "Stator"  'RTD #4 Application
RTD_4_Name = 0  'RTD #4 Name
RTD_4_Alarm$ = "Off"  'RTD #4 Alarm
RTD_4_Alarm_Relays$ = "Alarm"  'RTD #4 Alarm Relays
RTD_4_Alarm_Temperature = 130  'RTD #4 Alarm Temperature
RTD_4_Alarm_Events$ = "Off/No"  'RTD #4 Alarm Events
RTD_4_Trip$ = "Off"  'RTD #4 Trip
RTD_4_Trip_Voting$ = "RTD #4"  'RTD #4 Trip Voting
RTD_4_Trip_Relays$ = "Trip"  'RTD #4 Trip Relays
RTD_4_Trip_Temperature = 155  'RTD #4 Trip Temperature
RTD_4_Hi_Alarm$ = "Off"  'RTD #4 Hi Alarm
RTD_4_Hi_Alarm_Relays$ = "Alarm"  'RTD #4 Hi Alarm Relays
RTD_4_Hi_Alarm_Level = 130  'RTD #4 Hi Alarm Level
RTD_5_Application$ = "Stator"  'RTD #5 Application
RTD_5_Name = 0  'RTD #5 Name
RTD_5_Alarm$ = "Off"  'RTD #5 Alarm
RTD_5_Alarm_Relays$ = "Alarm"  'RTD #5 Alarm Relays
RTD_5_Alarm_Temperature = 130  'RTD #5 Alarm Temperature
RTD_5_Alarm_Events$ = "Off/No"  'RTD #5 Alarm Events
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RTD_5_Trip$ = "Off"  'RTD #5 Trip
RTD_5_Trip_Voting$ = "RTD #5"  'RTD #5 Trip Voting
RTD_5_Trip_Relays$ = "Trip"  'RTD #5 Trip Relays
RTD_5_Trip_Temperature = 155  'RTD #5 Trip Temperature
RTD_5_Hi_Alarm$ = "Off"  'RTD #5 Hi Alarm
RTD_5_Hi_Alarm_Relays$ = "Alarm"  'RTD #5 Hi Alarm Relays
RTD_5_Hi_Alarm_Level = 130  'RTD #5 Hi Alarm Level
RTD_6_Application$ = "Stator"  'RTD #6 Application
RTD_6_Name = 0  'RTD #6 Name
RTD_6_Alarm$ = "Off"  'RTD #6 Alarm
RTD_6_Alarm_Relays$ = "Alarm"  'RTD #6 Alarm Relays
RTD_6_Alarm_Temperature = 130  'RTD #6 Alarm Temperature
RTD_6_Alarm_Events$ = "Off/No"  'RTD #6 Alarm Events
RTD_6_Trip$ = "Off"  'RTD #6 Trip
RTD_6_Trip_Voting$ = "RTD #6"  'RTD #6 Trip Voting
RTD_6_Trip_Relays$ = "Trip"  'RTD #6 Trip Relays
RTD_6_Trip_Temperature = 155  'RTD #6 Trip Temperature
RTD_6_Hi_Alarm$ = "Off"  'RTD #6 Hi Alarm
RTD_6_Hi_Alarm_Relays$ = "Alarm"  'RTD #6 Hi Alarm Relays
RTD_6_Hi_Alarm_Level = 130  'RTD #6 Hi Alarm Level
RTD_7_Application$ = "Bearing"  'RTD #7 Application
RTD_7_Name = 0  'RTD #7 Name
RTD_7_Alarm$ = "Off"  'RTD #7 Alarm
RTD_7_Alarm_Relays$ = "Alarm"  'RTD #7 Alarm Relays
RTD_7_Alarm_Temperature = 80  'RTD #7 Alarm Temperature
RTD_7_Alarm_Events$ = "Off/No"  'RTD #7 Alarm Events
RTD_7_Trip$ = "Off"  'RTD #7 Trip
RTD_7_Trip_Voting$ = "RTD #7"  'RTD #7 Trip Voting
RTD_7_Trip_Relays$ = "Trip"  'RTD #7 Trip Relays
RTD_7_Trip_Temperature = 90  'RTD #7 Trip Temperature
RTD_7_Hi_Alarm$ = "Off"  'RTD #7 Hi Alarm
RTD_7_Hi_Alarm_Relays$ = "Alarm"  'RTD #7 Hi Alarm Relays
RTD_7_Hi_Alarm_Level = 80  'RTD #7 Hi Alarm Level
RTD_8_Application$ = "Bearing"  'RTD #8 Application
RTD_8_Name = 0  'RTD #8 Name
RTD_8_Alarm$ = "Off"  'RTD #8 Alarm
RTD_8_Alarm_Relays$ = "Alarm"  'RTD #8 Alarm Relays
RTD_8_Alarm_Temperature = 80  'RTD #8 Alarm Temperature
RTD_8_Alarm_Events$ = "Off/No"  'RTD #8 Alarm Events
RTD_8_Trip$ = "Off"  'RTD #8 Trip
RTD_8_Trip_Voting$ = "RTD #8"  'RTD #8 Trip Voting
RTD_8_Trip_Relays$ = "Trip"  'RTD #8 Trip Relays
RTD_8_Trip_Temperature = 90  'RTD #8 Trip Temperature
RTD_8_Hi_Alarm$ = "Off"  'RTD #8 Hi Alarm
RTD_8_Hi_Alarm_Relays$ = "Alarm"  'RTD #8 Hi Alarm Relays
RTD_8_Hi_Alarm_Level = 80  'RTD #8 Hi Alarm Level
RTD_9_Application$ = "Bearing"  'RTD #9 Application
RTD_9_Name = 0  'RTD #9 Name
RTD_9_Alarm$ = "Off"  'RTD #9 Alarm
RTD_9_Alarm_Relays$ = "Alarm"  'RTD #9 Alarm Relays
RTD_9_Alarm_Temperature = 80  'RTD #9 Alarm Temperature
RTD_9_Alarm_Events$ = "Off/No"  'RTD #9 Alarm Events
RTD_9_Trip$ = "Off"  'RTD #9 Trip
RTD_9_Trip_Voting$ = "RTD #9"  'RTD #9 Trip Voting
RTD_9_Trip_Relays$ = "Trip"  'RTD #9 Trip Relays
RTD_9_Trip_Temperature = 90  'RTD #9 Trip Temperature
RTD_9_Hi_Alarm$ = "Off"  'RTD #9 Hi Alarm
RTD_9_Hi_Alarm_Relays$ = "Alarm"  'RTD #9 Hi Alarm Relays
RTD_9_Hi_Alarm_Level = 80  'RTD #9 Hi Alarm Level
RTD_10_Application$ = "Bearing"  'RTD #10 Application
RTD_10_Name = 0  'RTD #10 Name
RTD_10_Alarm$ = "Off"  'RTD #10 Alarm
RTD_10_Alarm_Relays$ = "Alarm"  'RTD #10 Alarm Relays
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RTD_10_Alarm_Temperature = 80  'RTD #10 Alarm Temperature
RTD_10_Alarm_Events$ = "Off/No"  'RTD #10 Alarm Events
RTD_10_Trip$ = "Off"  'RTD #10 Trip
RTD_10_Trip_Voting$ = "RTD #10"  'RTD #10 Trip Voting
RTD_10_Trip_Relays$ = "Trip"  'RTD #10 Trip Relays
RTD_10_Trip_Temperature = 90  'RTD #10 Trip Temperature
RTD_10_Hi_Alarm$ = "Off"  'RTD #10 Hi Alarm
RTD_10_Hi_Alarm_Relays$ = "Alarm"  'RTD #10 Hi Alarm Relays
RTD_10_Hi_Alarm_Level = 80  'RTD #10 Hi Alarm Level
RTD_11_Application$ = "Other"  'RTD #11 Application
RTD_11_Name = 0  'RTD #11 Name
RTD_11_Alarm$ = "Off"  'RTD #11 Alarm
RTD_11_Alarm_Relays$ = "Alarm"  'RTD #11 Alarm Relays
RTD_11_Alarm_Temperature = 80  'RTD #11 Alarm Temperature
RTD_11_Alarm_Events$ = "Off/No"  'RTD #11 Alarm Events
RTD_11_Trip$ = "Off"  'RTD #11 Trip
RTD_11_Trip_Voting$ = "RTD #11"  'RTD #11 Trip Voting
RTD_11_Trip_Relays$ = "Trip"  'RTD #11 Trip Relays
RTD_11_Trip_Temperature = 90  'RTD #11 Trip Temperature
RTD_11_Hi_Alarm$ = "Off"  'RTD #11 Hi Alarm
RTD_11_Hi_Alarm_Relays$ = "Alarm"  'RTD #11 Hi Alarm Relays
RTD_11_Hi_Alarm_Level = 80  'RTD #11 Hi Alarm Level
RTD_12_Application$ = "Ambient"  'RTD #12 Application
RTD_12_Name = 0  'RTD #12  Name
RTD_12_Alarm$ = "Off"  'RTD #12 Alarm
RTD_12_Alarm_Relays$ = "Alarm"  'RTD #12 Alarm Relays
RTD_12_Alarm_Temperature = 60  'RTD #12 Alarm Temperature
RTD_12_Alarm_Events$ = "Off/No"  'RTD #12 Alarm Events
RTD_12_Trip$ = "Off"  'RTD #12 Trip
RTD_12_Trip_Voting$ = "RTD #12"  'RTD #12 Trip Voting
RTD_12_Trip_Relays$ = "Trip"  'RTD #12 Trip Relays
RTD_12_Trip_Temperature = 80  'RTD #12 Trip Temperature
RTD_12_Hi_Alarm$ = "Off"  'RTD #12 Hi Alarm
RTD_12_Hi_Alarm_Relays$ = "Alarm"  'RTD #12 Hi Alarm Relays
RTD_12_Hi_Alarm_Level = 60  'RTD #12 Hi Alarm Level
Open_RTD_Sensor_Alarm$ = "Off"  'Open RTD Sensor Alarm
Open_RTD_Sensor_Alarm_Relays$ = "Alarm"  'Open RTD Sensor Alarm Relays
Open_RTD_Sensor_Alarm_Events$ = "Off/No"  'Open RTD Sensor Alarm Events
RTD_Short_Low_Temp_Alarm$ = "Off"  'RTD Short/Low Temp Alarm
RTD_Short_Low_Temp_Alarm_Relays$ = "Alarm"  'RTD Short/Low Temp. Alarm Relays
RTD_Short_Low_Temp_Alarm_Events$ = "Off/No"  'RTD Short/Low Temp. Alarm Events
Undervoltage_Active_Only_If_Bus_Energized$ = "Off/No"  'Undervoltage Active Only
If Bus Energized
Undervoltage_Alarm$ = "Off"  'Undervoltage Alarm
Undervoltage_Alarm_Relays$ = "Alarm"  'Undervoltage Alarm Relays
Undervoltage_Alarm_Pickup = 0.85  'Undervoltage Alarm Pickup
Starting_Undervoltage_Alarm_Pickup = 1.00  'Starting Undervoltage Alarm Pickup
Undervoltage_Alarm_Delay = 3.0  'Undervoltage Alarm Delay
Undervoltage_Alarm_Events$ = "Off/No"  'Undervoltage Alarm Events
Undervoltage_Trip$ = "Off"  'Undervoltage Trip
Undervoltage_Trip_Mode$ = "1-Phase"  'Undervoltage Trip Mode
Undervoltage_Trip_Relays$ = "Trip"  'Undervoltage Trip Relays
Undervoltage_Trip_Pickup = 0.80  'Undervoltage Trip Pickup
Starting_Undervoltage_Trip_Pickup = 1.00  'Starting Undervoltage Trip Pickup
Undervoltage_Trip_Delay = 3.0  'Undervoltage Trip Delay
Overvoltage_Alarm$ = "Off"  'Overvoltage Alarm
Overvoltage_Relays$ = "Alarm"  'Overvoltage Relays
Overvoltage_Alarm_Pickup = 1.05  'Overvoltage Alarm Pickup
Overvoltage_Alarm_Delay = 3.0  'Overvoltage Alarm Delay
Overvoltage_Alarm_Events$ = "Off/No"  'Overvoltage Alarm Events
Overvoltage_Trip$ = "Off"  'Overvoltage Trip
Overvoltage_Trip_Relays$ = "Trip"  'Overvoltage Trip Relays
Overvoltage_Trip_Pickup = 1.10  'Overvoltage Trip Pickup
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Overvoltage_Trip_Delay = 3.0  'Overvoltage Trip Delay
Voltage_Phase_Reversal_Trip$ = "Off"  'Voltage Phase Reversal Trip
Voltage_Phase_Reversal_Trip_Relays$ = "Trip"  'Voltage Phase Reversal Trip Relays
Voltage_Frequency_Alarm$ = "Off"  'Voltage Frequency Alarm
Voltage_Frequency_Alarm_Relays$ = "Alarm"  'Voltage Frequency Alarm Relays
Overfrequency_Alarm_Level = 60.50  'Overfrequency Alarm Level
Underfrequency_Alarm_Level = 59.50  'Underfrequency Alarm Level
Voltage_Frequency_Alarm_Delay = 1.0  'Voltage Frequency Alarm Delay
Voltage_Frequency_Alarm_Events$ = "Off/No"  'Voltage Frequency Alarm Events
Voltage_Frequency_Trip$ = "Off"  'Voltage Frequency Trip
Voltage_Frequency_Trip_Relays$ = "Trip"  'Voltage Frequency Trip Relays
Overfrequency_Trip_Level = 60.50  'Overfrequency Trip Level
Underfrequency_Trip_Level = 59.50  'Underfrequency Trip Level
Voltage_Frequency_Trip_Delay = 1.0  'Voltage Frequency Trip Delay
Block_Power_Factor_Element_from_Start = 1  'Block Power Factor Element from Start
Power_Factor_Alarm$ = "Off"  'Power Factor Alarm
Power_Factor_Alarm_Relays$ = "Alarm"  'Power Factor Alarm Relays
Power_Factor_Lead_Alarm_Level = 1.00  'Power Factor Lead Alarm Level
Power_Factor_Lag_Alarm_Level = 1.00  'Power Factor Lag Alarm Level
Power_Factor_Alarm_Delay = 1.0  'Power Factor Alarm Delay
Power_Factor_Alarm_Events$ = "Off/No"  'Power Factor Alarm Events
Power_Factor_Trip$ = "Off"  'Power Factor Trip
Power_Factor_Trip_Relays$ = "Trip"  'Power Factor Trip Relays
Power_Factor_Lead_Trip_Level = 1.00  'Power Factor Lead Trip Level
Power_Factor_Lag_Trip_Level = 1.00  'Power Factor Lag Trip Level
Power_Factor_Trip_Delay = 1.0  'Power Factor Trip Delay
Block_kvar_Element_from_Start = 1  'Block kvar Element from Start
Reactive_Power_Alarm$ = "Off"  'Reactive Power Alarm
Reactive_Power_Alarm_Relays$ = "Alarm"  'Reactive Power Alarm Relays
Positive_Reactive_Power_Alarm_Level = 10  'Positive Reactive Power Alarm Level
Negative_Reactive_Power_Alarm_Level = 10  'Negative Reactive Power Alarm Level
Reactive_Power_Alarm_Delay = 1.0  'Reactive Power Alarm Delay
Reactive_Power_Alarm_Events$ = "Off/No"  'Reactive Power Alarm Events
Reactive_Power_Trip$ = "Off"  'Reactive Power Trip
Reactive_Power_Trip_Relays$ = "Trip"  'Reactive Power Trip Relays
Positive_Reactive_Power_Trip_Level = 25  'Positive Reactive Power Trip Level
Negative_Reactive_Power_Trip_Level = 25  'Negative Reactive Power Trip Level
Reactive_Power_Trip_Delay = 1.0  'Reactive Power Trip Delay
Block_Underpower_From_Start = 0  'Block Underpower From Start
Underpower_Alarm$ = "Off"  'Underpower Alarm
Underpower_Alarm_Relays$ = "Alarm"  'Underpower Alarm Relays
Underpower_Alarm_Level = 2  'Underpower Alarm Level
Underpower_Alarm_Delay = 1  'Underpower Alarm Delay
Underpower_Alarm_Events$ = "Off/No"  'Underpower Alarm Events
Underpower_Trip$ = "Off"  'Underpower Trip
Underpower_Trip_Relays$ = "Trip"  'Underpower Trip Relays
Underpower_Trip_Level = 1  'Underpower Trip Level
Underpower_Trip_Delay = 1  'Underpower Trip Delay
Block_Reverse_Power_From_Start = 0  'Block Reverse Power From Start
Reverse_Power_Alarm$ = "Off"  'Reverse Power Alarm
Reverse_Power_Alarm_Relays$ = "Alarm"  'Reverse Power Alarm Relays
Reverse_Power_Alarm_Level = 1  'Reverse Power Alarm Level
Reverse_Power_Alarm_Delay = 1.0  'Reverse Power Alarm Delay
Reverse_Power_Alarm_Events$ = "Off/No"  'Reverse Power Alarm Events
Reverse_Power_Trip$ = "Off"  'Reverse Power Trip
Reverse_Power_Trip_Relays$ = "Trip"  'Reverse Power Trip Relays
Reverse_Power_Trip_Level = 1  'Reverse Power Trip Level
Reverse_Power_Trip_Delay = 1.0  'Reverse Power Trip Delay
Torque_Metering$ = "Disabled"  'Torque Metering
Stator_Resistance = 0.004  'Stator Resistance
Pole_Pairs = 2  'Pole Pairs
Torque_Unit$ = "Newton-meter"  'Torque Unit
Overtorque_Alarm$ = "Off"  'Overtorque Alarm
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Overtorque_Alarm_Relays$ = "Alarm"  'Overtorque Alarm Relays
Overtorque_Alarm_Level = 4000.0  'Overtorque Alarm Level
Overtorque_Alarm_Delay = 1.0  'Overtorque Alarm Delay
Overtorque_Alarm_Events$ = "Off/No"  'Overtorque Alarm Events
Trip_Counter_Alarm$ = "Off"  'Trip Counter Alarm
Trip_Counter_Alarm_Relays$ = "Alarm"  'Trip Counter Alarm Relays
Trip_Counter_Alarm_Level = 25  'Trip Counter Alarm Level
Trip_Counter_Alarm_Events$ = "Off/No"  'Trip Counter Alarm Events
Starter_Failure_Alarm_Starter_Failure_$ = "Off"  'Starter Failure Alarm (Starter
Failure)
Starter_Type$ = "Breaker"  'Starter Type
Starter_Failure_Alarm_Relays$ = "Alarm"  'Starter Failure Alarm Relays
Starter_Failure_Alarm_Delay = 100  'Starter Failure Alarm Delay
Supervision_of_Trip_Coil$ = "Disabled"  'Supervision of Trip Coil
Starter_Failure_Alarm_Events$ = "Off/No"  'Starter Failure Alarm Events
Current_Demand_Period = 15  'Current Demand Period
Current_Demand_Alarm$ = "Off"  'Current Demand Alarm
Current_Demand_Alarm_Relays$ = "Alarm"  'Current Demand Alarm Relays
Current_Demand_Alarm_Level = 100  'Current Demand Alarm Level
Current_Demand_Alarm_Events$ = "Off/No"  'Current Demand Alarm Events
kW_Demand_Period = 15  'kW Demand Period
kW_Demand_Alarm$ = "Off"  'kW Demand Alarm
kW_Demand_Alarm_Relays$ = "Alarm"  'kW Demand Alarm Relays
kW_Demand_Alarm_Level = 100  'kW Demand Alarm Level
kW_Demand_Alarm_Events$ = "Off/No"  'kW Demand Alarm Events
kvar_Demand_Period = 15  'kvar Demand Period
kvar_Demand_Alarm$ = "Off"  'kvar Demand Alarm
kvar_Demand_Alarm_Relays$ = "Alarm"  'kvar Demand Alarm Relays
kvar_Demand_Alarm_Level = 100  'kvar Demand Alarm Level
kvar_Demand_Alarm_Events$ = "Off/No"  'kvar Demand Alarm Events
kVA_Demand_Period = 15  'kVA Demand Period
kVA_Demand_Alarm$ = "Off"  'kVA Demand Alarm
kVA_Demand_Alarm_Relays$ = "Alarm"  'kVA Demand Alarm Relays
kVA_Demand_Alarm_Level = 100  'kVA Demand Alarm Level
kVA_Demand_Alarm_Events$ = "Off/No"  'kVA Demand Alarm Events
Positive_kWh_Pulse_Output_Relay$ = "Off"  'Positive kWh Pulse Output Relay
Positive_kWh_Pulse_Output_Interval = 1  'Positive kWh Pulse Output Interval
Positive_kvarh_Pulse_Output_Relay$ = "Off"  'Positive kvarh Pulse Output Relay
Positive_kvarh_Pulse_Output_Interval = 1  'Positive kvarh Pulse Output Interval
Negative_kvarh_Pulse_Output_Relay$ = "Off"  'Negative kvarh Pulse Output Relay
Negative_kvarh_Pulse_Output_Interval = 1  'Negative kvarh Pulse Output Interval
Analog_Output_1_Selection$ = "None"  'Analog Output 1 Selection
Analog_Output_2_Selection$ = "Phase A Current"  'Analog Output 2 Selection
Analog_Output_3_Selection$ = "None"  'Analog Output 3 Selection
Analog_Output_4_Selection$ = "None"  'Analog Output 4 Selection
RTD_1_Minimum = -50  'RTD #1 Minimum
RTD_1_Maximum = 250  'RTD #1 Maximum
RTD_2_Minimum = -50  'RTD #2 Minimum
RTD_2_Maximum = 250  'RTD #2 Maximum
RTD_3_Minimum = -50  'RTD #3 Minimum
RTD_3_Maximum = 250  'RTD #3 Maximum
RTD_4_Minimum = -50  'RTD #4 Minimum
RTD_4_Maximum = 250  'RTD #4 Maximum
RTD_5_Minimum = -50  'RTD #5 Minimum
RTD_5_Maximum = 250  'RTD #5 Maximum
RTD_6_Minimum = -50  'RTD #6 Minimum
RTD_6_Maximum = 250  'RTD #6 Maximum
RTD_7_Minimum = -50  'RTD #7 Minimum
RTD_7_Maximum = 250  'RTD #7 Maximum
RTD_8_Minimum = -50  'RTD #8 Minimum
RTD_8_Maximum = 250  'RTD #8 Maximum
RTD_9_Minimum = -50  'RTD #9 Minimum
RTD_9_Maximum = 250  'RTD #9 Maximum
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RTD_10_Minimum = -50  'RTD #10 Minimum
RTD_10_Maximum = 250  'RTD #10 Maximum
RTD_11_Minimum = -50  'RTD #11 Minimum
RTD_11_Maximum = 250  'RTD #11 Maximum
RTD_12_Minimum = -50  'RTD #12 Minimum
RTD_12_Maximum = 250  'RTD #12 Maximum
Power_Factor_Minimum = 0.80  'Power Factor Minimum
Power_Factor_Maximum = -0.80  'Power Factor Maximum
Reactive_Power_Minimum = 0  'Reactive Power Minimum
Reactive_Power_Maximum = 750  'Reactive Power Maximum
Real_Power_Minimum = 0  'Real Power Minimum
Real_Power_Maximum = 1000  'Real Power Maximum
Apparent_Power_Minimum = 0  'Apparent Power Minimum
Apparent_Power_Maximum = 1250  'Apparent Power Maximum
Thermal_Capacity_Used_Minimum = 0  'Thermal Capacity Used Minimum
Thermal_Capacity_Used_Maximum = 100  'Thermal Capacity Used Maximum
Relay_Lockout_Time_Minimum = 0  'Relay Lockout Time Minimum
Relay_Lockout_Time_Maximum = 150  'Relay Lockout Time Maximum
Current_Demand_Minimum = 0  'Current Demand Minimum
Current_Demand_Maximum = 700  'Current Demand Maximum
kvar_Demand_Minimum = 0  'kvar Demand Minimum
kvar_Demand_Maximum = 1000  'kvar Demand Maximum
kW_Demand_Minimum = 0  'kW Demand Minimum
kW_Demand_Maximum = 1250  'kW Demand Maximum
kVA_Demand_Minimum = 0  'kVA Demand Minimum
kVA_Demand_Maximum = 1500  'kVA Demand Maximum
Speed2_Standard_Overload_Curve_Number = 4  'Speed2 Standard Overload Curve Number
Speed2_Undercurrent_Alarm$ = "Off"  'Speed2 Undercurrent Alarm
Speed2_Undercurrent_Alarm_Pickup = 0.70  'Speed2 Undercurrent Alarm Pickup
Speed2_Undercurrent_Alarm_Delay = 1  'Speed2 Undercurrent Alarm Delay
Speed2_Undercurrent_Alarm_Events$ = "Off/No"  'Speed2 Undercurrent Alarm Events
Speed2_Undercurrent_Trip$ = "Off"  'Speed2 Undercurrent Trip
Speed2_Undercurrent_Trip_Pickup = 0.70  'Speed2 Undercurrent Trip Pickup
Speed2_Undercurrent_Trip_Delay = 1  'Speed2 Undercurrent Trip Delay
Speed2_Acceleration_Timer_From_Start = 10.0  'Speed2 Acceleration Timer From
Start
Acceleration_Timer_From_Speed_One_to_Two = 10.0  'Acceleration Timer From Speed
One to Two
Ground_CT_Primary = 50  'Ground CT Primary
Phase_Differential_CT_Primary = 100  'Phase Differential CT Primary
Speed_2_Phase_Sequence$ = "ABC"  'Speed 2 Phase Sequence
Remote_Alarm_Name = 0  'Remote Alarm Name
Remote_Alarm_Function$ = "Unlatched"  'Remote Alarm Function
Remote_Alarm_Relays$ = "Alarm"  'Remote Alarm Relays
Remote_Alarm_Events$ = "Off/No"  'Remote Alarm Events
Remote_Trip_Name = 0  'Remote Trip Name
Remote_Trip_Relays$ = "Trip"  'Remote Trip Relays
Speed_Switch_Trip_Relays$ = "Trip"  'Speed Switch Trip Relays
Speed_Switch_Trip_Delays = 5.0  'Speed Switch Trip Delays
Load_Shed_Trip_Relays$ = "Trip"  'Load Shed Trip Relays
Block_Pressure_Switch_Alarm_from_Start = 0  'Block Pressure Switch Alarm from
Start
Pressure_Switch_Alarm_Function$ = "Unlatched"  'Pressure Switch Alarm Function
Pressure_Switch_Alarm_Relays$ = "Alarm"  'Pressure Switch Alarm Relays
Pressure_Switch_Alarm_Delay = 5.0  'Pressure Switch Alarm Delay
Pressure_Switch_Alarm_Events$ = "Off/No"  'Pressure Switch Alarm Events
Block_Pressure_Switch_Trip_from_Start = 0  'Block Pressure Switch Trip from Start
Pressure_Switch_Trip_Relays$ = "Trip"  'Pressure Switch Trip Relays
Pressure_Switch_Trip_Delay = 5.0  'Pressure Switch Trip Delay
Vibration_Switch_Alarm_Function$ = "Unlatched"  'Vibration Switch Alarm Function
Vibration_Switch_Alarm_Relays$ = "Alarm"  'Vibration Switch Alarm Relays
Vibration_Switch_Alarm_Delay = 5.0  'Vibration Switch Alarm Delay
Vibration_Switch_Alarm_Events$ = "Off/No"  'Vibration Switch Alarm Events
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Vibration_Switch_Trip_Relays$ = "Trip"  'Vibration Switch Trip Relays
Vibration_Switch_Trip_Delay = 5.0  'Vibration Switch Trip Delay
Counter_Units_Name = 0  'Counter Units Name
Counter_Preset_Value = 0  'Counter Preset Value
Counter_Type$ = "Increment"  'Counter Type
Counter_Alarm$ = "Off"  'Counter Alarm
Counter_Alarm_Relays$ = "Alarm"  'Counter Alarm Relays
Counter_Alarm_Level = 100  'Counter Alarm Level
Counter_Alarm_Pickup$ = "Over"  'Counter Alarm Pickup
Time_to_Trip_at_1_01_FLA = 17414.5  'Time to Trip at 1.01 x FLA
Time_to_Trip_at_1_05_FLA = 3414.9  'Time to Trip at 1.05 x FLA
Time_to_Trip_at_1_10_FLA = 1666.7  'Time to Trip at 1.10 x FLA
Time_to_Trip_at_1_20_FLA = 795.4  'Time to Trip at 1.20 x FLA
Time_to_Trip_at_1_30_FLA = 507.2  'Time to Trip at 1.30 x FLA
Time_to_Trip_at_1_40_FLA = 364.6  'Time to Trip at 1.40 x FLA
Time_to_Trip_at_1_50_FLA = 280.0  'Time to Trip at 1.50 x FLA
Time_to_Trip_at_1_75_FLA = 169.7  'Time to Trip at 1.75 x FLA
Time_to_Trip_at_2_00_FLA = 116.6  'Time to Trip at 2.00 x FLA
Time_to_Trip_at_2_25_FLA = 86.1  'Time to Trip at 2.25 x FLA
Time_to_Trip_at_2_50_FLA = 66.6  'Time to Trip at 2.50 x FLA
Time_to_Trip_at_2_75_FLA = 53.3  'Time to Trip at 2.75 x FLA
Time_to_Trip_at_3_00_FLA = 43.7  'Time to Trip at 3.00 x FLA
Time_to_Trip_at_3_25_FLA = 36.6  'Time to Trip at 3.25 x FLA
Time_to_Trip_at_3_50_FLA = 31.1  'Time to Trip at 3.50 x FLA
Time_to_Trip_at_3_75_FLA = 26.8  'Time to Trip at 3.75 x FLA
TIme_to_Trip_at_4_00_FLA = 23.3  'TIme to Trip at 4.00 x FLA
Time_to_Trip_at_4_25_FLA = 20.5  'Time to Trip at 4.25 x FLA
Time_to_Trip_at_4_50_FLA = 18.2  'Time to Trip at 4.50 x FLA
Time_to_Trip_at_4_75_FLA = 16.2  'Time to Trip at 4.75 x FLA
Time_to_Trip_at_5_00_FLA = 14.6  'Time to Trip at 5.00 x FLA
Time_to_Trip_at_5_50_FLA = 12.0  'Time to Trip at 5.50 x FLA
Time_to_Trip_at_6_00_FLA = 10.0  'Time to Trip at 6.00 x FLA
Time_to_Trip_at_6_50_FLA = 8.5  'Time to Trip at 6.50 x FLA
Time_to_Trip_at_7_00_FLA = 7.3  'Time to Trip at 7.00 x FLA
Time_to_Trip_at_7_50_FLA = 6.3  'Time to Trip at 7.50 x FLA
Time_to_Trip_at_8_00_FLA = 5.6  'Time to Trip at 8.00 x FLA
Time_to_Trip_at_10_0_FLA = 5.6  'Time to Trip at 10.0 x FLA
Time_to_Trip_at_15_0_FLA = 5.6  'Time to Trip at 15.0 x FLA
Time_to_Trip_at_20_0_FLA = 5.6  'Time to Trip at 20.0 x FLA
Overreach_Filter$ = "Off/No"  'Overreach Filter
Short_Circuit_Trip_Relays$ = "Trip"  'Short Circuit Trip Relays
Short_Circuit_Trip_Pickup = 4.0  'Short Circuit Trip Pickup
Intentional_Short_Circuit_Trip_Delay = 200  'Intentional Short Circuit Trip Delay
Ground_Fault_Trip_Backup_Relays$ = "Aux2"  'Ground Fault Trip Backup Relays
Ground_FaultTrip_Backup_Delay = 200  'Ground FaultTrip Backup Delay
Running_Time_Pulse_Relay$ = "Off"  'Running Time Pulse Relay
Running_Time_Pulse_Interval = 1  'Running Time Pulse Interval
Loss_Of_Comms_Function$ = "Off"  'Loss Of Comms Function
Loss_Of_Comms_Function_Type$ = "Alarm"  'Loss Of Comms Function Type
Loss_Of_Comms_Port$ = "COMP_RS485"  'Loss Of Comms Port
Assign_Loss_Of_Comms_Alarm_Relay$ = "Alarm"  'Assign Loss Of Comms Alarm Relay
Assign_Loss_Of_Comms_Trip_Relay$ = "Trip"  'Assign Loss Of Comms Trip Relay
Loss_Of_Comms_Delay = 1  'Loss Of Comms Delay
Loss_Of_Comms_Alarm_Event$ = "Off/No"  'Loss Of Comms Alarm Event
Phase_A_Current_Minimum = 0  'Phase A Current Minimum
Phase_A_Current_Maximum = 100  'Phase A Current Maximum
Phase_B_Current_Minimum = 0  'Phase B Current Minimum
Phase_B_Current_Maximum = 100  'Phase B Current Maximum
Phase_C_Current_Minimum = 0  'Phase C Current Minimum
Phase_C_Current_Maximum = 100  'Phase C Current Maximum
Average_Phase_Current_Minimum = 0  'Average Phase Current Minimum
Average_Phase_Current_Maximum = 100  'Average Phase Current Maximum
AB_Line_Voltage_Minimum = 3200  'AB Line Voltage Minimum
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AB_Line_Voltage_Maximum = 4500  'AB Line Voltage Maximum
BC_Line_Voltage_Minimum = 3200  'BC Line Voltage Minimum
BC_Line_Voltage_Maximum = 4500  'BC Line Voltage Maximum
CA_Line_Voltage_Minimum = 3200  'CA Line Voltage Minimum
CA_Line_Voltage_Maximum = 4500  'CA Line Voltage Maximum
Average_Line_Voltage_Minimum = 3200  'Average Line Voltage Minimum
Average_Line_Voltage_Maximum = 4500  'Average Line Voltage Maximum
Phase_AN_Voltage_Minimum = 1900  'Phase AN Voltage Minimum
Phase_AN_Voltage_Maximum = 2500  'Phase AN Voltage Maximum
Phase_BN_Voltage_Minimum = 1900  'Phase BN Voltage Minimum
Phase_BN_Voltage_Maximum = 2500  'Phase BN Voltage Maximum
Phase_CN_Voltage_Minimum = 1900  'Phase CN Voltage Minimum
Phase_CN_Voltage_Maximum = 2500  'Phase CN Voltage Maximum
Average_Phase_Voltage_Minimum = 1900  'Average Phase Voltage Minimum
Average_Phase_Voltage_Maximum = 2500  'Average Phase Voltage Maximum
Hottest_Stator_RTD_Minimum = 0  'Hottest Stator RTD Minimum
Hottest_Stator_RTD_Maximum = 200  'Hottest Stator RTD Maximum
Hottest_Bearing_RTD_Minimum = 0  'Hottest Bearing RTD Minimum
Hottest_Bearing_RTD_Maximum = 200  'Hottest Bearing RTD Maximum
Hottest_Ambient_RTD_Minimum = -50  'Hottest Ambient RTD Minimum
Hottest_Ambient_RTD_Maximum = 60  'Hottest Ambient RTD Maximum
Analog_Input_1_Minimum = 0  'Analog Input 1 Minimum
Analog_Input_1_Maximum = 50000  'Analog Input 1 Maximum
Analog_Input_2_Minimum = 0  'Analog Input 2 Minimum
Analog_Input_2_Maximum = 50000  'Analog Input 2 Maximum
Analog_Input_3_Minimum = 0  'Analog Input 3 Minimum
Analog_Input_3_Maximum = 50000  'Analog Input 3 Maximum
Analog_Input_4_Minimum = 0  'Analog Input 4 Minimum
Analog_Input_4_Maximum = 50000  'Analog Input 4 Maximum
Tachometer_Min = 3500  'Tachometer Min
Tachometer_Max = 3700  'Tachometer Max
MWh_Minimum = 50.000  'MWh Minimum
MWh_Maximum = 100.000  'MWh Maximum
Torque_Minimum = 0.0  'Torque Minimum
Torque_Maximum = 0.0  'Torque Maximum
Analog_Input_Diff_1_2_Minimum = 0  'Analog Input Diff 1-2 Minimum
Analog_Input_Diff_1_2_Maximum = 100  'Analog Input Diff 1-2 Maximum
Analog_Input_Diff_3_4_Minimum = 0  'Analog Input Diff 3-4 Minimum
Analog_Input_Diff_3_4_Maximum = 100  'Analog Input Diff 3-4 Maximum
Analog_Input_1_Setup$ = "Disabled"  'Analog Input 1 Setup
Analog_Input_1_Units = 0  'Analog Input 1 Units
Analog_Input_1_Minimum_analog_in_1_ = 0  'Analog Input 1 Minimum (analog in 1)
Analog_Input_1_Maximum_analog_in_1_ = 100  'Analog Input 1 Maximum (analog in 1)
Block_Analog_Input_1_From_Start = 0  'Block Analog Input 1 From Start
Analog_Input_1_Alarm$ = "Off"  'Analog Input 1 Alarm
Analog_Input_1_Alarm_Relays$ = "Alarm"  'Analog Input 1 Alarm Relays
Analog_Input_1_Alarm_Level = 10  'Analog Input 1 Alarm Level
Analog_Input_1_Alarm_Pickup$ = "Over"  'Analog Input 1 Alarm Pickup
Analog_Input_1_Alarm_Delay = 0.1  'Analog Input 1 Alarm Delay
Analog_Input_1_Alarm_Events$ = "Off/No"  'Analog Input 1 Alarm Events
Analog_Input_1_Trip$ = "Off"  'Analog Input 1 Trip
Analog_Input_1_Trip_Relays$ = "Trip"  'Analog Input 1 Trip Relays
Analog_Input_1_Trip_Level = 20  'Analog Input 1 Trip Level
Analog_Input_1_Trip_Pickup$ = "Over"  'Analog Input 1 Trip Pickup
Analog_Input_1_Trip_Delay = 0.1  'Analog Input 1 Trip Delay
Analog_Input_1_Name = 0  'Analog Input 1 Name
Analog_Input_2_Setup$ = "4-20 mA"  'Analog Input 2 Setup
Analog_Input_2_Units = 0  'Analog Input 2 Units
Analog_Input_2_Minimum_analog_in_2_ = 0  'Analog Input 2 Minimum (analog in 2)
Analog_Input_2_Maximum_analog_in_2_ = 100  'Analog Input 2 Maximum (analog in 2)
Block_Analog_Input_2_From_Start = 0  'Block Analog Input 2 From Start
Analog_Input_2_Alarm$ = "Off"  'Analog Input 2 Alarm
Analog_Input_2_Alarm_Relays$ = "Alarm"  'Analog Input 2 Alarm Relays
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Analog_Input_2_Alarm_Level = 10  'Analog Input 2 Alarm Level
Analog_Input_2_Alarm_Pickup$ = "Over"  'Analog Input 2 Alarm Pickup
Analog_Input_2_Alarm_Delay = 0.1  'Analog Input 2 Alarm Delay
Analog_Input_2_Alarm_Events$ = "Off/No"  'Analog Input 2 Alarm Events
Analog_Input_2_Trip$ = "Off"  'Analog Input 2 Trip
Analog_Input_2_Trip_Relays$ = "Trip"  'Analog Input 2 Trip Relays
Analog_Input_2_Trip_Level = 20  'Analog Input 2 Trip Level
Analog_Input_2_Trip_Pickup$ = "Over"  'Analog Input 2 Trip Pickup
Analog_Input_2_Trip_Delay = 0.1  'Analog Input 2 Trip Delay
Analog_Input_2_Name = 0  'Analog Input 2 Name
Analog_Input_3_Setup$ = "Disabled"  'Analog Input 3 Setup
Analog_Input_3_Units = 0  'Analog Input 3 Units
Analog_Input_3_Minimum_analog_in_3_ = 0  'Analog Input 3 Minimum (analog in 3)
Analog_Input_3_Maximum_analog_in_3_ = 100  'Analog Input 3 Maximum (analog in 3)
Block_Analog_Input_3_From_Start = 0  'Block Analog Input 3 From Start
Analog_Input_3_Alarm$ = "Off"  'Analog Input 3 Alarm
Analog_Input_3_Alarm_Relays$ = "Alarm"  'Analog Input 3 Alarm Relays
Analog_Input_3_Alarm_Level = 10  'Analog Input 3 Alarm Level
Analog_Input_3_Alarm_Pickup$ = "Over"  'Analog Input 3 Alarm Pickup
Analog_Input_3_Alarm_Delay = 0.1  'Analog Input 3 Alarm Delay
Analog_Input_3_Alarm_Events$ = "Off/No"  'Analog Input 3 Alarm Events
Analog_Input_3_Trip$ = "Off"  'Analog Input 3 Trip
Analog_Input_3_Trip_Relays$ = "Trip"  'Analog Input 3 Trip Relays
Analog_Input_3_Trip_Level = 20  'Analog Input 3 Trip Level
Analog_Input_3_Trip_Pickup$ = "Over"  'Analog Input 3 Trip Pickup
Analog_Input_3_Trip_Delay = 0.1  'Analog Input 3 Trip Delay
Analog_Input_3_Name = 0  'Analog Input 3 Name
Analog_Input_4_Setup$ = "Disabled"  'Analog Input 4 Setup
Analog_Input_4_Units = 0  'Analog Input 4 Units
Analog_Input_4_Minimum_analog_in_4_ = 0  'Analog Input 4 Minimum (analog in 4)
Analog_Input_4_Maximum_analog_in_4_ = 100  'Analog Input 4 Maximum (analog in 4)
Block_Analog_Input_4_From_Start = 0  'Block Analog Input 4 From Start
Analog_Input_4_Alarm$ = "Off"  'Analog Input 4 Alarm
Analog_Input_4_Alarm_Relays$ = "Alarm"  'Analog Input 4 Alarm Relays
Analog_Input_4_Alarm_Level = 10  'Analog Input 4 Alarm Level
Analog_Input_4_Alarm_Pickup$ = "Over"  'Analog Input 4 Alarm Pickup
Analog_Input_4_Alarm_Delay = 0.1  'Analog Input 4 Alarm Delay
Analog_Input_4_Alarm_Events$ = "Off/No"  'Analog Input 4 Alarm Events
Analog_Input_4_Trip$ = "Off"  'Analog Input 4 Trip
Analog_Input_4_Trip_Relays$ = "Trip"  'Analog Input 4 Trip Relays
Analog_Input_4_Trip_Level = 20  'Analog Input 4 Trip Level
Analog_Input_4_Trip_Pickup$ = "Over"  'Analog Input 4 Trip Pickup
Analog_Input_4_Trip_Delay = 0.1  'Analog Input 4 Trip Delay
Analog_Input_4_Name = 0  'Analog Input 4 Name
Speed2_Time_to_Trip_at_1_01_FLA = 17414.5  'Speed2 Time to Trip at 1.01 x FLA
Speed2_Time_to_Trip_at_1_05_FLA = 3414.9  'Speed2 Time to Trip at 1.05 x FLA
Speed2_Time_to_Trip_at_1_10_FLA = 1666.7  'Speed2 Time to Trip at 1.10 x FLA
Speed2_Time_to_Trip_at_1_20_FLA = 795.4  'Speed2 Time to Trip at 1.20 x FLA
Speed2_Time_to_Trip_at_1_30_FLA = 507.2  'Speed2 Time to Trip at 1.30 x FLA
Speed2_Time_to_Trip_at_1_40_FLA = 364.6  'Speed2 Time to Trip at 1.40 x FLA
Speed2_Time_to_Trip_at_1_50_FLA = 280.0  'Speed2 Time to Trip at 1.50 x FLA
Speed2_Time_to_Trip_at_1_75_FLA = 169.7  'Speed2 Time to Trip at 1.75 x FLA
Speed2_Time_to_Trip_at_2_00_FLA = 116.6  'Speed2 Time to Trip at 2.00 x FLA
Speed2_Time_to_Trip_at_2_25_FLA = 86.1  'Speed2 Time to Trip at 2.25 x FLA
Speed2_Time_to_Trip_at_2_50_FLA = 66.6  'Speed2 Time to Trip at 2.50 x FLA
Speed2_Time_to_Trip_at_2_75_FLA = 53.3  'Speed2 Time to Trip at 2.75 x FLA
Speed2_Time_to_Trip_at_3_00_FLA = 43.7  'Speed2 Time to Trip at 3.00 x FLA
Speed2_Time_to_Trip_at_3_25_FLA = 36.6  'Speed2 Time to Trip at 3.25 x FLA
Speed2_Time_to_Trip_at_3_50_FLA = 31.1  'Speed2 Time to Trip at 3.50 x FLA
Speed2_Time_to_Trip_at_3_75_FLA = 26.8  'Speed2 Time to Trip at 3.75 x FLA
Speed2_Time_to_Trip_at_4_00_FLA = 23.3  'Speed2 Time to Trip at 4.00 x FLA
Speed2_Time_to_Trip_at_4_25_FLA = 20.5  'Speed2 Time to Trip at 4.25 x FLA
Speed2_Time_to_Trip_at_4_50_FLA = 18.2  'Speed2 Time to Trip at 4.50 x FLA
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Speed2_Time_to_Trip_at_4_75_FLA = 16.2  'Speed2 Time to Trip at 4.75 x FLA
Speed2_Time_to_Trip_at_5_00_FLA = 14.6  'Speed2 Time to Trip at 5.00 x FLA
Speed2_Time_to_Trip_at_5_50_FLA = 12.0  'Speed2 Time to Trip at 5.50 x FLA
Speed2_Time_to_Trip_at_6_00_FLA = 10.0  'Speed2 Time to Trip at 6.00 x FLA
Speed2_Time_to_Trip_at_6_50_FLA = 8.5  'Speed2 Time to Trip at 6.50 x FLA
Speed2_Time_to_Trip_at_7_00_FLA = 7.3  'Speed2 Time to Trip at 7.00 x FLA
Speed2_Time_to_Trip_at_7_50_FLA = 6.3  'Speed2 Time to Trip at 7.50 x FLA
Speed2_Time_to_Trip_at_8_00_FLA = 5.6  'Speed2 Time to Trip at 8.00 x FLA
Speed2_Time_to_Trip_at_10_0_FLA = 5.6  'Speed2 Time to Trip at 10.0 x FLA
Speed2_Time_to_Trip_at_15_0_FLA = 5.6  'Speed2 Time to Trip at 15.0 x FLA
Speed2_Time_to_Trip_at_20_0_FLA = 5.6  'Speed2 Time to Trip at 20.0 x FLA
Speed2_Minimum_Allowable_Line_Voltage = 80  'Speed2 Minimum Allowable Line
Voltage
Speed2_Stall_Current_at_Min_Vline = 4.80  'Speed2 Stall Current at Min Vline
Speed2_Safe_Stall_Time_at_Min_Vline = 20.0  'Speed2 Safe Stall Time at Min Vline
Speed2_Accel_Intersect_at_Min_Vline = 3.80  'Speed2 Accel. Intersect at Min Vline
Speed2_Stall_Current_at_100_Vline = 6.00  'Speed2 Stall Current at 100% Vline
Speed2_Safe_Stall_Time_at_100_Vline = 10.0  'Speed2 Safe Stall Time at 100% Vline
Speed2_Accel_Intersect_at_100_Vline = 5.00  'Speed2 Accel. Intersect at 100%
Vline
Block_Speed2_Undercurrent_from_Start = 0  'Block Speed2 Undercurrent from Start
Speed_Switch_Trip_Speed2_Delay = 5.0  'Speed Switch Trip Speed2 Delay
Speed2_Rated_Speed = 3600  'Speed2 Rated Speed
Analog_In_Differential_1_2_Enable$ = "Disabled"  'Analog In Differential 1-2
Enable
Analog_In_Diff_1_2_Name = 0  'Analog In Diff 1-2 Name
Analog_In_Differential_1_2_Comparison$ = "% Difference"  'Analog In Differential
1-2 Comparison
Analog_In_Differential_1_2_Logic$ = "1<>2 (or 3<>4)"  'Analog In Differential 1-
2 Logic
Analog_In_Differential_1_2_Active_When$ = "Always"  'Analog In Differential 1-2
Active When
Analog_In_Differential_1_2_Block_from_Start = 0  'Analog In Differential 1-2
Block from Start
Analog_In_Differential_1_2_Alarm$ = "Off"  'Analog In Differential 1-2 Alarm
Analog_In_Differential_1_2_Alarm_Relays$ = "Alarm"  'Analog In Differential 1-2
Alarm Relays
Analog_In_Differential_1_2_Percent_Alarm = 10  'Analog In Differential 1-2
Percent Alarm
Analog_In_Differential_1_2_Absolute_Alarm = 10  'Analog In Differential 1-2
Absolute Alarm
Analog_In_Differential_1_2_Alarm_Delay = 0.1  'Analog In Differential 1-2 Alarm
Delay
Analog_In_Differential_1_2_Alarm_Events$ = "Off/No"  'Analog In Differential 1-2
Alarm Events
Analog_In_Differential_1_2_Trip$ = "Off"  'Analog In Differential 1-2 Trip
Analog_In_Differential_1_2_Trip_Relays$ = "Trip"  'Analog In Differential 1-2
Trip Relays
Analog_In_Differential_1_2_Percent_Trip = 10  'Analog In Differential 1-2
Percent Trip
Analog_In_Differential_1_2_Absolute_Trip = 10  'Analog In Differential 1-2
Absolute Trip
Analog_In_Differential_1_2_Trip_Delay = 0.1  'Analog In Differential 1-2 Trip
Delay
Analog_In_Differential_3_4_Enable$ = "Disabled"  'Analog In Differential 3-4
Enable
Analog_In_Diff_3_4_Name = 0  'Analog In Diff. 3-4 Name
Analog_In_Differential_3_4_Comparison$ = "% Difference"  'Analog In Differential
3-4 Comparison
Analog_In_Differential_3_4_Logic$ = "1<>2 (or 3<>4)"  'Analog In Differential 3-
4 Logic
Analog_In_Differential_3_4_Active_When$ = "Always"  'Analog In Differential 3-4
Active When
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Analog_In_Differential_3_4_Block_from_Start = 0  'Analog In Differential 3-4
Block from Start
Analog_In_Differential_3_4_Alarm$ = "Off"  'Analog In Differential 3-4 Alarm
Analog_In_Differential_3_4_Alarm_Relays$ = "Alarm"  'Analog In Differential 3-4
Alarm Relays
Analog_In_Differential_3_4_Percent_Alarm = 10  'Analog In Differential 3-4
Percent Alarm
Analog_In_Differential_3_4_Absolute_Alarm = 10  'Analog In Differential 3-4
Absolute Alarm
Analog_In_Differential_3_4_Alarm_Delay = 0.1  'Analog In Differential 3-4 Alarm
Delay
Analog_In_Differential_3_4_Alarm_Events$ = "Off/No"  'Analog In Differential 3-4
Alarm Events
Analog_In_Differential_3_4_Trip$ = "Off"  'Analog In Differential 3-4 Trip
Analog_In_Differential_3_4_Trip_Relays$ = "Trip"  'Analog In Differential 3-4
Trip Relays
Analog_In_Differential_3_4_Percent_Trip = 10  'Analog In Differential 3-4
Percent Trip
Analog_In_Differential_3_4_Absolute_Trip = 10  'Analog In Differential 3-4
Absolute Trip
Analog_In_Differential_3_4_Trip_Delay = 0.1  'Analog In Differential 3-4 Trip
Delay
Ground_Fault_Overreach_Filter$ = "Off/No"  'Ground Fault Overreach Filter
User_Map_Address_1 = 512  'User Map Address #1
User_Map_Address_2 = 528  'User Map Address #2
User_Map_Address_3 = 529  'User Map Address #3
User_Map_Address_4 = 551  'User Map Address #4
User_Map_Address_5 = 552  'User Map Address #5
User_Map_Address_6 = 553  'User Map Address #6
User_Map_Address_7 = 554  'User Map Address #7
User_Map_Address_8 = 555  'User Map Address #8
User_Map_Address_9 = 556  'User Map Address #9
User_Map_Address_10 = 720  'User Map Address #10
User_Map_Address_11 = 721  'User Map Address #11
User_Map_Address_12 = 722  'User Map Address #12
User_Map_Address_13 = 723  'User Map Address #13
User_Map_Address_14 = 724  'User Map Address #14
User_Map_Address_15 = 729  'User Map Address #15
User_Map_Address_16 = 768  'User Map Address #16
User_Map_Address_17 = 769  'User Map Address #17
User_Map_Address_18 = 770  'User Map Address #18
User_Map_Address_19 = 771  'User Map Address #19
User_Map_Address_20 = 772  'User Map Address #20
User_Map_Address_21 = 773  'User Map Address #21
User_Map_Address_22 = 774  'User Map Address #22
User_Map_Address_23 = 775  'User Map Address #23
User_Map_Address_24 = 779  'User Map Address #24
User_Map_Address_25 = 780  'User Map Address #25
User_Map_Address_26 = 801  'User Map Address #26
User_Map_Address_27 = 802  'User Map Address #27
User_Map_Address_28 = 803  'User Map Address #28
User_Map_Address_29 = 804  'User Map Address #29
User_Map_Address_30 = 805  'User Map Address #30
User_Map_Address_31 = 806  'User Map Address #31
User_Map_Address_32 = 807  'User Map Address #32
User_Map_Address_33 = 808  'User Map Address #33
User_Map_Address_34 = 809  'User Map Address #34
User_Map_Address_35 = 810  'User Map Address #35
User_Map_Address_36 = 811  'User Map Address #36
User_Map_Address_37 = 812  'User Map Address #37
User_Map_Address_38 = 832  'User Map Address #38
User_Map_Address_39 = 833  'User Map Address #39
User_Map_Address_40 = 834  'User Map Address #40
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User_Map_Address_41 = 835  'User Map Address #41
User_Map_Address_42 = 840  'User Map Address #42
User_Map_Address_43 = 880  'User Map Address #43
User_Map_Address_44 = 881  'User Map Address #44
User_Map_Address_45 = 882  'User Map Address #45
User_Map_Address_46 = 884  'User Map Address #46
User_Map_Address_47 = 885  'User Map Address #47
User_Map_Address_48 = 886  'User Map Address #48
User_Map_Address_49 = 781  'User Map Address #49
User_Map_Address_50 = 782  'User Map Address #50
User_Map_Address_51 = 783  'User Map Address #51
User_Map_Address_52 = 725  'User Map Address #52
User_Map_Address_53 = 726  'User Map Address #53
User_Map_Address_54 = 727  'User Map Address #54
User_Map_Address_55 = 728  'User Map Address #55
User_Map_Address_56 = 0  'User Map Address #56
User_Map_Address_57 = 0  'User Map Address #57
User_Map_Address_58 = 0  'User Map Address #58
User_Map_Address_59 = 0  'User Map Address #59
User_Map_Address_60 = 0  'User Map Address #60
User_Map_Address_61 = 0  'User Map Address #61
User_Map_Address_62 = 0  'User Map Address #62
User_Map_Address_63 = 0  'User Map Address #63
User_Map_Address_64 = 0  'User Map Address #64
User_Map_Address_65 = 0  'User Map Address #65
User_Map_Address_66 = 0  'User Map Address #66
User_Map_Address_67 = 0  'User Map Address #67
User_Map_Address_68 = 0  'User Map Address #68
User_Map_Address_69 = 0  'User Map Address #69
User_Map_Address_70 = 0  'User Map Address #70
User_Map_Address_71 = 0  'User Map Address #71
User_Map_Address_72 = 0  'User Map Address #72
User_Map_Address_73 = 0  'User Map Address #73
User_Map_Address_74 = 0  'User Map Address #74
User_Map_Address_75 = 0  'User Map Address #75
User_Map_Address_76 = 0  'User Map Address #76
User_Map_Address_77 = 0  'User Map Address #77
User_Map_Address_78 = 0  'User Map Address #78
User_Map_Address_79 = 0  'User Map Address #79
User_Map_Address_80 = 0  'User Map Address #80
User_Map_Address_81 = 0  'User Map Address #81
User_Map_Address_82 = 0  'User Map Address #82
User_Map_Address_83 = 0  'User Map Address #83
User_Map_Address_84 = 0  'User Map Address #84
User_Map_Address_85 = 0  'User Map Address #85
User_Map_Address_86 = 0  'User Map Address #86
User_Map_Address_87 = 0  'User Map Address #87
User_Map_Address_88 = 0  'User Map Address #88
User_Map_Address_89 = 0  'User Map Address #89
User_Map_Address_90 = 0  'User Map Address #90
User_Map_Address_91 = 0  'User Map Address #91
User_Map_Address_92 = 0  'User Map Address #92
User_Map_Address_93 = 0  'User Map Address #93
User_Map_Address_94 = 0  'User Map Address #94
User_Map_Address_95 = 0  'User Map Address #95
User_Map_Address_96 = 0  'User Map Address #96
User_Map_Address_97 = 0  'User Map Address #97
User_Map_Address_98 = 0  'User Map Address #98
User_Map_Address_99 = 0  'User Map Address #99
User_Map_Address_100 = 0  'User Map Address #100
User_Map_Address_101 = 0  'User Map Address #101
User_Map_Address_102 = 0  'User Map Address #102
User_Map_Address_103 = 0  'User Map Address #103
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User_Map_Address_104 = 0  'User Map Address #104
User_Map_Address_105 = 0  'User Map Address #105
User_Map_Address_106 = 0  'User Map Address #106
User_Map_Address_107 = 0  'User Map Address #107
User_Map_Address_108 = 0  'User Map Address #108
User_Map_Address_109 = 0  'User Map Address #109
User_Map_Address_110 = 0  'User Map Address #110
User_Map_Address_111 = 0  'User Map Address #111
User_Map_Address_112 = 0  'User Map Address #112
User_Map_Address_113 = 0  'User Map Address #113
User_Map_Address_114 = 0  'User Map Address #114
User_Map_Address_115 = 0  'User Map Address #115
User_Map_Address_116 = 0  'User Map Address #116
User_Map_Address_117 = 0  'User Map Address #117
User_Map_Address_118 = 0  'User Map Address #118
User_Map_Address_119 = 0  'User Map Address #119
User_Map_Address_120 = 0  'User Map Address #120
User_Map_Address_121 = 0  'User Map Address #121
User_Map_Address_122 = 0  'User Map Address #122
User_Map_Address_123 = 0  'User Map Address #123
User_Map_Address_124 = 0  'User Map Address #124
User_Map_Address_125 = 0  'User Map Address #125
Motor_Load_Minimum = 0.00  'Motor Load Minimum
Motor_Load_Maximum = 1.25  'Motor Load Maximum
```

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: **READ TEST NOTES**

OK?
RAN

Relay Test Results for: **TURN ON BATTERY SIMULATOR**

OK?
RAN

Relay Test Results for: *** GET SETTINGS FILE FROM DEVICE ***

OK?
RAN

Relay Test Results for: ***RELAY SETTINGS TO SETTINGS TAB***

OK?
RAN

Relay Test Results for: MODIFY RELAY TRIP SETTINGS

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: ***CURRENT CONNECTIONS***

OK?
RAN

Relay Test Results for: CURRENT METER TEST

	EXPECTED CURRENT	CURRENT READ	RANGE			OK?
A PHASE	75.0	74.0	71.2	TO	78.8	PASS
B PHASE	75.0	75.0	71.2	TO	78.8	PASS
C PHASE	75.0	74.0	71.2	TO	78.8	PASS

Relay Test Results for: OVERLOAD PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	2.791	2.760	1.12	PASS

Relay Test Results for: OVERLOAD TIMING TEST

Relay Test Results for: OVERLOAD TIMING TEST

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
3.00	7.200	2659.16	44.319	43.728	1.35	PASS
4.00	9.600	1414.37	23.573	23.319	1.09	PASS
5.00	12.000	878.11	14.635	14.573	0.42	PASS

Relay Test Results for: SHORT CIRCUIT TRIP PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	20.200	20.000	1.00	PASS

Relay Test Results for: SHORT CIRCUIT TRIP DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	24.000	12.96	0.216	0.150 TO 0.250	PASS

Relay Test Results for: UNDERCURRENT TRIP PICKUP

OK?
RAN

Relay Test Results for: MECHANICAL JAM PICKUP

OK?
RAN

Relay Test Results for: MECHANICAL JAM DELAY

OK?
RAN

Relay Test Results for: CURRENT UNBALANCE PICKUP

UNBALANCE% PU	RANGE	OK?
0.00	0.00 TO 0.00	RAN

Relay Test Results for: CURRENT UNBALANCE DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
0.32	12.800	67.01	1.117	0.500 TO 1.500	PASS

Relay Test Results for: ACCELERATION TIMER

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
1.20	3.312	600.32	10.005	10.000	0.05	PASS

Relay Test Results for: ***VOLTAGE INPUT TEST***

	EXPECTED VOLTAGE	VOLATGE READ	RANGE	OK?
APH-BPH	4200.0	4200.0	4116.0 TO 4284.0	PASS
BPH-CPH	4200.0	4200.0	4116.0 TO 4284.0	PASS
CPH-APH	4200.0	4186.0	4116.0 TO 4284.0	PASS

Relay Test Results for: UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: UNDERVOLTAGE DELAY

OK?
RAN

Relay Test Results for: OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: OVERVOLTAGE DELAY

OK?
RAN

Relay Test Results for: VOLTAGE PHASE REVERSAL

OK?
RAN

Relay Test Results for: UNDERFREQUENCY PICKUP

OK?
RAN

Relay Test Results for: UNDERFREQUENCY DELAY

OK?
RAN

Relay Test Results for: OVERFREQUENCY PICKUP

OK?
RAN

Relay Test Results for: OVERFREQUENCY DELAY

OK?
RAN

Relay Test Results for: ***POWER INPUT TEST***

EXPECTED POWER FACTOR	POWER FACTOR READ	EXPECTED KILOWATTS	KILOWATTS READ	RANGE	OK?
0.549	0.550	498.1	492.0	480.0 TO 516.3	PASS

Relay Test Results for: POWER FACTOR LEAD PICKUP

ANG(LAG)	VOLTAGE	CURRENT	POWER FACTOR	RANGE	OK?
0.00	0.00	0.000	0.000	0.000 TO 0.000	RAN

Relay Test Results for: POWER FACTOR LAG PICKUP

ANG(LAG)	VOLTAGE	CURRENT	POWER FACTOR	RANGE	OK?
0.00	0.00	0.000	0.000	0.000 TO 0.000	RAN

Relay Test Results for: REACTIVE POS KVAR TRIP PU

OK?
RAN

Relay Test Results for: REACTIVE NEG KVAR TRIP PU

OK?
RAN

Relay Test Results for: REACTIVE KVAR TRIP DELAY

OK?
RAN

Relay Test Results for: REVERSE POWER TRIP PU

OK?
RAN

Relay Test Results for: REVERSE POWER TRIP DELAY

OK?
RAN

Relay Test Results for: UNDERPOWER TRIP PU

OK?
RAN

Relay Test Results for: UNDERPOWER TRIP DELAY

OK?
RAN

Relay Test Results for: ***GROUND(1A/5A) INPUT TEST***

EXPECTED CURRENT	CURRENT READ	RANGE	OK?
50.0	49.9	49.0 TO 51.0	PASS

Relay Test Results for: GROUND(1A/5A) FAULT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	2.530	2.500	1.20	PASS

Relay Test Results for: GROUND(1A/5A) FAULT DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.10	2.750	14.23	0.237	0.000 TO 0.700	PASS

Relay Test Results for: ***DIFFERENTIAL INPUT TEST***

0.0	0.0	0.0 TO 0.0		RAN

Relay Test Results for: DIFFERENTIAL PICKUP PH A

OK?
RAN

Relay Test Results for: DIFFERENTIAL PICKUP PH B

Relay Test Results for:	DIFFERENTIAL PICKUP PH B	OK? RAN
Relay Test Results for:	DIFFERENTIAL PICKUP PH C	OK? RAN
Relay Test Results for:	DIFFERENTIAL FAULT DELAY	OK? RAN
Relay Test Results for:	RETURN RELAY SETTING	OK? RAN
Relay Test Results for:	**TURN OFF BATTERY SIMULATOR**	OK? RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SR-469.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 2.7 **Test Date:** 03/11/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	8	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	EAST BLOWER BUILDING
POSITION:	PAB-E3	RELAY_MANF:	GE MULTILIN
RELAY_TYPE:	SR-469	MODEL_STYLE:	469-P5-HI-A20-T
IEEE_DEVICE:	MF	IL_IB:	SR469-RELAY
SERIAL_NUMBER:	B3043944	FIRMWARE:	30I520A8.000
RELAY_ID:	AACI207024	CURRENT_TESTDATE:	3/11/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
RELAY_ADDRESS=1                              'SPECIFIC RELAY ADDRESS USED FOR
MODBUS COMMUNICATIONS (DEFAULT=1)
TRIP_OUTPUT$="F1-E2"                         'OUTPUT CONTACT TO SENSE A TRIP
AUTO_MASK=1                                  'SET TO 2 TO DISPLAY FLEX PROGRAMMING
SKIP_TST=1                                   'SET TO 1 TO SKIP MESSAGES FOR TESTS
SKIPPED
PRINT_RAN_TESTS=1                            'MARKS TESTS IF THEY WERE ATTEMPTED
BUT NOT APPLICABLE
Phase_CT_Secondary=5                         'THIS IS THE RELAYS PHASE NOMINAL CT
INPUT
VTR=Voltage_Transformer_Ratio                'VT RATIO
CTR=Phase_CT_Primary/Phase_CT_Secondary      'CALCULATED CT RATIO
FLA=(MOTOR_Full_load_Amps)/CTR               'SECONDARY FULL LOAD CURRENT
MTR_START_MULT=0.5                           'MULT OF FULL LOAD AMPS
MTR_START_DELAY=120                          'WAIT TIME IN CYCLES FOR START
```

Routine Notes:

Relay Settings Used for Testing:

```
SR_PART_NUM$ = "469-P5-HI-A20-T"  'Information acquired from Settings file
SR_FIRMWARE$ = "5200"  'Information acquired from Settings file
Default_Message_Cycle_Time = 2.0  'Default Message Cycle Time
Default_Message_Timeout = 300  'Default Message Timeout
Average_Motor_Load_Calculation_Period = 15  'Average Motor Load Calculation
Period
Temperature_Display_Units$ = "Celsius"  'Temperature Display Units
Trace_Memory_Trigger_Position = 25  'Trace Memory Trigger Position
Trace_Memory_Buffers$ = "8 x 28 cycles"  'Trace Memory Buffers
Display_Update_Interval = 0.4  'Display Update Interval
Motor_Load_Filter_Interval = 0  'Motor Load Filter Interval
Communication_Port_Passcode = 0  'Communication Port Passcode
Passcode_write_Only_ = 0  'Passcode (write Only)
First_Scratchpad_Message$ = "Text 1"  'First Scratchpad Message
Second_Scratchpad_Message$ = "Text 2"  'Second Scratchpad Message
Third_Scratchpad_Message$ = "Text 3"  'Third Scratchpad Message
Fourth_Scratchpad_Message$ = "Text 4"  'Fourth Scratchpad Message
Fifth_Scratchpad_Message$ = "GE MULTILIN       469 Motor Relay"  'Fifth
Scratchpad Message
Phase_CT_Primary = 150  'Phase CT Primary
Motor_Full_Load_Amps = 72  'Motor Full Load Amps
Ethernet_IP_Address = 0  'Ethernet IP Address
Ethernet_Subnet_Mask = 4294966272  'Ethernet Subnet Mask
```

```
Ethernet_Gateway_Address = 0  'Ethernet Gateway Address
DeviceNet_MAC_ID = 63  'DeviceNet MAC ID
DeviceNet_Baud_Rate$ = "125 kbps"  'DeviceNet Baud Rate
Front_RS232_baud_rate$ = "19200 baud"  'Front RS232 baud rate
Slave_Address = 1  'Slave Address
Computer_RS485_Baud_Rate$ = "19200 baud"  'Computer RS485 Baud Rate
Computer_RS485_Parity$ = "None"  'Computer RS485 Parity
Auxiliary_RS485_Baud_Rate$ = "9600 baud"  'Auxiliary RS485 Baud Rate
Auxiliary_RS485_Parity$ = "None"  'Auxiliary RS485 Parity
Ground_CT_Type$ = "5 A Secondary"  'Ground CT Type
Phase_Differential_CT_Type$ = "None"  'Phase Differential CT Type
Enable_Two_Speed_Motor_Option$ = "Off/No"  'Enable Two Speed Motor Option
Speed_Two_Phase_CT_Primary = 100  'Speed Two Phase CT Primary
Speed_Two_Motor_Full_Load_Amps = 1  'Speed Two Motor Full Load Amps
VoltageTransformer_Connection_Type$ = "Open Delta"  'VoltageTransformer
Connection Type
Enable_Single_VT_Connection$ = "Off"  'Enable Single VT Connection
Voltage_Transformer_Ratio = 35.00  'Voltage Transformer Ratio
Motor_Nameplate_Voltage = 4200  'Motor Nameplate Voltage
Nominal_System_Frequency$ = "60 Hz"  'Nominal System Frequency
System_Phase_Sequence$ = "ABC"  'System Phase Sequence
Serial_Communication_Control$ = "Off/No"  'Serial Communication Control
Assign_Start_Control_Relays$ = "Auxiliary 2"  'Assign Start Control Relays
Reduced_Voltage_Starting$ = "Off/No"  'Reduced Voltage Starting
Control_Relays_for_Reduced_Voltage_Starting$ = "Auxiliary 3"  'Control Relays
for Reduced Voltage Starting
Transition_On$ = "Current Only"  'Transition On
Reduced_Voltage_Start_Level = 100  'Reduced Voltage Start Level
Reduced_Voltage_Start_Timer = 200  'Reduced Voltage Start Timer
Incomplete_Sequence_Trip_Relays$ = "Trip"  'Incomplete Sequence Trip Relays
Starter_Status_Switch$ = "Start Aux a"  'Starter Status Switch
Assignable_Input_1_Function$ = "Off"  'Assignable Input 1 Function
Counter_Alarm_Events$ = "Off/No"  'Counter Alarm Events
Rated_Speed = 3600  'Rated Speed
Tachometer_Alarm$ = "Off"  'Tachometer Alarm
Tachometer_Alarm_Relays$ = "Alarm"  'Tachometer Alarm Relays
Tachometer_Alarm_Speed = 10  'Tachometer Alarm Speed
Tachometer_Alarm_Delay = 1  'Tachometer Alarm Delay
Tachometer_Alarm_Events$ = "Off/No"  'Tachometer Alarm Events
Tachometer_Trip$ = "Off"  'Tachometer Trip
Tachometer_Trip_Relays$ = "Trip"  'Tachometer Trip Relays
Tachometer_Trip_Speed = 10  'Tachometer Trip Speed
Tachometer_Trip_Delay = 1  'Tachometer Trip Delay
General_Switch_A_Name = 0  'General Switch A Name
General_Switch_A_Normal_State$ = "Normally Open"  'General Switch A Normal State
General_Switch_A_Block_Input_From_Start = 0  'General Switch A Block Input From
Start
General_Switch_A_Alarm$ = "Off"  'General Switch A Alarm
General_Switch_A_Alarm_Relays$ = "Alarm"  'General Switch A Alarm Relays
General_Switch_A_Alarm_Delay = 5.0  'General Switch A Alarm Delay
General_Switch_A_Alarm_Events$ = "Off/No"  'General Switch A Alarm Events
General_Switch_A_Trip$ = "Off"  'General Switch A Trip
General_Switch_A_Trip_Relays$ = "Trip"  'General Switch A Trip Relays
General_Switch_A_Trip_Delay = 5.0  'General Switch A Trip Delay
General_Switch_B_Name = 0  'General Switch B Name
General_Switch_B_Normal_State$ = "Normally Open"  'General Switch B Normal State
General_Switch_B_Block_Input_From_Start = 0  'General Switch B Block Input From
Start
General_Switch_B_Alarm$ = "Off"  'General Switch B Alarm
General_Switch_B_Alarm_Relays$ = "Alarm"  'General Switch B Alarm Relays
General_Switch_B_Alarm_Delay = 5.0  'General Switch B Alarm Delay
General_Switch_B_Alarm_Events$ = "Off/No"  'General Switch B Alarm Events
General_Switch_B_Trip$ = "Off"  'General Switch B Trip
```

```
General_Switch_B_Trip_Relays$ = "Trip"  'General Switch B Trip Relays
General_Switch_B_Trip_Delay = 5.0  'General Switch B Trip Delay
General_Switch_C_Name = 0  'General Switch C Name
General_Switch_C_Normal_State$ = "Normally Open"  'General Switch C Normal State
General_Switch_C_Block_Input_From_Start = 0  'General Switch C Block Input From
Start
General_Switch_C_Alarm$ = "Off"  'General Switch C Alarm
General_Switch_C_Alarm_Relays$ = "Alarm"  'General Switch C Alarm Relays
General_Switch_C_Alarm_Delay = 5.0  'General Switch C Alarm Delay
General_Switch_C_Alarm_Events$ = "Off/No"  'General Switch C Alarm Events
General_Switch_C_Trip$ = "Off"  'General Switch C Trip
General_Switch_C_Trip_Relays$ = "Trip"  'General Switch C Trip Relays
General_Switch_C_Trip_Delay = 5.0  'General Switch C Trip Delay
General_Switch_D_Name = 0  'General Switch D Name
General_Switch_D_Normal_State$ = "Normally Open"  'General Switch D Normal State
General_Switch_D_Block_Input_From_Start = 0  'General Switch D Block Input From
Start
General_Switch_D_Alarm$ = "Off"  'General Switch D Alarm
General_Switch_D_Alarm_Relays$ = "Alarm"  'General Switch D Alarm Relays
General_Switch_D_Alarm_Delay = 5.0  'General Switch D Alarm Delay
General_Switch_D_Alarm_Events$ = "Off/No"  'General Switch D Alarm Events
General_Switch_D_Trip$ = "Off"  'General Switch D Trip
General_Switch_D_Trip_Relays$ = "Trip"  'General Switch D Trip Relays
General_Switch_D_Trip_Delay = 5.0  'General Switch D Trip Delay
Assignable_Input_2_Function$ = "Off"  'Assignable Input 2 Function
Assignable_Input_3_Function$ = "Off"  'Assignable Input 3 Function
Assignable_Input_4_Function$ = "Off"  'Assignable Input 4 Function
Reset_Mode_R1_Trip$ = "All Resets"  'Reset Mode R1 Trip
Force_R1_Output_Relay$ = "Disabled"  'Force R1 Output Relay
Force_R1_Operate_Time = 0  'Force R1 Operate Time
Reset_Mode_R4_Auxiliary$ = "All Resets"  'Reset Mode R4 Auxiliary
Force_R4_Output_Relay$ = "Disabled"  'Force R4 Output Relay
Force_R4_Operate_Time = 0  'Force R4 Operate Time
Reset_Mode_R2_Auxiliary$ = "All Resets"  'Reset Mode R2 Auxiliary
Force_R2_Output_Relay$ = "Disabled"  'Force R2 Output Relay
Force_R2_Output_Operate_Time = 0  'Force R2 Output Operate Time
Reset_Mode_R3_Auxiliary$ = "All Resets"  'Reset Mode R3 Auxiliary
Force_R3_Output_Relay$ = "Disabled"  'Force R3 Output Relay
Force_R3_Operate_Time = 0  'Force R3 Operate Time
Force_R5_Output_Relay$ = "Disabled"  'Force R5 Output Relay
Force_R5_Operate_Time = 0  'Force R5 Operate Time
Reset_Mode_R6_Service$ = "All Resets"  'Reset Mode R6 Service
Curve_Style$ = "Standard"  'Curve Style
Overload_Pickup_Level = 1.15  'Overload Pickup Level
Unbalance_k_Factor = 0  'Unbalance k Factor
Cool_Time_Constant_Running = 15  'Cool Time Constant Running
Cool_Time_Constant_Stopped = 30  'Cool Time Constant Stopped
Hot_Cold_Safe_Stall_Ratio = 1.00  'Hot/Cold Safe Stall Ratio
RTD_Blasing$ = "Off/No"  'RTD Blasing
RTD_Blas_Minimum = 40  'RTD Blas Minimum
RTD_Blas_Center_Point = 130  'RTD Blas Center Point
RTD_Blas_Maximum = 155  'RTD Blas Maximum
Thermal_Capacity_Alarm$ = "Off"  'Thermal Capacity Alarm
Thermal_Capacity_Alarm_Relays$ = "Alarm"  'Thermal Capacity Alarm Relays
Thermal_Capacity_Alarm_Level = 75  'Thermal Capacity Alarm Level
Thermal_Capacity_Alarm_Events$ = "Off/No"  'Thermal Capacity Alarm Events
Overload_Trip_Relays$ = "Trip"  'Overload Trip Relays
Standard_Overload_Curve_Number = 4  'Standard Overload Curve Number
Minimum_Allowable_Line_Voltage = 80  'Minimum Allowable Line Voltage
Stall_Current_at_Min_Vline = 4.80  'Stall Current at Min Vline
Safe_Stall_Time_at_Min_Vline = 20.0  'Safe Stall Time at Min Vline
Accel_Intersect_at_Min_Vline = 3.80  'Accel. Intersect at Min Vline
Stall_Current_at_100_Vline = 6.00  'Stall Current at 100% Vline
```

```
Safe_Stall_Time_at_100_Vline = 10.0  'Safe Stall Time at 100% Vline
Accel_Intersect_at_100_Vline = 5.00  'Accel. Intersect at 100% Vline
Short_Circuit_Trip$ = "Latched"  'Short Circuit Trip
Short_Circuit_Trip_Backup$ = "Off/No"  'Short Circuit Trip Backup
Short_Circuit_Backup_Relays$ = "Aux2"  'Short Circuit Backup Relays
Short_Circuit_Trip_Backup_Delay = 200  'Short Circuit Trip Backup Delay
Overload_Alarm$ = "Off"  'Overload Alarm
Overload_Alarm_Relays$ = "Alarm"  'Overload Alarm Relays
Overload_Alarm_Events$ = "Off/No"  'Overload Alarm Events
Overload_Alarm_Delay = 0.1  'Overload Alarm Delay
Mechanical_Jam_Trip$ = "Off"  'Mechanical Jam Trip
Mechanical_Jam_Trip_Relays$ = "Trip"  'Mechanical Jam Trip Relays
Mechanical_Jam_Pickup = 1.50  'Mechanical Jam Pickup
Mechanical_Jam_Delay = 1  'Mechanical Jam Delay
Block_Undercurrent_from_Start = 0  'Block Undercurrent from Start
Undercurrent_Alarm$ = "Off"  'Undercurrent Alarm
Undercurrent_Alarm_Relays$ = "Alarm"  'Undercurrent Alarm Relays
Undercurrent_Alarm_Pickup = 0.70  'Undercurrent Alarm Pickup
Undercurrent_Alarm_Delay = 1  'Undercurrent Alarm Delay
Undercurrent_Alarm_Events$ = "Off/No"  'Undercurrent Alarm Events
Undercurrent_Trip$ = "Off"  'Undercurrent Trip
Undercurrent_Trip_Relays$ = "Trip"  'Undercurrent Trip Relays
Undercurrent_Trip_Pickup = 0.70  'Undercurrent Trip Pickup
Undercurrent_Trip_Delay = 1  'Undercurrent Trip Delay
Current_Unbalance_Alarm$ = "Off"  'Current Unbalance Alarm
Current_Unbalance_Alarm_Relays$ = "Alarm"  'Current Unbalance Alarm Relays
Current_Unbalance_Alarm_Pickup = 15  'Current Unbalance Alarm Pickup
Current_Unbalance_Alarm_Delay = 1  'Current Unbalance Alarm Delay
Current_Unbalance_Alarm_Events$ = "Off/No"  'Current Unbalance Alarm Events
Current_Unbalance_Trip$ = "Off"  'Current Unbalance Trip
Current_Unbalance_Trip_Relays$ = "Trip"  'Current Unbalance Trip Relays
Current_Unbalance_Trip_Pickup = 20  'Current Unbalance Trip Pickup
Current_Unbalance_Trip_Delay = 1  'Current Unbalance Trip Delay
Ground_Fault_Alarm$ = "Off"  'Ground Fault Alarm
Ground_Fault_Alarm_Relays$ = "Alarm"  'Ground Fault Alarm Relays
Ground_Fault_Alarm_Pickup = 0.10  'Ground Fault Alarm Pickup
Alarm_Pickup_for_Multlin_CT_50_025 = 1.00  'Alarm Pickup for Multlin CT 50/.025
Intentional_GF_Alarm_Delay = 0  'Intentional GF Alarm Delay
Ground_Fault_Alarm_Events$ = "Off/No"  'Ground Fault Alarm Events
Ground_Fault_Trip$ = "Latched"  'Ground Fault Trip
Ground_Fault_Trip_Relays$ = "Trip"  'Ground Fault Trip Relays
Ground_Fault_Trip_Pickup = 0.50  'Ground Fault Trip Pickup
Trip_Pickup_for_Multlin_CT_50_025 = 1.00  'Trip Pickup for Multlin CT 50/.025
Intentional_GF_Trip_Delay = 200  'Intentional GF Trip Delay
Ground_Fault_Trip_Backup$ = "Off/No"  'Ground Fault Trip Backup
Phase_Differential_Trip$ = "Off"  'Phase Differential Trip
Phase_Differential_Trip_Relays$ = "Trip"  'Phase Differential Trip Relays
Differential_Trip_Pickup_While_Starting = 0.10  'Differential Trip Pickup While
Starting
Differential_Trip_Delay_While_Starting = 0  'Differential Trip Delay While
Starting
Differential_Trip_Pickup_While_Running = 0.10  'Differential Trip Pickup While
Running
Differential_Trip_Delay_While_Running = 0  'Differential Trip Delay While Running
Accleration_Timer_Trip$ = "Off"  'Accleration Timer Trip
Acceleration_Timer_Trip_Relays$ = "Trip"  'Acceleration Timer Trip Relays
Acceleration_Timer_from_Start = 10.0  'Acceleration Timer from Start
Start_Inhibit_Block$ = "Off/No"  'Start Inhibit Block
Thermal_Capacity_Used_Margin = 25  'Thermal Capacity Used Margin
Jogging_Block$ = "Off/No"  'Jogging Block
Maximum_Starts_Hour_Permissible = 3  'Maximum Starts/Hour Permissible
Time_Between_Starts = 10  'Time Between Starts
Restart_Block$ = "Off/No"  'Restart Block
```

```
Restart_Block_Time = 1  'Restart Block Time
Stator_RTD_Type$ = "100 Ohm Platinum"  'Stator RTD Type
Bearing_RTD_Type$ = "100 Ohm Platinum"  'Bearing RTD Type
Ambient_RTD_Type$ = "100 Ohm Platinum"  'Ambient RTD Type
Other_RTD_Type$ = "100 Ohm Platinum"  'Other RTD Type
RTD_1_Application$ = "Stator"  'RTD #1 Application
RTD_1_Name = 0  'RTD #1 Name
RTD_1_Alarm$ = "Off"  'RTD #1 Alarm
RTD_1_Alarm_Relays$ = "Alarm"  'RTD #1 Alarm Relays
RTD_1_Alarm_Temperature = 130  'RTD #1 Alarm Temperature
RTD_1_Alarm_Events$ = "Off/No"  'RTD #1 Alarm Events
RTD_1_Trip$ = "Off"  'RTD #1 Trip
RTD_1_Trip_Voting$ = "RTD #1"  'RTD #1 Trip Voting
RTD_1_Trip_Relays$ = "Trip"  'RTD #1 Trip Relays
RTD_1_Trip_Temperature = 155  'RTD #1 Trip Temperature
RTD_1_Hi_Alarm$ = "Off"  'RTD #1 Hi Alarm
RTD_1_Hi_Alarm_Relays$ = "Alarm"  'RTD #1 Hi Alarm Relays
RTD_1_Hi_Alarm_Level = 130  'RTD #1 Hi Alarm Level
RTD_2_Application$ = "Stator"  'RTD #2 Application
RTD_2_Name = 0  'RTD #2 Name
RTD_2_Alarm$ = "Off"  'RTD #2 Alarm
RTD_2_Alarm_Relays$ = "Alarm"  'RTD #2 Alarm Relays
RTD_2_Alarm_Temperature = 130  'RTD #2 Alarm Temperature
RTD_2_Alarm_Events$ = "Off/No"  'RTD #2 Alarm Events
RTD_2_Trip$ = "Off"  'RTD #2 Trip
RTD_2_Trip_Voting$ = "RTD #2"  'RTD #2 Trip Voting
RTD_2_Trip_Relays$ = "Trip"  'RTD #2 Trip Relays
RTD_2_Trip_Temperature = 155  'RTD #2 Trip Temperature
RTD_2_Hi_Alarm$ = "Off"  'RTD #2 Hi Alarm
RTD_2_Hi_Alarm_Relays$ = "Alarm"  'RTD #2 Hi Alarm Relays
RTD_2_Hi_Alarm_Level = 130  'RTD #2 Hi Alarm Level
RTD_3_Application$ = "Stator"  'RTD #3 Application
RTD_3_Name = 0  'RTD #3 Name
RTD_3_Alarm$ = "Off"  'RTD #3 Alarm
RTD_3_Alarm_Relays$ = "Alarm"  'RTD #3 Alarm Relays
RTD_3_Alarm_Temperature = 130  'RTD #3 Alarm Temperature
RTD_3_Alarm_Events$ = "Off/No"  'RTD #3 Alarm Events
RTD_3_Trip$ = "Off"  'RTD #3 Trip
RTD_3_Trip_Voting$ = "RTD #3"  'RTD #3 Trip Voting
RTD_3_Trip_Relays$ = "Trip"  'RTD #3 Trip Relays
RTD_3_Trip_Temperature = 155  'RTD #3 Trip Temperature
RTD_3_Hi_Alarm$ = "Off"  'RTD #3 Hi Alarm
RTD_3_Hi_Alarm_Relays$ = "Alarm"  'RTD #3 Hi Alarm Relays
RTD_3_Hi_Alarm_Level = 130  'RTD #3 Hi Alarm Level
RTD_4_Application$ = "Stator"  'RTD #4 Application
RTD_4_Name = 0  'RTD #4 Name
RTD_4_Alarm$ = "Off"  'RTD #4 Alarm
RTD_4_Alarm_Relays$ = "Alarm"  'RTD #4 Alarm Relays
RTD_4_Alarm_Temperature = 130  'RTD #4 Alarm Temperature
RTD_4_Alarm_Events$ = "Off/No"  'RTD #4 Alarm Events
RTD_4_Trip$ = "Off"  'RTD #4 Trip
RTD_4_Trip_Voting$ = "RTD #4"  'RTD #4 Trip Voting
RTD_4_Trip_Relays$ = "Trip"  'RTD #4 Trip Relays
RTD_4_Trip_Temperature = 155  'RTD #4 Trip Temperature
RTD_4_Hi_Alarm$ = "Off"  'RTD #4 Hi Alarm
RTD_4_Hi_Alarm_Relays$ = "Alarm"  'RTD #4 Hi Alarm Relays
RTD_4_Hi_Alarm_Level = 130  'RTD #4 Hi Alarm Level
RTD_5_Application$ = "Stator"  'RTD #5 Application
RTD_5_Name = 0  'RTD #5 Name
RTD_5_Alarm$ = "Off"  'RTD #5 Alarm
RTD_5_Alarm_Relays$ = "Alarm"  'RTD #5 Alarm Relays
RTD_5_Alarm_Temperature = 130  'RTD #5 Alarm Temperature
RTD_5_Alarm_Events$ = "Off/No"  'RTD #5 Alarm Events
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RTD_5_Trip$ = "Off"  'RTD #5 Trip
RTD_5_Trip_Voting$ = "RTD #5"  'RTD #5 Trip Voting
RTD_5_Trip_Relays$ = "Trip"  'RTD #5 Trip Relays
RTD_5_Trip_Temperature = 155  'RTD #5 Trip Temperature
RTD_5_Hi_Alarm$ = "Off"  'RTD #5 Hi Alarm
RTD_5_Hi_Alarm_Relays$ = "Alarm"  'RTD #5 Hi Alarm Relays
RTD_5_Hi_Alarm_Level = 130  'RTD #5 Hi Alarm Level
RTD_6_Application$ = "Stator"  'RTD #6 Application
RTD_6_Name = 0  'RTD #6 Name
RTD_6_Alarm$ = "Off"  'RTD #6 Alarm
RTD_6_Alarm_Relays$ = "Alarm"  'RTD #6 Alarm Relays
RTD_6_Alarm_Temperature = 130  'RTD #6 Alarm Temperature
RTD_6_Alarm_Events$ = "Off/No"  'RTD #6 Alarm Events
RTD_6_Trip$ = "Off"  'RTD #6 Trip
RTD_6_Trip_Voting$ = "RTD #6"  'RTD #6 Trip Voting
RTD_6_Trip_Relays$ = "Trip"  'RTD #6 Trip Relays
RTD_6_Trip_Temperature = 155  'RTD #6 Trip Temperature
RTD_6_Hi_Alarm$ = "Off"  'RTD #6 Hi Alarm
RTD_6_Hi_Alarm_Relays$ = "Alarm"  'RTD #6 Hi Alarm Relays
RTD_6_Hi_Alarm_Level = 130  'RTD #6 Hi Alarm Level
RTD_7_Application$ = "Bearing"  'RTD #7 Application
RTD_7_Name = 0  'RTD #7 Name
RTD_7_Alarm$ = "Off"  'RTD #7 Alarm
RTD_7_Alarm_Relays$ = "Alarm"  'RTD #7 Alarm Relays
RTD_7_Alarm_Temperature = 80  'RTD #7 Alarm Temperature
RTD_7_Alarm_Events$ = "Off/No"  'RTD #7 Alarm Events
RTD_7_Trip$ = "Off"  'RTD #7 Trip
RTD_7_Trip_Voting$ = "RTD #7"  'RTD #7 Trip Voting
RTD_7_Trip_Relays$ = "Trip"  'RTD #7 Trip Relays
RTD_7_Trip_Temperature = 90  'RTD #7 Trip Temperature
RTD_7_Hi_Alarm$ = "Off"  'RTD #7 Hi Alarm
RTD_7_Hi_Alarm_Relays$ = "Alarm"  'RTD #7 Hi Alarm Relays
RTD_7_Hi_Alarm_Level = 80  'RTD #7 Hi Alarm Level
RTD_8_Application$ = "Bearing"  'RTD #8 Application
RTD_8_Name = 0  'RTD #8 Name
RTD_8_Alarm$ = "Off"  'RTD #8 Alarm
RTD_8_Alarm_Relays$ = "Alarm"  'RTD #8 Alarm Relays
RTD_8_Alarm_Temperature = 80  'RTD #8 Alarm Temperature
RTD_8_Alarm_Events$ = "Off/No"  'RTD #8 Alarm Events
RTD_8_Trip$ = "Off"  'RTD #8 Trip
RTD_8_Trip_Voting$ = "RTD #8"  'RTD #8 Trip Voting
RTD_8_Trip_Relays$ = "Trip"  'RTD #8 Trip Relays
RTD_8_Trip_Temperature = 90  'RTD #8 Trip Temperature
RTD_8_Hi_Alarm$ = "Off"  'RTD #8 Hi Alarm
RTD_8_Hi_Alarm_Relays$ = "Alarm"  'RTD #8 Hi Alarm Relays
RTD_8_Hi_Alarm_Level = 80  'RTD #8 Hi Alarm Level
RTD_9_Application$ = "Bearing"  'RTD #9 Application
RTD_9_Name = 0  'RTD #9 Name
RTD_9_Alarm$ = "Off"  'RTD #9 Alarm
RTD_9_Alarm_Relays$ = "Alarm"  'RTD #9 Alarm Relays
RTD_9_Alarm_Temperature = 80  'RTD #9 Alarm Temperature
RTD_9_Alarm_Events$ = "Off/No"  'RTD #9 Alarm Events
RTD_9_Trip$ = "Off"  'RTD #9 Trip
RTD_9_Trip_Voting$ = "RTD #9"  'RTD #9 Trip Voting
RTD_9_Trip_Relays$ = "Trip"  'RTD #9 Trip Relays
RTD_9_Trip_Temperature = 90  'RTD #9 Trip Temperature
RTD_9_Hi_Alarm$ = "Off"  'RTD #9 Hi Alarm
RTD_9_Hi_Alarm_Relays$ = "Alarm"  'RTD #9 Hi Alarm Relays
RTD_9_Hi_Alarm_Level = 80  'RTD #9 Hi Alarm Level
RTD_10_Application$ = "Bearing"  'RTD #10 Application
RTD_10_Name = 0  'RTD #10 Name
RTD_10_Alarm$ = "Off"  'RTD #10 Alarm
RTD_10_Alarm_Relays$ = "Alarm"  'RTD #10 Alarm Relays
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RTD_10_Alarm_Temperature = 80  'RTD #10 Alarm Temperature
RTD_10_Alarm_Events$ = "Off/No"  'RTD #10 Alarm Events
RTD_10_Trip$ = "Off"  'RTD #10 Trip
RTD_10_Trip_Voting$ = "RTD #10"  'RTD #10 Trip Voting
RTD_10_Trip_Relays$ = "Trip"  'RTD #10 Trip Relays
RTD_10_Trip_Temperature = 90  'RTD #10 Trip Temperature
RTD_10_Hi_Alarm$ = "Off"  'RTD #10 Hi Alarm
RTD_10_Hi_Alarm_Relays$ = "Alarm"  'RTD #10 Hi Alarm Relays
RTD_10_Hi_Alarm_Level = 80  'RTD #10 Hi Alarm Level
RTD_11_Application$ = "Other"  'RTD #11 Application
RTD_11_Name = 0  'RTD #11 Name
RTD_11_Alarm$ = "Off"  'RTD #11 Alarm
RTD_11_Alarm_Relays$ = "Alarm"  'RTD #11 Alarm Relays
RTD_11_Alarm_Temperature = 80  'RTD #11 Alarm Temperature
RTD_11_Alarm_Events$ = "Off/No"  'RTD #11 Alarm Events
RTD_11_Trip$ = "Off"  'RTD #11 Trip
RTD_11_Trip_Voting$ = "RTD #11"  'RTD #11 Trip Voting
RTD_11_Trip_Relays$ = "Trip"  'RTD #11 Trip Relays
RTD_11_Trip_Temperature = 90  'RTD #11 Trip Temperature
RTD_11_Hi_Alarm$ = "Off"  'RTD #11 Hi Alarm
RTD_11_Hi_Alarm_Relays$ = "Alarm"  'RTD #11 Hi Alarm Relays
RTD_11_Hi_Alarm_Level = 80  'RTD #11 Hi Alarm Level
RTD_12_Application$ = "Ambient"  'RTD #12 Application
RTD_12_Name = 0  'RTD #12  Name
RTD_12_Alarm$ = "Off"  'RTD #12 Alarm
RTD_12_Alarm_Relays$ = "Alarm"  'RTD #12 Alarm Relays
RTD_12_Alarm_Temperature = 60  'RTD #12 Alarm Temperature
RTD_12_Alarm_Events$ = "Off/No"  'RTD #12 Alarm Events
RTD_12_Trip$ = "Off"  'RTD #12 Trip
RTD_12_Trip_Voting$ = "RTD #12"  'RTD #12 Trip Voting
RTD_12_Trip_Relays$ = "Trip"  'RTD #12 Trip Relays
RTD_12_Trip_Temperature = 80  'RTD #12 Trip Temperature
RTD_12_Hi_Alarm$ = "Off"  'RTD #12 Hi Alarm
RTD_12_Hi_Alarm_Relays$ = "Alarm"  'RTD #12 Hi Alarm Relays
RTD_12_Hi_Alarm_Level = 60  'RTD #12 Hi Alarm Level
Open_RTD_Sensor_Alarm$ = "Off"  'Open RTD Sensor Alarm
Open_RTD_Sensor_Alarm_Relays$ = "Alarm"  'Open RTD Sensor Alarm Relays
Open_RTD_Sensor_Alarm_Events$ = "Off/No"  'Open RTD Sensor Alarm Events
RTD_Short_Low_Temp_Alarm$ = "Off"  'RTD Short/Low Temp Alarm
RTD_Short_Low_Temp_Alarm_Relays$ = "Alarm"  'RTD Short/Low Temp. Alarm Relays
RTD_Short_Low_Temp_Alarm_Events$ = "Off/No"  'RTD Short/Low Temp. Alarm Events
Undervoltage_Active_Only_If_Bus_Energized$ = "Off/No"  'Undervoltage Active Only
If Bus Energized
Undervoltage_Alarm$ = "Off"  'Undervoltage Alarm
Undervoltage_Alarm_Relays$ = "Alarm"  'Undervoltage Alarm Relays
Undervoltage_Alarm_Pickup = 0.85  'Undervoltage Alarm Pickup
Starting_Undervoltage_Alarm_Pickup = 1.00  'Starting Undervoltage Alarm Pickup
Undervoltage_Alarm_Delay = 3.0  'Undervoltage Alarm Delay
Undervoltage_Alarm_Events$ = "Off/No"  'Undervoltage Alarm Events
Undervoltage_Trip$ = "Off"  'Undervoltage Trip
Undervoltage_Trip_Mode$ = "1-Phase"  'Undervoltage Trip Mode
Undervoltage_Trip_Relays$ = "Trip"  'Undervoltage Trip Relays
Undervoltage_Trip_Pickup = 0.80  'Undervoltage Trip Pickup
Starting_Undervoltage_Trip_Pickup = 1.00  'Starting Undervoltage Trip Pickup
Undervoltage_Trip_Delay = 3.0  'Undervoltage Trip Delay
Overvoltage_Alarm$ = "Off"  'Overvoltage Alarm
Overvoltage_Relays$ = "Alarm"  'Overvoltage Relays
Overvoltage_Alarm_Pickup = 1.05  'Overvoltage Alarm Pickup
Overvoltage_Alarm_Delay = 3.0  'Overvoltage Alarm Delay
Overvoltage_Alarm_Events$ = "Off/No"  'Overvoltage Alarm Events
Overvoltage_Trip$ = "Off"  'Overvoltage Trip
Overvoltage_Trip_Relays$ = "Trip"  'Overvoltage Trip Relays
Overvoltage_Trip_Pickup = 1.10  'Overvoltage Trip Pickup
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Overvoltage_Trip_Delay = 3.0  'Overvoltage Trip Delay
Voltage_Phase_Reversal_Trip$ = "Off"  'Voltage Phase Reversal Trip
Voltage_Phase_Reversal_Trip_Relays$ = "Trip"  'Voltage Phase Reversal Trip Relays
Voltage_Frequency_Alarm$ = "Off"  'Voltage Frequency Alarm
Voltage_Frequency_Alarm_Relays$ = "Alarm"  'Voltage Frequency Alarm Relays
Overfrequency_Alarm_Level = 60.50  'Overfrequency Alarm Level
Underfrequency_Alarm_Level = 59.50  'Underfrequency Alarm Level
Voltage_Frequency_Alarm_Delay = 1.0  'Voltage Frequency Alarm Delay
Voltage_Frequency_Alarm_Events$ = "Off/No"  'Voltage Frequency Alarm Events
Voltage_Frequency_Trip$ = "Off"  'Voltage Frequency Trip
Voltage_Frequency_Trip_Relays$ = "Trip"  'Voltage Frequency Trip Relays
Overfrequency_Trip_Level = 60.50  'Overfrequency Trip Level
Underfrequency_Trip_Level = 59.50  'Underfrequency Trip Level
Voltage_Frequency_Trip_Delay = 1.0  'Voltage Frequency Trip Delay
Block_Power_Factor_Element_from_Start = 1  'Block Power Factor Element from Start
Power_Factor_Alarm$ = "Off"  'Power Factor Alarm
Power_Factor_Alarm_Relays$ = "Alarm"  'Power Factor Alarm Relays
Power_Factor_Lead_Alarm_Level = 1.00  'Power Factor Lead Alarm Level
Power_Factor_Lag_Alarm_Level = 1.00  'Power Factor Lag Alarm Level
Power_Factor_Alarm_Delay = 1.0  'Power Factor Alarm Delay
Power_Factor_Alarm_Events$ = "Off/No"  'Power Factor Alarm Events
Power_Factor_Trip$ = "Off"  'Power Factor Trip
Power_Factor_Trip_Relays$ = "Trip"  'Power Factor Trip Relays
Power_Factor_Lead_Trip_Level = 1.00  'Power Factor Lead Trip Level
Power_Factor_Lag_Trip_Level = 1.00  'Power Factor Lag Trip Level
Power_Factor_Trip_Delay = 1.0  'Power Factor Trip Delay
Block_kvar_Element_from_Start = 1  'Block kvar Element from Start
Reactive_Power_Alarm$ = "Off"  'Reactive Power Alarm
Reactive_Power_Alarm_Relays$ = "Alarm"  'Reactive Power Alarm Relays
Positive_Reactive_Power_Alarm_Level = 10  'Positive Reactive Power Alarm Level
Negative_Reactive_Power_Alarm_Level = 10  'Negative Reactive Power Alarm Level
Reactive_Power_Alarm_Delay = 1.0  'Reactive Power Alarm Delay
Reactive_Power_Alarm_Events$ = "Off/No"  'Reactive Power Alarm Events
Reactive_Power_Trip$ = "Off"  'Reactive Power Trip
Reactive_Power_Trip_Relays$ = "Trip"  'Reactive Power Trip Relays
Positive_Reactive_Power_Trip_Level = 25  'Positive Reactive Power Trip Level
Negative_Reactive_Power_Trip_Level = 25  'Negative Reactive Power Trip Level
Reactive_Power_Trip_Delay = 1.0  'Reactive Power Trip Delay
Block_Underpower_From_Start = 0  'Block Underpower From Start
Underpower_Alarm$ = "Off"  'Underpower Alarm
Underpower_Alarm_Relays$ = "Alarm"  'Underpower Alarm Relays
Underpower_Alarm_Level = 2  'Underpower Alarm Level
Underpower_Alarm_Delay = 1  'Underpower Alarm Delay
Underpower_Alarm_Events$ = "Off/No"  'Underpower Alarm Events
Underpower_Trip$ = "Off"  'Underpower Trip
Underpower_Trip_Relays$ = "Trip"  'Underpower Trip Relays
Underpower_Trip_Level = 1  'Underpower Trip Level
Underpower_Trip_Delay = 1  'Underpower Trip Delay
Block_Reverse_Power_From_Start = 0  'Block Reverse Power From Start
Reverse_Power_Alarm$ = "Off"  'Reverse Power Alarm
Reverse_Power_Alarm_Relays$ = "Alarm"  'Reverse Power Alarm Relays
Reverse_Power_Alarm_Level = 1  'Reverse Power Alarm Level
Reverse_Power_Alarm_Delay = 1.0  'Reverse Power Alarm Delay
Reverse_Power_Alarm_Events$ = "Off/No"  'Reverse Power Alarm Events
Reverse_Power_Trip$ = "Off"  'Reverse Power Trip
Reverse_Power_Trip_Relays$ = "Trip"  'Reverse Power Trip Relays
Reverse_Power_Trip_Level = 1  'Reverse Power Trip Level
Reverse_Power_Trip_Delay = 1.0  'Reverse Power Trip Delay
Torque_Metering$ = "Disabled"  'Torque Metering
Stator_Resistance = 0.004  'Stator Resistance
Pole_Pairs = 2  'Pole Pairs
Torque_Unit$ = "Newton-meter"  'Torque Unit
Overtorque_Alarm$ = "Off"  'Overtorque Alarm
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Overtorque_Alarm_Relays$ = "Alarm"  'Overtorque Alarm Relays
Overtorque_Alarm_Level = 4000.0  'Overtorque Alarm Level
Overtorque_Alarm_Delay = 1.0  'Overtorque Alarm Delay
Overtorque_Alarm_Events$ = "Off/No"  'Overtorque Alarm Events
Trip_Counter_Alarm$ = "Off"  'Trip Counter Alarm
Trip_Counter_Alarm_Relays$ = "Alarm"  'Trip Counter Alarm Relays
Trip_Counter_Alarm_Level = 25  'Trip Counter Alarm Level
Trip_Counter_Alarm_Events$ = "Off/No"  'Trip Counter Alarm Events
Starter_Failure_Alarm_Starter_Failure_$ = "Off"  'Starter Failure Alarm (Starter
Failure)
Starter_Type$ = "Breaker"  'Starter Type
Starter_Failure_Alarm_Relays$ = "Alarm"  'Starter Failure Alarm Relays
Starter_Failure_Alarm_Delay = 100  'Starter Failure Alarm Delay
Supervision_of_Trip_Coil$ = "Disabled"  'Supervision of Trip Coil
Starter_Failure_Alarm_Events$ = "Off/No"  'Starter Failure Alarm Events
Current_Demand_Period = 15  'Current Demand Period
Current_Demand_Alarm$ = "Off"  'Current Demand Alarm
Current_Demand_Alarm_Relays$ = "Alarm"  'Current Demand Alarm Relays
Current_Demand_Alarm_Level = 100  'Current Demand Alarm Level
Current_Demand_Alarm_Events$ = "Off/No"  'Current Demand Alarm Events
kW_Demand_Period = 15  'kW Demand Period
kW_Demand_Alarm$ = "Off"  'kW Demand Alarm
kW_Demand_Alarm_Relays$ = "Alarm"  'kW Demand Alarm Relays
kW_Demand_Alarm_Level = 100  'kW Demand Alarm Level
kW_Demand_Alarm_Events$ = "Off/No"  'kW Demand Alarm Events
kvar_Demand_Period = 15  'kvar Demand Period
kvar_Demand_Alarm$ = "Off"  'kvar Demand Alarm
kvar_Demand_Alarm_Relays$ = "Alarm"  'kvar Demand Alarm Relays
kvar_Demand_Alarm_Level = 100  'kvar Demand Alarm Level
kvar_Demand_Alarm_Events$ = "Off/No"  'kvar Demand Alarm Events
kVA_Demand_Period = 15  'kVA Demand Period
kVA_Demand_Alarm$ = "Off"  'kVA Demand Alarm
kVA_Demand_Alarm_Relays$ = "Alarm"  'kVA Demand Alarm Relays
kVA_Demand_Alarm_Level = 100  'kVA Demand Alarm Level
kVA_Demand_Alarm_Events$ = "Off/No"  'kVA Demand Alarm Events
Positive_kWh_Pulse_Output_Relay$ = "Off"  'Positive kWh Pulse Output Relay
Positive_kWh_Pulse_Output_Interval = 1  'Positive kWh Pulse Output Interval
Positive_kvarh_Pulse_Output_Relay$ = "Off"  'Positive kvarh Pulse Output Relay
Positive_kvarh_Pulse_Output_Interval = 1  'Positive kvarh Pulse Output Interval
Negative_kvarh_Pulse_Output_Relay$ = "Off"  'Negative kvarh Pulse Output Relay
Negative_kvarh_Pulse_Output_Interval = 1  'Negative kvarh Pulse Output Interval
Analog_Output_1_Selection$ = "None"  'Analog Output 1 Selection
Analog_Output_2_Selection$ = "Phase A Current"  'Analog Output 2 Selection
Analog_Output_3_Selection$ = "None"  'Analog Output 3 Selection
Analog_Output_4_Selection$ = "None"  'Analog Output 4 Selection
RTD_1_Minimum = -50  'RTD #1 Minimum
RTD_1_Maximum = 250  'RTD #1 Maximum
RTD_2_Minimum = -50  'RTD #2 Minimum
RTD_2_Maximum = 250  'RTD #2 Maximum
RTD_3_Minimum = -50  'RTD #3 Minimum
RTD_3_Maximum = 250  'RTD #3 Maximum
RTD_4_Minimum = -50  'RTD #4 Minimum
RTD_4_Maximum = 250  'RTD #4 Maximum
RTD_5_Minimum = -50  'RTD #5 Minimum
RTD_5_Maximum = 250  'RTD #5 Maximum
RTD_6_Minimum = -50  'RTD #6 Minimum
RTD_6_Maximum = 250  'RTD #6 Maximum
RTD_7_Minimum = -50  'RTD #7 Minimum
RTD_7_Maximum = 250  'RTD #7 Maximum
RTD_8_Minimum = -50  'RTD #8 Minimum
RTD_8_Maximum = 250  'RTD #8 Maximum
RTD_9_Minimum = -50  'RTD #9 Minimum
RTD_9_Maximum = 250  'RTD #9 Maximum
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RTD_10_Minimum = -50  'RTD #10 Minimum
RTD_10_Maximum = 250  'RTD #10 Maximum
RTD_11_Minimum = -50  'RTD #11 Minimum
RTD_11_Maximum = 250  'RTD #11 Maximum
RTD_12_Minimum = -50  'RTD #12 Minimum
RTD_12_Maximum = 250  'RTD #12 Maximum
Power_Factor_Minimum = 0.80  'Power Factor Minimum
Power_Factor_Maximum = -0.80  'Power Factor Maximum
Reactive_Power_Minimum = 0  'Reactive Power Minimum
Reactive_Power_Maximum = 750  'Reactive Power Maximum
Real_Power_Minimum = 0  'Real Power Minimum
Real_Power_Maximum = 1000  'Real Power Maximum
Apparent_Power_Minimum = 0  'Apparent Power Minimum
Apparent_Power_Maximum = 1250  'Apparent Power Maximum
Thermal_Capacity_Used_Minimum = 0  'Thermal Capacity Used Minimum
Thermal_Capacity_Used_Maximum = 100  'Thermal Capacity Used Maximum
Relay_Lockout_Time_Minimum = 0  'Relay Lockout Time Minimum
Relay_Lockout_Time_Maximum = 150  'Relay Lockout Time Maximum
Current_Demand_Minimum = 0  'Current Demand Minimum
Current_Demand_Maximum = 700  'Current Demand Maximum
kvar_Demand_Minimum = 0  'kvar Demand Minimum
kvar_Demand_Maximum = 1000  'kvar Demand Maximum
kW_Demand_Minimum = 0  'kW Demand Minimum
kW_Demand_Maximum = 1250  'kW Demand Maximum
kVA_Demand_Minimum = 0  'kVA Demand Minimum
kVA_Demand_Maximum = 1500  'kVA Demand Maximum
Speed2_Standard_Overload_Curve_Number = 4  'Speed2 Standard Overload Curve Number
Speed2_Undercurrent_Alarm$ = "Off"  'Speed2 Undercurrent Alarm
Speed2_Undercurrent_Alarm_Pickup = 0.70  'Speed2 Undercurrent Alarm Pickup
Speed2_Undercurrent_Alarm_Delay = 1  'Speed2 Undercurrent Alarm Delay
Speed2_Undercurrent_Alarm_Events$ = "Off/No"  'Speed2 Undercurrent Alarm Events
Speed2_Undercurrent_Trip$ = "Off"  'Speed2 Undercurrent Trip
Speed2_Undercurrent_Trip_Pickup = 0.70  'Speed2 Undercurrent Trip Pickup
Speed2_Undercurrent_Trip_Delay = 1  'Speed2 Undercurrent Trip Delay
Speed2_Acceleration_Timer_From_Start = 10.0  'Speed2 Acceleration Timer From
Start
Acceleration_Timer_From_Speed_One_to_Two = 10.0  'Acceleration Timer From Speed
One to Two
Ground_CT_Primary = 50  'Ground CT Primary
Phase_Differential_CT_Primary = 100  'Phase Differential CT Primary
Speed_2_Phase_Sequence$ = "ABC"  'Speed 2 Phase Sequence
Remote_Alarm_Name = 0  'Remote Alarm Name
Remote_Alarm_Function$ = "Unlatched"  'Remote Alarm Function
Remote_Alarm_Relays$ = "Alarm"  'Remote Alarm Relays
Remote_Alarm_Events$ = "Off/No"  'Remote Alarm Events
Remote_Trip_Name = 0  'Remote Trip Name
Remote_Trip_Relays$ = "Trip"  'Remote Trip Relays
Speed_Switch_Trip_Relays$ = "Trip"  'Speed Switch Trip Relays
Speed_Switch_Trip_Delays = 5.0  'Speed Switch Trip Delays
Load_Shed_Trip_Relays$ = "Trip"  'Load Shed Trip Relays
Block_Pressure_Switch_Alarm_from_Start = 0  'Block Pressure Switch Alarm from
Start
Pressure_Switch_Alarm_Function$ = "Unlatched"  'Pressure Switch Alarm Function
Pressure_Switch_Alarm_Relays$ = "Alarm"  'Pressure Switch Alarm Relays
Pressure_Switch_Alarm_Delay = 5.0  'Pressure Switch Alarm Delay
Pressure_Switch_Alarm_Events$ = "Off/No"  'Pressure Switch Alarm Events
Block_Pressure_Switch_Trip_from_Start = 0  'Block Pressure Switch Trip from Start
Pressure_Switch_Trip_Relays$ = "Trip"  'Pressure Switch Trip Relays
Pressure_Switch_Trip_Delay = 5.0  'Pressure Switch Trip Delay
Vibration_Switch_Alarm_Function$ = "Unlatched"  'Vibration Switch Alarm Function
Vibration_Switch_Alarm_Relays$ = "Alarm"  'Vibration Switch Alarm Relays
Vibration_Switch_Alarm_Delay = 5.0  'Vibration Switch Alarm Delay
Vibration_Switch_Alarm_Events$ = "Off/No"  'Vibration Switch Alarm Events
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Vibration_Switch_Trip_Relays$ = "Trip"  'Vibration Switch Trip Relays
Vibration_Switch_Trip_Delay = 5.0  'Vibration Switch Trip Delay
Counter_Units_Name = 0  'Counter Units Name
Counter_Preset_Value = 0  'Counter Preset Value
Counter_Type$ = "Increment"  'Counter Type
Counter_Alarm$ = "Off"  'Counter Alarm
Counter_Alarm_Relays$ = "Alarm"  'Counter Alarm Relays
Counter_Alarm_Level = 100  'Counter Alarm Level
Counter_Alarm_Pickup$ = "Over"  'Counter Alarm Pickup
Time_to_Trip_at_1_01_FLA = 17414.5  'Time to Trip at 1.01 x FLA
Time_to_Trip_at_1_05_FLA = 3414.9  'Time to Trip at 1.05 x FLA
Time_to_Trip_at_1_10_FLA = 1666.7  'Time to Trip at 1.10 x FLA
Time_to_Trip_at_1_20_FLA = 795.4  'Time to Trip at 1.20 x FLA
Time_to_Trip_at_1_30_FLA = 507.2  'Time to Trip at 1.30 x FLA
Time_to_Trip_at_1_40_FLA = 364.6  'Time to Trip at 1.40 x FLA
Time_to_Trip_at_1_50_FLA = 280.0  'Time to Trip at 1.50 x FLA
Time_to_Trip_at_1_75_FLA = 169.7  'Time to Trip at 1.75 x FLA
Time_to_Trip_at_2_00_FLA = 116.6  'Time to Trip at 2.00 x FLA
Time_to_Trip_at_2_25_FLA = 86.1  'Time to Trip at 2.25 x FLA
Time_to_Trip_at_2_50_FLA = 66.6  'Time to Trip at 2.50 x FLA
Time_to_Trip_at_2_75_FLA = 53.3  'Time to Trip at 2.75 x FLA
Time_to_Trip_at_3_00_FLA = 43.7  'Time to Trip at 3.00 x FLA
Time_to_Trip_at_3_25_FLA = 36.6  'Time to Trip at 3.25 x FLA
Time_to_Trip_at_3_50_FLA = 31.1  'Time to Trip at 3.50 x FLA
Time_to_Trip_at_3_75_FLA = 26.8  'Time to Trip at 3.75 x FLA
TIme_to_Trip_at_4_00_FLA = 23.3  'TIme to Trip at 4.00 x FLA
Time_to_Trip_at_4_25_FLA = 20.5  'Time to Trip at 4.25 x FLA
Time_to_Trip_at_4_50_FLA = 18.2  'Time to Trip at 4.50 x FLA
Time_to_Trip_at_4_75_FLA = 16.2  'Time to Trip at 4.75 x FLA
Time_to_Trip_at_5_00_FLA = 14.6  'Time to Trip at 5.00 x FLA
Time_to_Trip_at_5_50_FLA = 12.0  'Time to Trip at 5.50 x FLA
Time_to_Trip_at_6_00_FLA = 10.0  'Time to Trip at 6.00 x FLA
Time_to_Trip_at_6_50_FLA = 8.5  'Time to Trip at 6.50 x FLA
Time_to_Trip_at_7_00_FLA = 7.3  'Time to Trip at 7.00 x FLA
Time_to_Trip_at_7_50_FLA = 6.3  'Time to Trip at 7.50 x FLA
Time_to_Trip_at_8_00_FLA = 5.6  'Time to Trip at 8.00 x FLA
Time_to_Trip_at_10_0_FLA = 5.6  'Time to Trip at 10.0 x FLA
Time_to_Trip_at_15_0_FLA = 5.6  'Time to Trip at 15.0 x FLA
Time_to_Trip_at_20_0_FLA = 5.6  'Time to Trip at 20.0 x FLA
Overreach_Filter$ = "Off/No"  'Overreach Filter
Short_Circuit_Trip_Relays$ = "Trip"  'Short Circuit Trip Relays
Short_Circuit_Trip_Pickup = 4.0  'Short Circuit Trip Pickup
Intentional_Short_Circuit_Trip_Delay = 200  'Intentional Short Circuit Trip Delay
Ground_Fault_Trip_Backup_Relays$ = "Aux2"  'Ground Fault Trip Backup Relays
Ground_FaultTrip_Backup_Delay = 200  'Ground FaultTrip Backup Delay
Running_Time_Pulse_Relay$ = "Off"  'Running Time Pulse Relay
Running_Time_Pulse_Interval = 1  'Running Time Pulse Interval
Loss_Of_Comms_Function$ = "Off"  'Loss Of Comms Function
Loss_Of_Comms_Function_Type$ = "Alarm"  'Loss Of Comms Function Type
Loss_Of_Comms_Port$ = "COMP_RS485"  'Loss Of Comms Port
Assign_Loss_Of_Comms_Alarm_Relay$ = "Alarm"  'Assign Loss Of Comms Alarm Relay
Assign_Loss_Of_Comms_Trip_Relay$ = "Trip"  'Assign Loss Of Comms Trip Relay
Loss_Of_Comms_Delay = 1  'Loss Of Comms Delay
Loss_Of_Comms_Alarm_Event$ = "Off/No"  'Loss Of Comms Alarm Event
Phase_A_Current_Minimum = 0  'Phase A Current Minimum
Phase_A_Current_Maximum = 100  'Phase A Current Maximum
Phase_B_Current_Minimum = 0  'Phase B Current Minimum
Phase_B_Current_Maximum = 100  'Phase B Current Maximum
Phase_C_Current_Minimum = 0  'Phase C Current Minimum
Phase_C_Current_Maximum = 100  'Phase C Current Maximum
Average_Phase_Current_Minimum = 0  'Average Phase Current Minimum
Average_Phase_Current_Maximum = 100  'Average Phase Current Maximum
AB_Line_Voltage_Minimum = 3200  'AB Line Voltage Minimum
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AB_Line_Voltage_Maximum = 4500  'AB Line Voltage Maximum
BC_Line_Voltage_Minimum = 3200  'BC Line Voltage Minimum
BC_Line_Voltage_Maximum = 4500  'BC Line Voltage Maximum
CA_Line_Voltage_Minimum = 3200  'CA Line Voltage Minimum
CA_Line_Voltage_Maximum = 4500  'CA Line Voltage Maximum
Average_Line_Voltage_Minimum = 3200  'Average Line Voltage Minimum
Average_Line_Voltage_Maximum = 4500  'Average Line Voltage Maximum
Phase_AN_Voltage_Minimum = 1900  'Phase AN Voltage Minimum
Phase_AN_Voltage_Maximum = 2500  'Phase AN Voltage Maximum
Phase_BN_Voltage_Minimum = 1900  'Phase BN Voltage Minimum
Phase_BN_Voltage_Maximum = 2500  'Phase BN Voltage Maximum
Phase_CN_Voltage_Minimum = 1900  'Phase CN Voltage Minimum
Phase_CN_Voltage_Maximum = 2500  'Phase CN Voltage Maximum
Average_Phase_Voltage_Minimum = 1900  'Average Phase Voltage Minimum
Average_Phase_Voltage_Maximum = 2500  'Average Phase Voltage Maximum
Hottest_Stator_RTD_Minimum = 0  'Hottest Stator RTD Minimum
Hottest_Stator_RTD_Maximum = 200  'Hottest Stator RTD Maximum
Hottest_Bearing_RTD_Minimum = 0  'Hottest Bearing RTD Minimum
Hottest_Bearing_RTD_Maximum = 200  'Hottest Bearing RTD Maximum
Hottest_Ambient_RTD_Minimum = -50  'Hottest Ambient RTD Minimum
Hottest_Ambient_RTD_Maximum = 60  'Hottest Ambient RTD Maximum
Analog_Input_1_Minimum = 0  'Analog Input 1 Minimum
Analog_Input_1_Maximum = 50000  'Analog Input 1 Maximum
Analog_Input_2_Minimum = 0  'Analog Input 2 Minimum
Analog_Input_2_Maximum = 50000  'Analog Input 2 Maximum
Analog_Input_3_Minimum = 0  'Analog Input 3 Minimum
Analog_Input_3_Maximum = 50000  'Analog Input 3 Maximum
Analog_Input_4_Minimum = 0  'Analog Input 4 Minimum
Analog_Input_4_Maximum = 50000  'Analog Input 4 Maximum
Tachometer_Min = 3500  'Tachometer Min
Tachometer_Max = 3700  'Tachometer Max
MWh_Minimum = 50.000  'MWh Minimum
MWh_Maximum = 100.000  'MWh Maximum
Torque_Minimum = 0.0  'Torque Minimum
Torque_Maximum = 0.0  'Torque Maximum
Analog_Input_Diff_1_2_Minimum = 0  'Analog Input Diff 1-2 Minimum
Analog_Input_Diff_1_2_Maximum = 100  'Analog Input Diff 1-2 Maximum
Analog_Input_Diff_3_4_Minimum = 0  'Analog Input Diff 3-4 Minimum
Analog_Input_Diff_3_4_Maximum = 100  'Analog Input Diff 3-4 Maximum
Analog_Input_1_Setup$ = "Disabled"  'Analog Input 1 Setup
Analog_Input_1_Units = 0  'Analog Input 1 Units
Analog_Input_1_Minimum_analog_in_1_ = 0  'Analog Input 1 Minimum (analog in 1)
Analog_Input_1_Maximum_analog_in_1_ = 100  'Analog Input 1 Maximum (analog in 1)
Block_Analog_Input_1_From_Start = 0  'Block Analog Input 1 From Start
Analog_Input_1_Alarm$ = "Off"  'Analog Input 1 Alarm
Analog_Input_1_Alarm_Relays$ = "Alarm"  'Analog Input 1 Alarm Relays
Analog_Input_1_Alarm_Level = 10  'Analog Input 1 Alarm Level
Analog_Input_1_Alarm_Pickup$ = "Over"  'Analog Input 1 Alarm Pickup
Analog_Input_1_Alarm_Delay = 0.1  'Analog Input 1 Alarm Delay
Analog_Input_1_Alarm_Events$ = "Off/No"  'Analog Input 1 Alarm Events
Analog_Input_1_Trip$ = "Off"  'Analog Input 1 Trip
Analog_Input_1_Trip_Relays$ = "Trip"  'Analog Input 1 Trip Relays
Analog_Input_1_Trip_Level = 20  'Analog Input 1 Trip Level
Analog_Input_1_Trip_Pickup$ = "Over"  'Analog Input 1 Trip Pickup
Analog_Input_1_Trip_Delay = 0.1  'Analog Input 1 Trip Delay
Analog_Input_1_Name = 0  'Analog Input 1 Name
Analog_Input_2_Setup$ = "4-20 mA"  'Analog Input 2 Setup
Analog_Input_2_Units = 0  'Analog Input 2 Units
Analog_Input_2_Minimum_analog_in_2_ = 0  'Analog Input 2 Minimum (analog in 2)
Analog_Input_2_Maximum_analog_in_2_ = 100  'Analog Input 2 Maximum (analog in 2)
Block_Analog_Input_2_From_Start = 0  'Block Analog Input 2 From Start
Analog_Input_2_Alarm$ = "Off"  'Analog Input 2 Alarm
Analog_Input_2_Alarm_Relays$ = "Alarm"  'Analog Input 2 Alarm Relays
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Analog_Input_2_Alarm_Level = 10  'Analog Input 2 Alarm Level
Analog_Input_2_Alarm_Pickup$ = "Over"  'Analog Input 2 Alarm Pickup
Analog_Input_2_Alarm_Delay = 0.1  'Analog Input 2 Alarm Delay
Analog_Input_2_Alarm_Events$ = "Off/No"  'Analog Input 2 Alarm Events
Analog_Input_2_Trip$ = "Off"  'Analog Input 2 Trip
Analog_Input_2_Trip_Relays$ = "Trip"  'Analog Input 2 Trip Relays
Analog_Input_2_Trip_Level = 20  'Analog Input 2 Trip Level
Analog_Input_2_Trip_Pickup$ = "Over"  'Analog Input 2 Trip Pickup
Analog_Input_2_Trip_Delay = 0.1  'Analog Input 2 Trip Delay
Analog_Input_2_Name = 0  'Analog Input 2 Name
Analog_Input_3_Setup$ = "Disabled"  'Analog Input 3 Setup
Analog_Input_3_Units = 0  'Analog Input 3 Units
Analog_Input_3_Minimum_analog_in_3_ = 0  'Analog Input 3 Minimum (analog in 3)
Analog_Input_3_Maximum_analog_in_3_ = 100  'Analog Input 3 Maximum (analog in 3)
Block_Analog_Input_3_From_Start = 0  'Block Analog Input 3 From Start
Analog_Input_3_Alarm$ = "Off"  'Analog Input 3 Alarm
Analog_Input_3_Alarm_Relays$ = "Alarm"  'Analog Input 3 Alarm Relays
Analog_Input_3_Alarm_Level = 10  'Analog Input 3 Alarm Level
Analog_Input_3_Alarm_Pickup$ = "Over"  'Analog Input 3 Alarm Pickup
Analog_Input_3_Alarm_Delay = 0.1  'Analog Input 3 Alarm Delay
Analog_Input_3_Alarm_Events$ = "Off/No"  'Analog Input 3 Alarm Events
Analog_Input_3_Trip$ = "Off"  'Analog Input 3 Trip
Analog_Input_3_Trip_Relays$ = "Trip"  'Analog Input 3 Trip Relays
Analog_Input_3_Trip_Level = 20  'Analog Input 3 Trip Level
Analog_Input_3_Trip_Pickup$ = "Over"  'Analog Input 3 Trip Pickup
Analog_Input_3_Trip_Delay = 0.1  'Analog Input 3 Trip Delay
Analog_Input_3_Name = 0  'Analog Input 3 Name
Analog_Input_4_Setup$ = "Disabled"  'Analog Input 4 Setup
Analog_Input_4_Units = 0  'Analog Input 4 Units
Analog_Input_4_Minimum_analog_in_4_ = 0  'Analog Input 4 Minimum (analog in 4)
Analog_Input_4_Maximum_analog_in_4_ = 100  'Analog Input 4 Maximum (analog in 4)
Block_Analog_Input_4_From_Start = 0  'Block Analog Input 4 From Start
Analog_Input_4_Alarm$ = "Off"  'Analog Input 4 Alarm
Analog_Input_4_Alarm_Relays$ = "Alarm"  'Analog Input 4 Alarm Relays
Analog_Input_4_Alarm_Level = 10  'Analog Input 4 Alarm Level
Analog_Input_4_Alarm_Pickup$ = "Over"  'Analog Input 4 Alarm Pickup
Analog_Input_4_Alarm_Delay = 0.1  'Analog Input 4 Alarm Delay
Analog_Input_4_Alarm_Events$ = "Off/No"  'Analog Input 4 Alarm Events
Analog_Input_4_Trip$ = "Off"  'Analog Input 4 Trip
Analog_Input_4_Trip_Relays$ = "Trip"  'Analog Input 4 Trip Relays
Analog_Input_4_Trip_Level = 20  'Analog Input 4 Trip Level
Analog_Input_4_Trip_Pickup$ = "Over"  'Analog Input 4 Trip Pickup
Analog_Input_4_Trip_Delay = 0.1  'Analog Input 4 Trip Delay
Analog_Input_4_Name = 0  'Analog Input 4 Name
Speed2_Time_to_Trip_at_1_01_FLA = 17414.5  'Speed2 Time to Trip at 1.01 x FLA
Speed2_Time_to_Trip_at_1_05_FLA = 3414.9  'Speed2 Time to Trip at 1.05 x FLA
Speed2_Time_to_Trip_at_1_10_FLA = 1666.7  'Speed2 Time to Trip at 1.10 x FLA
Speed2_Time_to_Trip_at_1_20_FLA = 795.4  'Speed2 Time to Trip at 1.20 x FLA
Speed2_Time_to_Trip_at_1_30_FLA = 507.2  'Speed2 Time to Trip at 1.30 x FLA
Speed2_Time_to_Trip_at_1_40_FLA = 364.6  'Speed2 Time to Trip at 1.40 x FLA
Speed2_Time_to_Trip_at_1_50_FLA = 280.0  'Speed2 Time to Trip at 1.50 x FLA
Speed2_Time_to_Trip_at_1_75_FLA = 169.7  'Speed2 Time to Trip at 1.75 x FLA
Speed2_Time_to_Trip_at_2_00_FLA = 116.6  'Speed2 Time to Trip at 2.00 x FLA
Speed2_Time_to_Trip_at_2_25_FLA = 86.1  'Speed2 Time to Trip at 2.25 x FLA
Speed2_Time_to_Trip_at_2_50_FLA = 66.6  'Speed2 Time to Trip at 2.50 x FLA
Speed2_Time_to_Trip_at_2_75_FLA = 53.3  'Speed2 Time to Trip at 2.75 x FLA
Speed2_Time_to_Trip_at_3_00_FLA = 43.7  'Speed2 Time to Trip at 3.00 x FLA
Speed2_Time_to_Trip_at_3_25_FLA = 36.6  'Speed2 Time to Trip at 3.25 x FLA
Speed2_Time_to_Trip_at_3_50_FLA = 31.1  'Speed2 Time to Trip at 3.50 x FLA
Speed2_Time_to_Trip_at_3_75_FLA = 26.8  'Speed2 Time to Trip at 3.75 x FLA
Speed2_Time_to_Trip_at_4_00_FLA = 23.3  'Speed2 Time to Trip at 4.00 x FLA
Speed2_Time_to_Trip_at_4_25_FLA = 20.5  'Speed2 Time to Trip at 4.25 x FLA
Speed2_Time_to_Trip_at_4_50_FLA = 18.2  'Speed2 Time to Trip at 4.50 x FLA
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Speed2_Time_to_Trip_at_4_75_FLA = 16.2  'Speed2 Time to Trip at 4.75 x FLA
Speed2_Time_to_Trip_at_5_00_FLA = 14.6  'Speed2 Time to Trip at 5.00 x FLA
Speed2_Time_to_Trip_at_5_50_FLA = 12.0  'Speed2 Time to Trip at 5.50 x FLA
Speed2_Time_to_Trip_at_6_00_FLA = 10.0  'Speed2 Time to Trip at 6.00 x FLA
Speed2_Time_to_Trip_at_6_50_FLA = 8.5  'Speed2 Time to Trip at 6.50 x FLA
Speed2_Time_to_Trip_at_7_00_FLA = 7.3  'Speed2 Time to Trip at 7.00 x FLA
Speed2_Time_to_Trip_at_7_50_FLA = 6.3  'Speed2 Time to Trip at 7.50 x FLA
Speed2_Time_to_Trip_at_8_00_FLA = 5.6  'Speed2 Time to Trip at 8.00 x FLA
Speed2_Time_to_Trip_at_10_0_FLA = 5.6  'Speed2 Time to Trip at 10.0 x FLA
Speed2_Time_to_Trip_at_15_0_FLA = 5.6  'Speed2 Time to Trip at 15.0 x FLA
Speed2_Time_to_Trip_at_20_0_FLA = 5.6  'Speed2 Time to Trip at 20.0 x FLA
Speed2_Minimum_Allowable_Line_Voltage = 80  'Speed2 Minimum Allowable Line
Voltage
Speed2_Stall_Current_at_Min_Vline = 4.80  'Speed2 Stall Current at Min Vline
Speed2_Safe_Stall_Time_at_Min_Vline = 20.0  'Speed2 Safe Stall Time at Min Vline
Speed2_Accel_Intersect_at_Min_Vline = 3.80  'Speed2 Accel. Intersect at Min Vline
Speed2_Stall_Current_at_100_Vline = 6.00  'Speed2 Stall Current at 100% Vline
Speed2_Safe_Stall_Time_at_100_Vline = 10.0  'Speed2 Safe Stall Time at 100% Vline
Speed2_Accel_Intersect_at_100_Vline = 5.00  'Speed2 Accel. Intersect at 100%
Vline
Block_Speed2_Undercurrent_from_Start = 0  'Block Speed2 Undercurrent from Start
Speed_Switch_Trip_Speed2_Delay = 5.0  'Speed Switch Trip Speed2 Delay
Speed2_Rated_Speed = 3600  'Speed2 Rated Speed
Analog_In_Differential_1_2_Enable$ = "Disabled"  'Analog In Differential 1-2
Enable
Analog_In_Diff_1_2_Name = 0  'Analog In Diff 1-2 Name
Analog_In_Differential_1_2_Comparison$ = "% Difference"  'Analog In Differential
1-2 Comparison
Analog_In_Differential_1_2_Logic$ = "1<>2 (or 3<>4)"  'Analog In Differential 1-
2 Logic
Analog_In_Differential_1_2_Active_When$ = "Always"  'Analog In Differential 1-2
Active When
Analog_In_Differential_1_2_Block_from_Start = 0  'Analog In Differential 1-2
Block from Start
Analog_In_Differential_1_2_Alarm$ = "Off"  'Analog In Differential 1-2 Alarm
Analog_In_Differential_1_2_Alarm_Relays$ = "Alarm"  'Analog In Differential 1-2
Alarm Relays
Analog_In_Differential_1_2_Percent_Alarm = 10  'Analog In Differential 1-2
Percent Alarm
Analog_In_Differential_1_2_Absolute_Alarm = 10  'Analog In Differential 1-2
Absolute Alarm
Analog_In_Differential_1_2_Alarm_Delay = 0.1  'Analog In Differential 1-2 Alarm
Delay
Analog_In_Differential_1_2_Alarm_Events$ = "Off/No"  'Analog In Differential 1-2
Alarm Events
Analog_In_Differential_1_2_Trip$ = "Off"  'Analog In Differential 1-2 Trip
Analog_In_Differential_1_2_Trip_Relays$ = "Trip"  'Analog In Differential 1-2
Trip Relays
Analog_In_Differential_1_2_Percent_Trip = 10  'Analog In Differential 1-2
Percent Trip
Analog_In_Differential_1_2_Absolute_Trip = 10  'Analog In Differential 1-2
Absolute Trip
Analog_In_Differential_1_2_Trip_Delay = 0.1  'Analog In Differential 1-2 Trip
Delay
Analog_In_Differential_3_4_Enable$ = "Disabled"  'Analog In Differential 3-4
Enable
Analog_In_Diff_3_4_Name = 0  'Analog In Diff. 3-4 Name
Analog_In_Differential_3_4_Comparison$ = "% Difference"  'Analog In Differential
3-4 Comparison
Analog_In_Differential_3_4_Logic$ = "1<>2 (or 3<>4)"  'Analog In Differential 3-
4 Logic
Analog_In_Differential_3_4_Active_When$ = "Always"  'Analog In Differential 3-4
Active When
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Analog_In_Differential_3_4_Block_from_Start = 0  'Analog In Differential 3-4
Block from Start
Analog_In_Differential_3_4_Alarm$ = "Off"  'Analog In Differential 3-4 Alarm
Analog_In_Differential_3_4_Alarm_Relays$ = "Alarm"  'Analog In Differential 3-4
Alarm Relays
Analog_In_Differential_3_4_Percent_Alarm = 10  'Analog In Differential 3-4
Percent Alarm
Analog_In_Differential_3_4_Absolute_Alarm = 10  'Analog In Differential 3-4
Absolute Alarm
Analog_In_Differential_3_4_Alarm_Delay = 0.1  'Analog In Differential 3-4 Alarm
Delay
Analog_In_Differential_3_4_Alarm_Events$ = "Off/No"  'Analog In Differential 3-4
Alarm Events
Analog_In_Differential_3_4_Trip$ = "Off"  'Analog In Differential 3-4 Trip
Analog_In_Differential_3_4_Trip_Relays$ = "Trip"  'Analog In Differential 3-4
Trip Relays
Analog_In_Differential_3_4_Percent_Trip = 10  'Analog In Differential 3-4
Percent Trip
Analog_In_Differential_3_4_Absolute_Trip = 10  'Analog In Differential 3-4
Absolute Trip
Analog_In_Differential_3_4_Trip_Delay = 0.1  'Analog In Differential 3-4 Trip
Delay
Ground_Fault_Overreach_Filter$ = "Off/No"  'Ground Fault Overreach Filter
User_Map_Address_1 = 512  'User Map Address #1
User_Map_Address_2 = 528  'User Map Address #2
User_Map_Address_3 = 529  'User Map Address #3
User_Map_Address_4 = 551  'User Map Address #4
User_Map_Address_5 = 552  'User Map Address #5
User_Map_Address_6 = 553  'User Map Address #6
User_Map_Address_7 = 554  'User Map Address #7
User_Map_Address_8 = 555  'User Map Address #8
User_Map_Address_9 = 556  'User Map Address #9
User_Map_Address_10 = 720  'User Map Address #10
User_Map_Address_11 = 721  'User Map Address #11
User_Map_Address_12 = 722  'User Map Address #12
User_Map_Address_13 = 723  'User Map Address #13
User_Map_Address_14 = 724  'User Map Address #14
User_Map_Address_15 = 729  'User Map Address #15
User_Map_Address_16 = 768  'User Map Address #16
User_Map_Address_17 = 769  'User Map Address #17
User_Map_Address_18 = 770  'User Map Address #18
User_Map_Address_19 = 771  'User Map Address #19
User_Map_Address_20 = 772  'User Map Address #20
User_Map_Address_21 = 773  'User Map Address #21
User_Map_Address_22 = 774  'User Map Address #22
User_Map_Address_23 = 775  'User Map Address #23
User_Map_Address_24 = 779  'User Map Address #24
User_Map_Address_25 = 780  'User Map Address #25
User_Map_Address_26 = 801  'User Map Address #26
User_Map_Address_27 = 802  'User Map Address #27
User_Map_Address_28 = 803  'User Map Address #28
User_Map_Address_29 = 804  'User Map Address #29
User_Map_Address_30 = 805  'User Map Address #30
User_Map_Address_31 = 806  'User Map Address #31
User_Map_Address_32 = 807  'User Map Address #32
User_Map_Address_33 = 808  'User Map Address #33
User_Map_Address_34 = 809  'User Map Address #34
User_Map_Address_35 = 810  'User Map Address #35
User_Map_Address_36 = 811  'User Map Address #36
User_Map_Address_37 = 812  'User Map Address #37
User_Map_Address_38 = 832  'User Map Address #38
User_Map_Address_39 = 833  'User Map Address #39
User_Map_Address_40 = 834  'User Map Address #40
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User_Map_Address_41 = 835  'User Map Address #41
User_Map_Address_42 = 840  'User Map Address #42
User_Map_Address_43 = 880  'User Map Address #43
User_Map_Address_44 = 881  'User Map Address #44
User_Map_Address_45 = 882  'User Map Address #45
User_Map_Address_46 = 884  'User Map Address #46
User_Map_Address_47 = 885  'User Map Address #47
User_Map_Address_48 = 886  'User Map Address #48
User_Map_Address_49 = 781  'User Map Address #49
User_Map_Address_50 = 782  'User Map Address #50
User_Map_Address_51 = 783  'User Map Address #51
User_Map_Address_52 = 725  'User Map Address #52
User_Map_Address_53 = 726  'User Map Address #53
User_Map_Address_54 = 727  'User Map Address #54
User_Map_Address_55 = 728  'User Map Address #55
User_Map_Address_56 = 0  'User Map Address #56
User_Map_Address_57 = 0  'User Map Address #57
User_Map_Address_58 = 0  'User Map Address #58
User_Map_Address_59 = 0  'User Map Address #59
User_Map_Address_60 = 0  'User Map Address #60
User_Map_Address_61 = 0  'User Map Address #61
User_Map_Address_62 = 0  'User Map Address #62
User_Map_Address_63 = 0  'User Map Address #63
User_Map_Address_64 = 0  'User Map Address #64
User_Map_Address_65 = 0  'User Map Address #65
User_Map_Address_66 = 0  'User Map Address #66
User_Map_Address_67 = 0  'User Map Address #67
User_Map_Address_68 = 0  'User Map Address #68
User_Map_Address_69 = 0  'User Map Address #69
User_Map_Address_70 = 0  'User Map Address #70
User_Map_Address_71 = 0  'User Map Address #71
User_Map_Address_72 = 0  'User Map Address #72
User_Map_Address_73 = 0  'User Map Address #73
User_Map_Address_74 = 0  'User Map Address #74
User_Map_Address_75 = 0  'User Map Address #75
User_Map_Address_76 = 0  'User Map Address #76
User_Map_Address_77 = 0  'User Map Address #77
User_Map_Address_78 = 0  'User Map Address #78
User_Map_Address_79 = 0  'User Map Address #79
User_Map_Address_80 = 0  'User Map Address #80
User_Map_Address_81 = 0  'User Map Address #81
User_Map_Address_82 = 0  'User Map Address #82
User_Map_Address_83 = 0  'User Map Address #83
User_Map_Address_84 = 0  'User Map Address #84
User_Map_Address_85 = 0  'User Map Address #85
User_Map_Address_86 = 0  'User Map Address #86
User_Map_Address_87 = 0  'User Map Address #87
User_Map_Address_88 = 0  'User Map Address #88
User_Map_Address_89 = 0  'User Map Address #89
User_Map_Address_90 = 0  'User Map Address #90
User_Map_Address_91 = 0  'User Map Address #91
User_Map_Address_92 = 0  'User Map Address #92
User_Map_Address_93 = 0  'User Map Address #93
User_Map_Address_94 = 0  'User Map Address #94
User_Map_Address_95 = 0  'User Map Address #95
User_Map_Address_96 = 0  'User Map Address #96
User_Map_Address_97 = 0  'User Map Address #97
User_Map_Address_98 = 0  'User Map Address #98
User_Map_Address_99 = 0  'User Map Address #99
User_Map_Address_100 = 0  'User Map Address #100
User_Map_Address_101 = 0  'User Map Address #101
User_Map_Address_102 = 0  'User Map Address #102
User_Map_Address_103 = 0  'User Map Address #103
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User_Map_Address_104 = 0  'User Map Address #104
User_Map_Address_105 = 0  'User Map Address #105
User_Map_Address_106 = 0  'User Map Address #106
User_Map_Address_107 = 0  'User Map Address #107
User_Map_Address_108 = 0  'User Map Address #108
User_Map_Address_109 = 0  'User Map Address #109
User_Map_Address_110 = 0  'User Map Address #110
User_Map_Address_111 = 0  'User Map Address #111
User_Map_Address_112 = 0  'User Map Address #112
User_Map_Address_113 = 0  'User Map Address #113
User_Map_Address_114 = 0  'User Map Address #114
User_Map_Address_115 = 0  'User Map Address #115
User_Map_Address_116 = 0  'User Map Address #116
User_Map_Address_117 = 0  'User Map Address #117
User_Map_Address_118 = 0  'User Map Address #118
User_Map_Address_119 = 0  'User Map Address #119
User_Map_Address_120 = 0  'User Map Address #120
User_Map_Address_121 = 0  'User Map Address #121
User_Map_Address_122 = 0  'User Map Address #122
User_Map_Address_123 = 0  'User Map Address #123
User_Map_Address_124 = 0  'User Map Address #124
User_Map_Address_125 = 0  'User Map Address #125
Motor_Load_Minimum = 0.00  'Motor Load Minimum
Motor_Load_Maximum = 1.25  'Motor Load Maximum
```

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: **READ TEST NOTES**

OK?
RAN

Relay Test Results for: **TURN ON BATTERY SIMULATOR**

OK?
RAN

Relay Test Results for: *** GET SETTINGS FILE FROM DEVICE ***

OK?
RAN

Relay Test Results for: ***RELAY SETTINGS TO SETTINGS TAB***

OK?
RAN

Relay Test Results for: MODIFY RELAY TRIP SETTINGS

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: ***CURRENT CONNECTIONS***

OK?
RAN

Relay Test Results for: CURRENT METER TEST

	EXPECTED CURRENT	CURRENT READ	RANGE			OK?
A PHASE	75.0	74.0	71.2	TO	78.8	PASS
B PHASE	75.0	74.0	71.2	TO	78.8	PASS
C PHASE	75.0	74.0	71.2	TO	78.8	PASS

Relay Test Results for: OVERLOAD PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	2.791	2.760	1.12	PASS

Relay Test Results for: OVERLOAD TIMING TEST

Relay Test Results for: OVERLOAD TIMING TEST

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
3.00	7.200	2663.89	44.398	43.728	1.53	PASS
4.00	9.600	1414.86	23.581	23.319	1.12	PASS
5.00	12.000	881.70	14.695	14.573	0.84	PASS

Relay Test Results for: SHORT CIRCUIT TRIP PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	20.000	20.000	-0.00	PASS

Relay Test Results for: UNDERCURRENT TRIP PICKUP

OK?
RAN

Relay Test Results for: MECHANICAL JAM PICKUP

OK?
RAN

Relay Test Results for: MECHANICAL JAM DELAY

OK?
RAN

Relay Test Results for: CURRENT UNBALANCE PICKUP

UNBALANCE% PU	RANGE	OK?
0.00	0.00 TO 0.00	RAN

Relay Test Results for: CURRENT UNBALANCE DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
0.32	12.800	76.16	1.269	0.500 TO 1.500	PASS

Relay Test Results for: ACCELERATION TIMER

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
1.20	3.312	599.18	9.986	10.000	-0.14	PASS

Relay Test Results for: ***VOLTAGE INPUT TEST***

	EXPECTED VOLTAGE	VOLATGE READ	RANGE	OK?
APH-BPH	4200.0	4200.0	4116.0 TO 4284.0	PASS
BPH-CPH	4200.0	4200.0	4116.0 TO 4284.0	PASS
CPH-APH	4200.0	4203.0	4116.0 TO 4284.0	PASS

Relay Test Results for: UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: UNDERVOLTAGE DELAY

OK?
RAN

Relay Test Results for: OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: OVERVOLTAGE DELAY

OK?
RAN

Relay Test Results for: VOLTAGE PHASE REVERSAL

OK?
RAN

Relay Test Results for: UNDERFREQUENCY PICKUP

OK?
RAN

Relay Test Results for: UNDERFREQUENCY DELAY

OK?
RAN

Relay Test Results for: OVERFREQUENCY PICKUP

OK?
RAN

Relay Test Results for: OVERFREQUENCY DELAY

OK?
RAN

Relay Test Results for: ***POWER INPUT TEST***

EXPECTED POWER FACTOR	POWER FACTOR READ	EXPECTED KILOWATTS	KILOWATTS READ	RANGE	OK?
0.549	0.950	498.1	495.0	480.0 TO 516.3	PASS

Relay Test Results for: POWER FACTOR LEAD PICKUP

ANG(LAG)	VOLTAGE	CURRENT	POWER FACTOR	RANGE	OK?
0.00	0.00	0.000	0.000	0.000 TO 0.000	RAN

Relay Test Results for: POWER FACTOR LAG PICKUP

ANG(LAG)	VOLTAGE	CURRENT	POWER FACTOR	RANGE	OK?
0.00	0.00	0.000	0.000	0.000 TO 0.000	RAN

Relay Test Results for: REACTIVE POS KVAR TRIP PU

OK?
RAN

Relay Test Results for: REACTIVE NEG KVAR TRIP PU

OK?
RAN

Relay Test Results for: REACTIVE KVAR TRIP DELAY

OK?
RAN

Relay Test Results for: REVERSE POWER TRIP PU

OK?
RAN

Relay Test Results for: REVERSE POWER TRIP DELAY

OK?
RAN

Relay Test Results for: UNDERPOWER TRIP PU

OK?
RAN

Relay Test Results for: UNDERPOWER TRIP DELAY

OK?
RAN

Relay Test Results for: ***GROUND(1A/5A) INPUT TEST***

EXPECTED CURRENT	CURRENT READ	RANGE	OK?
50.0	49.9	49.0 TO 51.0	PASS

Relay Test Results for: GROUND(1A/5A) FAULT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	2.530	2.500	1.20	PASS

Relay Test Results for: GROUND(1A/5A) FAULT DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.10	2.750	13.82	0.230	0.000 TO 0.700	PASS

Relay Test Results for: ***DIFFERENTIAL INPUT TEST***

0.0	0.0	0.0 TO 0.0	RAN

Relay Test Results for: DIFFERENTIAL PICKUP PH A

OK?
RAN

Relay Test Results for: DIFFERENTIAL PICKUP PH B

OK?
RAN

Relay Test Results for: DIFFERENTIAL PICKUP PH C

Relay Test Results for:	DIFFERENTIAL PICKUP PH C	
		OK? RAN
Relay Test Results for:	DIFFERENTIAL FAULT DELAY	
		OK? RAN
Relay Test Results for:	RETURN RELAY SETTING	
		OK? RAN
Relay Test Results for:	**TURN OFF BATTERY SIMULATOR**	
		OK? RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-551.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 8.2 **Test Date:** 03/06/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	13.2 KV	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	CENTRAL ELECTRICAL BUILDING
POSITION:	52F25 UNIT SUB 5-SH	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	SEL-551
SERIAL_NUMBER:	1132620132	FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408
RELAY_ID:	AACI207024	CURRENT_TESTDATE:	3/6/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
CONTACT$="4"          'OUTPUT CONTACT TO MASK
SEL_AUTO=1            '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1            'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1              'NO ERROR MESSAGE IF NO OPERATION
```

Routine Notes:

»FRI Mar 6, 2020

OUT1 NO GOOD PER PREVIOUS TEST RESULTS. OUT1 WAS DAMAGED WHEN 86 LOCKOUT RELAY WAS STUCK AND DIDN'T CLEAR ITSELF. TRIP CIRCUIT WIRING AND TRIP LOGIC SWITCHED TO OUT2 PREVIOUSLY.

Relay Settings Used for Testing:

```
RID$ = "52F25"
TID$ = "SUB 5 SH"
CTR = 120
CTRN = 120
TDURD = 9.000
s50P1P = 16.5
s50P2P = 3.5
s50P3P$ = "OFF"
s50P4P$ = "OFF"
s50P5P$ = "OFF"
s50P6P$ = "OFF"
s50ABCP$ = "OFF"
s51P1P = 1.2
s51P1C$ = "C3"
s51P1TD = 1.00
s51P1RS$ = "N"
s51P2P$ = "OFF"
s51P2C$ = "U3"
s51P2TD = 15.00
s51P2RS$ = "N"
s50N1P$ = "OFF"
s50N2P$ = "OFF"
s51N1P$ = "OFF"
s51N1C$ = "U4"
s51N1TD = 3.00
s51N1RS$ = "N"
s50G1P = 5.4
s50G2P$ = "OFF"
```

```
s51G1P = 0.5
s51G1C$ = "U1"
s51G1TD = 0.50
s51G1RS$ = "N"
s50Q1P$ = "OFF"
s50Q2P$ = "OFF"
s51Q1P$ = "OFF"
s51Q1C$ = "U3"
s51Q1TD = 15.00
s51Q1RS$ = "N"
s51Q2P$ = "OFF"
s51Q2C$ = "U3"
s51Q2TD = 15.00
s51Q2RS$ = "N"
s79OI1 = 0.000
s79OI2 = 600.000
s79OI3 = 0.000
s79OI4 = 0.000
s79RSD = 1800.000
s79RSLD = 300.000
CFD = 60.000
DMTC = 5
PDEMP = 5.00
NDEMP = 1.50
GDEMP = 1.50
QDEMP = 1.50
SV5PU = 0.000
SV5DO = 0.000
SV6PU = 0.000
SV6DO = 0.000
SV7PU = 0.000
SV7DO = 0.000
SV8PU = 0.000
SV8DO = 0.000
SV9PU = 0.000
SV9DO = 0.000
SV10PU = 0.000
SV10DO = 0.000
SV11PU = 0.000
SV11DO = 0.000
SV12PU = 0.000
SV12DO = 0.000
SV13PU = 0.000
SV13DO = 0.000
SV14PU = 0.000
SV14DO = 0.000
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
TR$ = "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "
ULTR$ = "!(51P1 + 51G1)"
s51P1TC = 1
s51P2TC = 1
s51N1TC = 1
s51G1TC = 1
s51Q1TC = 1
s51Q2TC = 1
s52A$ = "IN1"
CL$ = "LB4"
ULCL$ = "TRIP"
s79RI$ = "TRIP"
s79RIS$ = "IN1"
s79DTL$ = "!LB1 + LB3"
```

```
s79DLS$ = "79LO"
s79SKP$ = "50P2 * SH0"
s79STL$ = "TRIP"
s79BRS$ = "(51P1 + 51G1) * (79RS + 79CY)"
s79SEQ = 0
ER1$ = "51P1 + 51G1 + 51N1"
ER2 = 0
SV1 = 0
SV2 = 0
SV3 = 0
SV4 = 0
SV5 = 0
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
OUT1 = 0
OUT2$ = "TRIP"
OUT3 = 0
OUT4 = 0
DP1$ = "IN1"
DP2$ = "LB2"
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
```

Relay Test Results for: ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for: LOG INTO THE RELAY

OK?
RAN

Relay Test Results for: DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for: SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

Relay Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

52F25                              Date: 03/06/20    Time: 11:25:17.698
SUB 5 SH

FID=SEL-551-R514-Vf-Z002002-D20110408      CID=CCFD

SELF TESTS

W=Warn    F=Fail

       IA       IB       IC       IN       MOF
OS      3        3        3        3        0

       +5V_PS   +5V_REG  -5V_REG  +10V_PS  -10V_PS  VBAT
PS      4.98     5.01    -4.96     9.92    -9.95     3.45

       TEMP     RAM      ROM      CR_RAM   EEPROM
        31.7    OK       OK       OK       OK

 Relay Enabled

=>>
```

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR ELEMENT TEST

OK?
RAN

Relay Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	213.0	-1.4	PASS
B-N	0.0	0.0	0.0	240.0	238.0	-0.8	PASS
C-N	0.0	0.0	0.0	264.0	264.0	0.0	PASS

Relay Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		16.670	16.500	1.03	PASS
B-N		16.670	16.500	1.03	PASS
C-N		16.505	16.500	0.03	PASS

Relay Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		3.505	3.500	0.14	PASS
B-N		3.505	3.500	0.14	PASS
C-N		3.505	3.500	0.14	PASS

Relay Test Results for: 50P3P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P4P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P5P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P6P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE A OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE B OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE C OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.452	5.400	0.96	PASS

Relay Test Results for: 50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		1.216	1.200	1.33	PASS
B-N		1.228	1.200	2.33	PASS
C-N		1.204	1.200	0.33	PASS

Relay Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

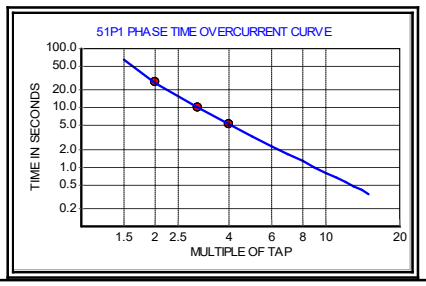
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.400	1642.76	27.379	26.667	2.67	PASS
3.00	3.600	605.92	10.099	10.000	0.99	PASS
4.00	4.800	322.78	5.380	5.333	0.87	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.400	1626.47	27.108	26.667	1.65	PASS
3.00	3.600	603.69	10.062	10.000	0.62	PASS
4.00	4.800	321.19	5.353	5.333	0.37	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.400	1619.06	26.984	26.667	1.19	PASS
3.00	3.600	598.84	9.981	10.000	-0.19	PASS
4.00	4.800	319.54	5.326	5.333	-0.14	PASS



Relay Test Results for: 51P2P PHASE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P2 PHASE TIME OVERCURRENT CURVE

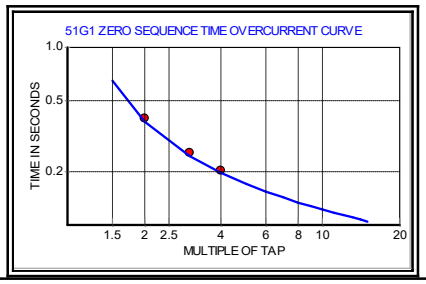
OK?
RAN

Relay Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.525	0.500	5.00	PASS

Relay Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.000	23.75	0.396	0.384	3.12	PASS
3.00	1.500	15.20	0.253	0.245	3.27	PASS
4.00	2.000	12.22	0.204	0.196	3.79	PASS



Relay Test Results for: 51Q1P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q1 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51Q2P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q2 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: NEUTRAL TEST CONNECTIONS

OK?
RAN

Relay Test Results for: 50N1P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N2P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1P NEUTRAL TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1 NEUTRAL TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: RESTORE LOGIC SETTINGS

OK?
RAN

Relay Test Results for: RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

```
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE
```

Relay Test Results for: LOG OUT OF THE RELAY

OK?
RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SR-469.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 2.7 **Test Date:** 03/12/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	8	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	EAST BLOWER BUILDING
POSITION:	PAB-E2	RELAY_MANF:	GE MULTILIN
RELAY_TYPE:	SR-469	MODEL_STYLE:	469-P5-HI-A20-T
IEEE_DEVICE:	MF	IL_IB:	SR469-RELAY
SERIAL_NUMBER:	B3043943	FIRMWARE:	30I520A8.000
RELAY_ID:	AACI207024	CURRENT_TESTDATE:	3/12/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
RELAY_ADDRESS=1                              'SPECIFIC RELAY ADDRESS USED FOR
MODBUS COMMUNICATIONS (DEFAULT=1)
TRIP_OUTPUT$="F1-E2"                         'OUTPUT CONTACT TO SENSE A TRIP
AUTO_MASK=1                                  'SET TO 2 TO DISPLAY FLEX PROGRAMMING
SKIP_TST=1                                   'SET TO 1 TO SKIP MESSAGES FOR TESTS
SKIPPED
PRINT_RAN_TESTS=1                            'MARKS TESTS IF THEY WERE ATTEMPTED
BUT NOT APPLICABLE
Phase_CT_Secondary=5                         'THIS IS THE RELAYS PHASE NOMINAL CT
INPUT
VTR=Voltage_Transformer_Ratio                'VT RATIO
CTR=Phase_CT_Primary/Phase_CT_Secondary      'CALCULATED CT RATIO
FLA=(MOTOR_Full_load_Amps)/CTR               'SECONDARY FULL LOAD CURRENT
MTR_START_MULT=0.5                           'MULT OF FULL LOAD AMPS
MTR_START_DELAY=120                          'WAIT TIME IN CYCLES FOR START
```

Routine Notes:

Relay Settings Used for Testing:

```
SR_PART_NUM$ = "469-P5-HI-A20-T"  'Information acquired from Settings file
SR_FIRMWARE$ = "5200"  'Information acquired from Settings file
Default_Message_Cycle_Time = 2.0  'Default Message Cycle Time
Default_Message_Timeout = 300  'Default Message Timeout
Average_Motor_Load_Calculation_Period = 15  'Average Motor Load Calculation
Period
Temperature_Display_Units$ = "Celsius"  'Temperature Display Units
Trace_Memory_Trigger_Position = 25  'Trace Memory Trigger Position
Trace_Memory_Buffers$ = "8 x 28 cycles"  'Trace Memory Buffers
Display_Update_Interval = 0.4  'Display Update Interval
Motor_Load_Filter_Interval = 0  'Motor Load Filter Interval
Communication_Port_Passcode = 0  'Communication Port Passcode
Passcode_write_Only_ = 0  'Passcode (write Only)
First_Scratchpad_Message$ = "Text 1"  'First Scratchpad Message
Second_Scratchpad_Message$ = "Text 2"  'Second Scratchpad Message
Third_Scratchpad_Message$ = "Text 3"  'Third Scratchpad Message
Fourth_Scratchpad_Message$ = "Text 4"  'Fourth Scratchpad Message
Fifth_Scratchpad_Message$ = "GE MULTILIN       469 Motor Relay"  'Fifth
Scratchpad Message
Phase_CT_Primary = 150  'Phase CT Primary
Motor_Full_Load_Amps = 72  'Motor Full Load Amps
Ethernet_IP_Address = 0  'Ethernet IP Address
Ethernet_Subnet_Mask = 4294966272  'Ethernet Subnet Mask
```

```
Ethernet_Gateway_Address = 0  'Ethernet Gateway Address
DeviceNet_MAC_ID = 63  'DeviceNet MAC ID
DeviceNet_Baud_Rate$ = "125 kbps"  'DeviceNet Baud Rate
Front_RS232_baud_rate$ = "19200 baud"  'Front RS232 baud rate
Slave_Address = 254  'Slave Address
Computer_RS485_Baud_Rate$ = "19200 baud"  'Computer RS485 Baud Rate
Computer_RS485_Parity$ = "None"  'Computer RS485 Parity
Auxiliary_RS485_Baud_Rate$ = "9600 baud"  'Auxiliary RS485 Baud Rate
Auxiliary_RS485_Parity$ = "None"  'Auxiliary RS485 Parity
Ground_CT_Type$ = "5 A Secondary"  'Ground CT Type
Phase_Differential_CT_Type$ = "None"  'Phase Differential CT Type
Enable_Two_Speed_Motor_Option$ = "Off/No"  'Enable Two Speed Motor Option
Speed_Two_Phase_CT_Primary = 100  'Speed Two Phase CT Primary
Speed_Two_Motor_Full_Load_Amps = 1  'Speed Two Motor Full Load Amps
VoltageTransformer_Connection_Type$ = "Open Delta"  'VoltageTransformer
Connection Type
Enable_Single_VT_Connection$ = "Off"  'Enable Single VT Connection
Voltage_Transformer_Ratio = 35.00  'Voltage Transformer Ratio
Motor_Nameplate_Voltage = 4200  'Motor Nameplate Voltage
Nominal_System_Frequency$ = "60 Hz"  'Nominal System Frequency
System_Phase_Sequence$ = "ABC"  'System Phase Sequence
Serial_Communication_Control$ = "Off/No"  'Serial Communication Control
Assign_Start_Control_Relays$ = "Auxiliary 2"  'Assign Start Control Relays
Reduced_Voltage_Starting$ = "Off/No"  'Reduced Voltage Starting
Control_Relays_for_Reduced_Voltage_Starting$ = "Auxiliary 3"  'Control Relays
for Reduced Voltage Starting
Transition_On$ = "Current Only"  'Transition On
Reduced_Voltage_Start_Level = 100  'Reduced Voltage Start Level
Reduced_Voltage_Start_Timer = 200  'Reduced Voltage Start Timer
Incomplete_Sequence_Trip_Relays$ = "Trip"  'Incomplete Sequence Trip Relays
Starter_Status_Switch$ = "Start Aux a"  'Starter Status Switch
Assignable_Input_1_Function$ = "Off"  'Assignable Input 1 Function
Counter_Alarm_Events$ = "Off/No"  'Counter Alarm Events
Rated_Speed = 3600  'Rated Speed
Tachometer_Alarm$ = "Off"  'Tachometer Alarm
Tachometer_Alarm_Relays$ = "Alarm"  'Tachometer Alarm Relays
Tachometer_Alarm_Speed = 10  'Tachometer Alarm Speed
Tachometer_Alarm_Delay = 1  'Tachometer Alarm Delay
Tachometer_Alarm_Events$ = "Off/No"  'Tachometer Alarm Events
Tachometer_Trip$ = "Off"  'Tachometer Trip
Tachometer_Trip_Relays$ = "Trip"  'Tachometer Trip Relays
Tachometer_Trip_Speed = 10  'Tachometer Trip Speed
Tachometer_Trip_Delay = 1  'Tachometer Trip Delay
General_Switch_A_Name = 0  'General Switch A Name
General_Switch_A_Normal_State$ = "Normally Open"  'General Switch A Normal State
General_Switch_A_Block_Input_From_Start = 0  'General Switch A Block Input From
Start
General_Switch_A_Alarm$ = "Off"  'General Switch A Alarm
General_Switch_A_Alarm_Relays$ = "Alarm"  'General Switch A Alarm Relays
General_Switch_A_Alarm_Delay = 5.0  'General Switch A Alarm Delay
General_Switch_A_Alarm_Events$ = "Off/No"  'General Switch A Alarm Events
General_Switch_A_Trip$ = "Off"  'General Switch A Trip
General_Switch_A_Trip_Relays$ = "Trip"  'General Switch A Trip Relays
General_Switch_A_Trip_Delay = 5.0  'General Switch A Trip Delay
General_Switch_B_Name = 0  'General Switch B Name
General_Switch_B_Normal_State$ = "Normally Open"  'General Switch B Normal State
General_Switch_B_Block_Input_From_Start = 0  'General Switch B Block Input From
Start
General_Switch_B_Alarm$ = "Off"  'General Switch B Alarm
General_Switch_B_Alarm_Relays$ = "Alarm"  'General Switch B Alarm Relays
General_Switch_B_Alarm_Delay = 5.0  'General Switch B Alarm Delay
General_Switch_B_Alarm_Events$ = "Off/No"  'General Switch B Alarm Events
General_Switch_B_Trip$ = "Off"  'General Switch B Trip
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General_Switch_B_Trip_Relays$ = "Trip"  'General Switch B Trip Relays
General_Switch_B_Trip_Delay = 5.0  'General Switch B Trip Delay
General_Switch_C_Name = 0  'General Switch C Name
General_Switch_C_Normal_State$ = "Normally Open"  'General Switch C Normal State
General_Switch_C_Block_Input_From_Start = 0  'General Switch C Block Input From
Start
General_Switch_C_Alarm$ = "Off"  'General Switch C Alarm
General_Switch_C_Alarm_Relays$ = "Alarm"  'General Switch C Alarm Relays
General_Switch_C_Alarm_Delay = 5.0  'General Switch C Alarm Delay
General_Switch_C_Alarm_Events$ = "Off/No"  'General Switch C Alarm Events
General_Switch_C_Trip$ = "Off"  'General Switch C Trip
General_Switch_C_Trip_Relays$ = "Trip"  'General Switch C Trip Relays
General_Switch_C_Trip_Delay = 5.0  'General Switch C Trip Delay
General_Switch_D_Name = 0  'General Switch D Name
General_Switch_D_Normal_State$ = "Normally Open"  'General Switch D Normal State
General_Switch_D_Block_Input_From_Start = 0  'General Switch D Block Input From
Start
General_Switch_D_Alarm$ = "Off"  'General Switch D Alarm
General_Switch_D_Alarm_Relays$ = "Alarm"  'General Switch D Alarm Relays
General_Switch_D_Alarm_Delay = 5.0  'General Switch D Alarm Delay
General_Switch_D_Alarm_Events$ = "Off/No"  'General Switch D Alarm Events
General_Switch_D_Trip$ = "Off"  'General Switch D Trip
General_Switch_D_Trip_Relays$ = "Trip"  'General Switch D Trip Relays
General_Switch_D_Trip_Delay = 5.0  'General Switch D Trip Delay
Assignable_Input_2_Function$ = "Off"  'Assignable Input 2 Function
Assignable_Input_3_Function$ = "Off"  'Assignable Input 3 Function
Assignable_Input_4_Function$ = "Off"  'Assignable Input 4 Function
Reset_Mode_R1_Trip$ = "All Resets"  'Reset Mode R1 Trip
Force_R1_Output_Relay$ = "Disabled"  'Force R1 Output Relay
Force_R1_Operate_Time = 0  'Force R1 Operate Time
Reset_Mode_R4_Auxiliary$ = "All Resets"  'Reset Mode R4 Auxiliary
Force_R4_Output_Relay$ = "Disabled"  'Force R4 Output Relay
Force_R4_Operate_Time = 0  'Force R4 Operate Time
Reset_Mode_R2_Auxiliary$ = "All Resets"  'Reset Mode R2 Auxiliary
Force_R2_Output_Relay$ = "Disabled"  'Force R2 Output Relay
Force_R2_Output_Operate_Time = 0  'Force R2 Output Operate Time
Reset_Mode_R3_Auxiliary$ = "All Resets"  'Reset Mode R3 Auxiliary
Force_R3_Output_Relay$ = "Disabled"  'Force R3 Output Relay
Force_R3_Operate_Time = 0  'Force R3 Operate Time
Force_R5_Output_Relay$ = "Disabled"  'Force R5 Output Relay
Force_R5_Operate_Time = 0  'Force R5 Operate Time
Reset_Mode_R6_Service$ = "All Resets"  'Reset Mode R6 Service
Curve_Style$ = "Standard"  'Curve Style
Overload_Pickup_Level = 1.15  'Overload Pickup Level
Unbalance_k_Factor = 0  'Unbalance k Factor
Cool_Time_Constant_Running = 15  'Cool Time Constant Running
Cool_Time_Constant_Stopped = 30  'Cool Time Constant Stopped
Hot_Cold_Safe_Stall_Ratio = 1.00  'Hot/Cold Safe Stall Ratio
RTD_Blasing$ = "Off/No"  'RTD Blasing
RTD_Blas_Minimum = 40  'RTD Blas Minimum
RTD_Blas_Center_Point = 130  'RTD Blas Center Point
RTD_Blas_Maximum = 155  'RTD Blas Maximum
Thermal_Capacity_Alarm$ = "Off"  'Thermal Capacity Alarm
Thermal_Capacity_Alarm_Relays$ = "Alarm"  'Thermal Capacity Alarm Relays
Thermal_Capacity_Alarm_Level = 75  'Thermal Capacity Alarm Level
Thermal_Capacity_Alarm_Events$ = "Off/No"  'Thermal Capacity Alarm Events
Overload_Trip_Relays$ = "Trip"  'Overload Trip Relays
Standard_Overload_Curve_Number = 4  'Standard Overload Curve Number
Minimum_Allowable_Line_Voltage = 80  'Minimum Allowable Line Voltage
Stall_Current_at_Min_Vline = 4.80  'Stall Current at Min Vline
Safe_Stall_Time_at_Min_Vline = 20.0  'Safe Stall Time at Min Vline
Accel_Intersect_at_Min_Vline = 3.80  'Accel. Intersect at Min Vline
Stall_Current_at_100_Vline = 6.00  'Stall Current at 100% Vline
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Safe_Stall_Time_at_100_Vline = 10.0  'Safe Stall Time at 100% Vline
Accel_Intersect_at_100_Vline = 5.00  'Accel. Intersect at 100% Vline
Short_Circuit_Trip$ = "Latched"  'Short Circuit Trip
Short_Circuit_Trip_Backup$ = "Off/No"  'Short Circuit Trip Backup
Short_Circuit_Backup_Relays$ = "Aux2"  'Short Circuit Backup Relays
Short_Circuit_Trip_Backup_Delay = 200  'Short Circuit Trip Backup Delay
Overload_Alarm$ = "Off"  'Overload Alarm
Overload_Alarm_Relays$ = "Alarm"  'Overload Alarm Relays
Overload_Alarm_Events$ = "Off/No"  'Overload Alarm Events
Overload_Alarm_Delay = 0.1  'Overload Alarm Delay
Mechanical_Jam_Trip$ = "Off"  'Mechanical Jam Trip
Mechanical_Jam_Trip_Relays$ = "Trip"  'Mechanical Jam Trip Relays
Mechanical_Jam_Pickup = 1.50  'Mechanical Jam Pickup
Mechanical_Jam_Delay = 1  'Mechanical Jam Delay
Block_Undercurrent_from_Start = 0  'Block Undercurrent from Start
Undercurrent_Alarm$ = "Off"  'Undercurrent Alarm
Undercurrent_Alarm_Relays$ = "Alarm"  'Undercurrent Alarm Relays
Undercurrent_Alarm_Pickup = 0.70  'Undercurrent Alarm Pickup
Undercurrent_Alarm_Delay = 1  'Undercurrent Alarm Delay
Undercurrent_Alarm_Events$ = "Off/No"  'Undercurrent Alarm Events
Undercurrent_Trip$ = "Off"  'Undercurrent Trip
Undercurrent_Trip_Relays$ = "Trip"  'Undercurrent Trip Relays
Undercurrent_Trip_Pickup = 0.70  'Undercurrent Trip Pickup
Undercurrent_Trip_Delay = 1  'Undercurrent Trip Delay
Current_Unbalance_Alarm$ = "Off"  'Current Unbalance Alarm
Current_Unbalance_Alarm_Relays$ = "Alarm"  'Current Unbalance Alarm Relays
Current_Unbalance_Alarm_Pickup = 15  'Current Unbalance Alarm Pickup
Current_Unbalance_Alarm_Delay = 1  'Current Unbalance Alarm Delay
Current_Unbalance_Alarm_Events$ = "Off/No"  'Current Unbalance Alarm Events
Current_Unbalance_Trip$ = "Off"  'Current Unbalance Trip
Current_Unbalance_Trip_Relays$ = "Trip"  'Current Unbalance Trip Relays
Current_Unbalance_Trip_Pickup = 20  'Current Unbalance Trip Pickup
Current_Unbalance_Trip_Delay = 1  'Current Unbalance Trip Delay
Ground_Fault_Alarm$ = "Off"  'Ground Fault Alarm
Ground_Fault_Alarm_Relays$ = "Alarm"  'Ground Fault Alarm Relays
Ground_Fault_Alarm_Pickup = 0.10  'Ground Fault Alarm Pickup
Alarm_Pickup_for_Multlin_CT_50_025 = 1.00  'Alarm Pickup for Multlin CT 50/.025
Intentional_GF_Alarm_Delay = 0  'Intentional GF Alarm Delay
Ground_Fault_Alarm_Events$ = "Off/No"  'Ground Fault Alarm Events
Ground_Fault_Trip$ = "Latched"  'Ground Fault Trip
Ground_Fault_Trip_Relays$ = "Trip"  'Ground Fault Trip Relays
Ground_Fault_Trip_Pickup = 0.50  'Ground Fault Trip Pickup
Trip_Pickup_for_Multlin_CT_50_025 = 1.00  'Trip Pickup for Multlin CT 50/.025
Intentional_GF_Trip_Delay = 200  'Intentional GF Trip Delay
Ground_Fault_Trip_Backup$ = "Off/No"  'Ground Fault Trip Backup
Phase_Differential_Trip$ = "Off"  'Phase Differential Trip
Phase_Differential_Trip_Relays$ = "Trip"  'Phase Differential Trip Relays
Differential_Trip_Pickup_While_Starting = 0.10  'Differential Trip Pickup While
Starting
Differential_Trip_Delay_While_Starting = 0  'Differential Trip Delay While
Starting
Differential_Trip_Pickup_While_Running = 0.10  'Differential Trip Pickup While
Running
Differential_Trip_Delay_While_Running = 0  'Differential Trip Delay While Running
Accleration_Timer_Trip$ = "Off"  'Accleration Timer Trip
Acceleration_Timer_Trip_Relays$ = "Trip"  'Acceleration Timer Trip Relays
Acceleration_Timer_from_Start = 10.0  'Acceleration Timer from Start
Start_Inhibit_Block$ = "Off/No"  'Start Inhibit Block
Thermal_Capacity_Used_Margin = 25  'Thermal Capacity Used Margin
Jogging_Block$ = "Off/No"  'Jogging Block
Maximum_Starts_Hour_Permissible = 3  'Maximum Starts/Hour Permissible
Time_Between_Starts = 10  'Time Between Starts
Restart_Block$ = "Off/No"  'Restart Block
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Restart_Block_Time = 1  'Restart Block Time
Stator_RTD_Type$ = "100 Ohm Platinum"  'Stator RTD Type
Bearing_RTD_Type$ = "100 Ohm Platinum"  'Bearing RTD Type
Ambient_RTD_Type$ = "100 Ohm Platinum"  'Ambient RTD Type
Other_RTD_Type$ = "100 Ohm Platinum"  'Other RTD Type
RTD_1_Application$ = "Stator"  'RTD #1 Application
RTD_1_Name = 0  'RTD #1 Name
RTD_1_Alarm$ = "Off"  'RTD #1 Alarm
RTD_1_Alarm_Relays$ = "Alarm"  'RTD #1 Alarm Relays
RTD_1_Alarm_Temperature = 130  'RTD #1 Alarm Temperature
RTD_1_Alarm_Events$ = "Off/No"  'RTD #1 Alarm Events
RTD_1_Trip$ = "Off"  'RTD #1 Trip
RTD_1_Trip_Voting$ = "RTD #1"  'RTD #1 Trip Voting
RTD_1_Trip_Relays$ = "Trip"  'RTD #1 Trip Relays
RTD_1_Trip_Temperature = 155  'RTD #1 Trip Temperature
RTD_1_Hi_Alarm$ = "Off"  'RTD #1 Hi Alarm
RTD_1_Hi_Alarm_Relays$ = "Alarm"  'RTD #1 Hi Alarm Relays
RTD_1_Hi_Alarm_Level = 130  'RTD #1 Hi Alarm Level
RTD_2_Application$ = "Stator"  'RTD #2 Application
RTD_2_Name = 0  'RTD #2 Name
RTD_2_Alarm$ = "Off"  'RTD #2 Alarm
RTD_2_Alarm_Relays$ = "Alarm"  'RTD #2 Alarm Relays
RTD_2_Alarm_Temperature = 130  'RTD #2 Alarm Temperature
RTD_2_Alarm_Events$ = "Off/No"  'RTD #2 Alarm Events
RTD_2_Trip$ = "Off"  'RTD #2 Trip
RTD_2_Trip_Voting$ = "RTD #2"  'RTD #2 Trip Voting
RTD_2_Trip_Relays$ = "Trip"  'RTD #2 Trip Relays
RTD_2_Trip_Temperature = 155  'RTD #2 Trip Temperature
RTD_2_Hi_Alarm$ = "Off"  'RTD #2 Hi Alarm
RTD_2_Hi_Alarm_Relays$ = "Alarm"  'RTD #2 Hi Alarm Relays
RTD_2_Hi_Alarm_Level = 130  'RTD #2 Hi Alarm Level
RTD_3_Application$ = "Stator"  'RTD #3 Application
RTD_3_Name = 0  'RTD #3 Name
RTD_3_Alarm$ = "Off"  'RTD #3 Alarm
RTD_3_Alarm_Relays$ = "Alarm"  'RTD #3 Alarm Relays
RTD_3_Alarm_Temperature = 130  'RTD #3 Alarm Temperature
RTD_3_Alarm_Events$ = "Off/No"  'RTD #3 Alarm Events
RTD_3_Trip$ = "Off"  'RTD #3 Trip
RTD_3_Trip_Voting$ = "RTD #3"  'RTD #3 Trip Voting
RTD_3_Trip_Relays$ = "Trip"  'RTD #3 Trip Relays
RTD_3_Trip_Temperature = 155  'RTD #3 Trip Temperature
RTD_3_Hi_Alarm$ = "Off"  'RTD #3 Hi Alarm
RTD_3_Hi_Alarm_Relays$ = "Alarm"  'RTD #3 Hi Alarm Relays
RTD_3_Hi_Alarm_Level = 130  'RTD #3 Hi Alarm Level
RTD_4_Application$ = "Stator"  'RTD #4 Application
RTD_4_Name = 0  'RTD #4 Name
RTD_4_Alarm$ = "Off"  'RTD #4 Alarm
RTD_4_Alarm_Relays$ = "Alarm"  'RTD #4 Alarm Relays
RTD_4_Alarm_Temperature = 130  'RTD #4 Alarm Temperature
RTD_4_Alarm_Events$ = "Off/No"  'RTD #4 Alarm Events
RTD_4_Trip$ = "Off"  'RTD #4 Trip
RTD_4_Trip_Voting$ = "RTD #4"  'RTD #4 Trip Voting
RTD_4_Trip_Relays$ = "Trip"  'RTD #4 Trip Relays
RTD_4_Trip_Temperature = 155  'RTD #4 Trip Temperature
RTD_4_Hi_Alarm$ = "Off"  'RTD #4 Hi Alarm
RTD_4_Hi_Alarm_Relays$ = "Alarm"  'RTD #4 Hi Alarm Relays
RTD_4_Hi_Alarm_Level = 130  'RTD #4 Hi Alarm Level
RTD_5_Application$ = "Stator"  'RTD #5 Application
RTD_5_Name = 0  'RTD #5 Name
RTD_5_Alarm$ = "Off"  'RTD #5 Alarm
RTD_5_Alarm_Relays$ = "Alarm"  'RTD #5 Alarm Relays
RTD_5_Alarm_Temperature = 130  'RTD #5 Alarm Temperature
RTD_5_Alarm_Events$ = "Off/No"  'RTD #5 Alarm Events
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RTD_5_Trip$ = "Off"  'RTD #5 Trip
RTD_5_Trip_Voting$ = "RTD #5"  'RTD #5 Trip Voting
RTD_5_Trip_Relays$ = "Trip"  'RTD #5 Trip Relays
RTD_5_Trip_Temperature = 155  'RTD #5 Trip Temperature
RTD_5_Hi_Alarm$ = "Off"  'RTD #5 Hi Alarm
RTD_5_Hi_Alarm_Relays$ = "Alarm"  'RTD #5 Hi Alarm Relays
RTD_5_Hi_Alarm_Level = 130  'RTD #5 Hi Alarm Level
RTD_6_Application$ = "Stator"  'RTD #6 Application
RTD_6_Name = 0  'RTD #6 Name
RTD_6_Alarm$ = "Off"  'RTD #6 Alarm
RTD_6_Alarm_Relays$ = "Alarm"  'RTD #6 Alarm Relays
RTD_6_Alarm_Temperature = 130  'RTD #6 Alarm Temperature
RTD_6_Alarm_Events$ = "Off/No"  'RTD #6 Alarm Events
RTD_6_Trip$ = "Off"  'RTD #6 Trip
RTD_6_Trip_Voting$ = "RTD #6"  'RTD #6 Trip Voting
RTD_6_Trip_Relays$ = "Trip"  'RTD #6 Trip Relays
RTD_6_Trip_Temperature = 155  'RTD #6 Trip Temperature
RTD_6_Hi_Alarm$ = "Off"  'RTD #6 Hi Alarm
RTD_6_Hi_Alarm_Relays$ = "Alarm"  'RTD #6 Hi Alarm Relays
RTD_6_Hi_Alarm_Level = 130  'RTD #6 Hi Alarm Level
RTD_7_Application$ = "Bearing"  'RTD #7 Application
RTD_7_Name = 0  'RTD #7 Name
RTD_7_Alarm$ = "Off"  'RTD #7 Alarm
RTD_7_Alarm_Relays$ = "Alarm"  'RTD #7 Alarm Relays
RTD_7_Alarm_Temperature = 80  'RTD #7 Alarm Temperature
RTD_7_Alarm_Events$ = "Off/No"  'RTD #7 Alarm Events
RTD_7_Trip$ = "Off"  'RTD #7 Trip
RTD_7_Trip_Voting$ = "RTD #7"  'RTD #7 Trip Voting
RTD_7_Trip_Relays$ = "Trip"  'RTD #7 Trip Relays
RTD_7_Trip_Temperature = 90  'RTD #7 Trip Temperature
RTD_7_Hi_Alarm$ = "Off"  'RTD #7 Hi Alarm
RTD_7_Hi_Alarm_Relays$ = "Alarm"  'RTD #7 Hi Alarm Relays
RTD_7_Hi_Alarm_Level = 80  'RTD #7 Hi Alarm Level
RTD_8_Application$ = "Bearing"  'RTD #8 Application
RTD_8_Name = 0  'RTD #8 Name
RTD_8_Alarm$ = "Off"  'RTD #8 Alarm
RTD_8_Alarm_Relays$ = "Alarm"  'RTD #8 Alarm Relays
RTD_8_Alarm_Temperature = 80  'RTD #8 Alarm Temperature
RTD_8_Alarm_Events$ = "Off/No"  'RTD #8 Alarm Events
RTD_8_Trip$ = "Off"  'RTD #8 Trip
RTD_8_Trip_Voting$ = "RTD #8"  'RTD #8 Trip Voting
RTD_8_Trip_Relays$ = "Trip"  'RTD #8 Trip Relays
RTD_8_Trip_Temperature = 90  'RTD #8 Trip Temperature
RTD_8_Hi_Alarm$ = "Off"  'RTD #8 Hi Alarm
RTD_8_Hi_Alarm_Relays$ = "Alarm"  'RTD #8 Hi Alarm Relays
RTD_8_Hi_Alarm_Level = 80  'RTD #8 Hi Alarm Level
RTD_9_Application$ = "Bearing"  'RTD #9 Application
RTD_9_Name = 0  'RTD #9 Name
RTD_9_Alarm$ = "Off"  'RTD #9 Alarm
RTD_9_Alarm_Relays$ = "Alarm"  'RTD #9 Alarm Relays
RTD_9_Alarm_Temperature = 80  'RTD #9 Alarm Temperature
RTD_9_Alarm_Events$ = "Off/No"  'RTD #9 Alarm Events
RTD_9_Trip$ = "Off"  'RTD #9 Trip
RTD_9_Trip_Voting$ = "RTD #9"  'RTD #9 Trip Voting
RTD_9_Trip_Relays$ = "Trip"  'RTD #9 Trip Relays
RTD_9_Trip_Temperature = 90  'RTD #9 Trip Temperature
RTD_9_Hi_Alarm$ = "Off"  'RTD #9 Hi Alarm
RTD_9_Hi_Alarm_Relays$ = "Alarm"  'RTD #9 Hi Alarm Relays
RTD_9_Hi_Alarm_Level = 80  'RTD #9 Hi Alarm Level
RTD_10_Application$ = "Bearing"  'RTD #10 Application
RTD_10_Name = 0  'RTD #10 Name
RTD_10_Alarm$ = "Off"  'RTD #10 Alarm
RTD_10_Alarm_Relays$ = "Alarm"  'RTD #10 Alarm Relays
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RTD_10_Alarm_Temperature = 80  'RTD #10 Alarm Temperature
RTD_10_Alarm_Events$ = "Off/No"  'RTD #10 Alarm Events
RTD_10_Trip$ = "Off"  'RTD #10 Trip
RTD_10_Trip_Voting$ = "RTD #10"  'RTD #10 Trip Voting
RTD_10_Trip_Relays$ = "Trip"  'RTD #10 Trip Relays
RTD_10_Trip_Temperature = 90  'RTD #10 Trip Temperature
RTD_10_Hi_Alarm$ = "Off"  'RTD #10 Hi Alarm
RTD_10_Hi_Alarm_Relays$ = "Alarm"  'RTD #10 Hi Alarm Relays
RTD_10_Hi_Alarm_Level = 80  'RTD #10 Hi Alarm Level
RTD_11_Application$ = "Other"  'RTD #11 Application
RTD_11_Name = 0  'RTD #11 Name
RTD_11_Alarm$ = "Off"  'RTD #11 Alarm
RTD_11_Alarm_Relays$ = "Alarm"  'RTD #11 Alarm Relays
RTD_11_Alarm_Temperature = 80  'RTD #11 Alarm Temperature
RTD_11_Alarm_Events$ = "Off/No"  'RTD #11 Alarm Events
RTD_11_Trip$ = "Off"  'RTD #11 Trip
RTD_11_Trip_Voting$ = "RTD #11"  'RTD #11 Trip Voting
RTD_11_Trip_Relays$ = "Trip"  'RTD #11 Trip Relays
RTD_11_Trip_Temperature = 90  'RTD #11 Trip Temperature
RTD_11_Hi_Alarm$ = "Off"  'RTD #11 Hi Alarm
RTD_11_Hi_Alarm_Relays$ = "Alarm"  'RTD #11 Hi Alarm Relays
RTD_11_Hi_Alarm_Level = 80  'RTD #11 Hi Alarm Level
RTD_12_Application$ = "Ambient"  'RTD #12 Application
RTD_12_Name = 0  'RTD #12  Name
RTD_12_Alarm$ = "Off"  'RTD #12 Alarm
RTD_12_Alarm_Relays$ = "Alarm"  'RTD #12 Alarm Relays
RTD_12_Alarm_Temperature = 60  'RTD #12 Alarm Temperature
RTD_12_Alarm_Events$ = "Off/No"  'RTD #12 Alarm Events
RTD_12_Trip$ = "Off"  'RTD #12 Trip
RTD_12_Trip_Voting$ = "RTD #12"  'RTD #12 Trip Voting
RTD_12_Trip_Relays$ = "Trip"  'RTD #12 Trip Relays
RTD_12_Trip_Temperature = 80  'RTD #12 Trip Temperature
RTD_12_Hi_Alarm$ = "Off"  'RTD #12 Hi Alarm
RTD_12_Hi_Alarm_Relays$ = "Alarm"  'RTD #12 Hi Alarm Relays
RTD_12_Hi_Alarm_Level = 60  'RTD #12 Hi Alarm Level
Open_RTD_Sensor_Alarm$ = "Off"  'Open RTD Sensor Alarm
Open_RTD_Sensor_Alarm_Relays$ = "Alarm"  'Open RTD Sensor Alarm Relays
Open_RTD_Sensor_Alarm_Events$ = "Off/No"  'Open RTD Sensor Alarm Events
RTD_Short_Low_Temp_Alarm$ = "Off"  'RTD Short/Low Temp Alarm
RTD_Short_Low_Temp_Alarm_Relays$ = "Alarm"  'RTD Short/Low Temp. Alarm Relays
RTD_Short_Low_Temp_Alarm_Events$ = "Off/No"  'RTD Short/Low Temp. Alarm Events
Undervoltage_Active_Only_If_Bus_Energized$ = "Off/No"  'Undervoltage Active Only
If Bus Energized
Undervoltage_Alarm$ = "Off"  'Undervoltage Alarm
Undervoltage_Alarm_Relays$ = "Alarm"  'Undervoltage Alarm Relays
Undervoltage_Alarm_Pickup = 0.85  'Undervoltage Alarm Pickup
Starting_Undervoltage_Alarm_Pickup = 1.00  'Starting Undervoltage Alarm Pickup
Undervoltage_Alarm_Delay = 3.0  'Undervoltage Alarm Delay
Undervoltage_Alarm_Events$ = "Off/No"  'Undervoltage Alarm Events
Undervoltage_Trip$ = "Off"  'Undervoltage Trip
Undervoltage_Trip_Mode$ = "1-Phase"  'Undervoltage Trip Mode
Undervoltage_Trip_Relays$ = "Trip"  'Undervoltage Trip Relays
Undervoltage_Trip_Pickup = 0.80  'Undervoltage Trip Pickup
Starting_Undervoltage_Trip_Pickup = 1.00  'Starting Undervoltage Trip Pickup
Undervoltage_Trip_Delay = 3.0  'Undervoltage Trip Delay
Overvoltage_Alarm$ = "Off"  'Overvoltage Alarm
Overvoltage_Relays$ = "Alarm"  'Overvoltage Relays
Overvoltage_Alarm_Pickup = 1.05  'Overvoltage Alarm Pickup
Overvoltage_Alarm_Delay = 3.0  'Overvoltage Alarm Delay
Overvoltage_Alarm_Events$ = "Off/No"  'Overvoltage Alarm Events
Overvoltage_Trip$ = "Off"  'Overvoltage Trip
Overvoltage_Trip_Relays$ = "Trip"  'Overvoltage Trip Relays
Overvoltage_Trip_Pickup = 1.10  'Overvoltage Trip Pickup
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Overvoltage_Trip_Delay = 3.0  'Overvoltage Trip Delay
Voltage_Phase_Reversal_Trip$ = "Off"  'Voltage Phase Reversal Trip
Voltage_Phase_Reversal_Trip_Relays$ = "Trip"  'Voltage Phase Reversal Trip Relays
Voltage_Frequency_Alarm$ = "Off"  'Voltage Frequency Alarm
Voltage_Frequency_Alarm_Relays$ = "Alarm"  'Voltage Frequency Alarm Relays
Overfrequency_Alarm_Level = 60.50  'Overfrequency Alarm Level
Underfrequency_Alarm_Level = 59.50  'Underfrequency Alarm Level
Voltage_Frequency_Alarm_Delay = 1.0  'Voltage Frequency Alarm Delay
Voltage_Frequency_Alarm_Events$ = "Off/No"  'Voltage Frequency Alarm Events
Voltage_Frequency_Trip$ = "Off"  'Voltage Frequency Trip
Voltage_Frequency_Trip_Relays$ = "Trip"  'Voltage Frequency Trip Relays
Overfrequency_Trip_Level = 60.50  'Overfrequency Trip Level
Underfrequency_Trip_Level = 59.50  'Underfrequency Trip Level
Voltage_Frequency_Trip_Delay = 1.0  'Voltage Frequency Trip Delay
Block_Power_Factor_Element_from_Start = 1  'Block Power Factor Element from Start
Power_Factor_Alarm$ = "Off"  'Power Factor Alarm
Power_Factor_Alarm_Relays$ = "Alarm"  'Power Factor Alarm Relays
Power_Factor_Lead_Alarm_Level = 1.00  'Power Factor Lead Alarm Level
Power_Factor_Lag_Alarm_Level = 1.00  'Power Factor Lag Alarm Level
Power_Factor_Alarm_Delay = 1.0  'Power Factor Alarm Delay
Power_Factor_Alarm_Events$ = "Off/No"  'Power Factor Alarm Events
Power_Factor_Trip$ = "Off"  'Power Factor Trip
Power_Factor_Trip_Relays$ = "Trip"  'Power Factor Trip Relays
Power_Factor_Lead_Trip_Level = 1.00  'Power Factor Lead Trip Level
Power_Factor_Lag_Trip_Level = 1.00  'Power Factor Lag Trip Level
Power_Factor_Trip_Delay = 1.0  'Power Factor Trip Delay
Block_kvar_Element_from_Start = 1  'Block kvar Element from Start
Reactive_Power_Alarm$ = "Off"  'Reactive Power Alarm
Reactive_Power_Alarm_Relays$ = "Alarm"  'Reactive Power Alarm Relays
Positive_Reactive_Power_Alarm_Level = 10  'Positive Reactive Power Alarm Level
Negative_Reactive_Power_Alarm_Level = 10  'Negative Reactive Power Alarm Level
Reactive_Power_Alarm_Delay = 1.0  'Reactive Power Alarm Delay
Reactive_Power_Alarm_Events$ = "Off/No"  'Reactive Power Alarm Events
Reactive_Power_Trip$ = "Off"  'Reactive Power Trip
Reactive_Power_Trip_Relays$ = "Trip"  'Reactive Power Trip Relays
Positive_Reactive_Power_Trip_Level = 25  'Positive Reactive Power Trip Level
Negative_Reactive_Power_Trip_Level = 25  'Negative Reactive Power Trip Level
Reactive_Power_Trip_Delay = 1.0  'Reactive Power Trip Delay
Block_Underpower_From_Start = 0  'Block Underpower From Start
Underpower_Alarm$ = "Off"  'Underpower Alarm
Underpower_Alarm_Relays$ = "Alarm"  'Underpower Alarm Relays
Underpower_Alarm_Level = 2  'Underpower Alarm Level
Underpower_Alarm_Delay = 1  'Underpower Alarm Delay
Underpower_Alarm_Events$ = "Off/No"  'Underpower Alarm Events
Underpower_Trip$ = "Off"  'Underpower Trip
Underpower_Trip_Relays$ = "Trip"  'Underpower Trip Relays
Underpower_Trip_Level = 1  'Underpower Trip Level
Underpower_Trip_Delay = 1  'Underpower Trip Delay
Block_Reverse_Power_From_Start = 0  'Block Reverse Power From Start
Reverse_Power_Alarm$ = "Off"  'Reverse Power Alarm
Reverse_Power_Alarm_Relays$ = "Alarm"  'Reverse Power Alarm Relays
Reverse_Power_Alarm_Level = 1  'Reverse Power Alarm Level
Reverse_Power_Alarm_Delay = 1.0  'Reverse Power Alarm Delay
Reverse_Power_Alarm_Events$ = "Off/No"  'Reverse Power Alarm Events
Reverse_Power_Trip$ = "Off"  'Reverse Power Trip
Reverse_Power_Trip_Relays$ = "Trip"  'Reverse Power Trip Relays
Reverse_Power_Trip_Level = 1  'Reverse Power Trip Level
Reverse_Power_Trip_Delay = 1.0  'Reverse Power Trip Delay
Torque_Metering$ = "Disabled"  'Torque Metering
Stator_Resistance = 0.004  'Stator Resistance
Pole_Pairs = 2  'Pole Pairs
Torque_Unit$ = "Newton-meter"  'Torque Unit
Overtorque_Alarm$ = "Off"  'Overtorque Alarm
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Overtorque_Alarm_Relays$ = "Alarm"  'Overtorque Alarm Relays
Overtorque_Alarm_Level = 4000.0  'Overtorque Alarm Level
Overtorque_Alarm_Delay = 1.0  'Overtorque Alarm Delay
Overtorque_Alarm_Events$ = "Off/No"  'Overtorque Alarm Events
Trip_Counter_Alarm$ = "Off"  'Trip Counter Alarm
Trip_Counter_Alarm_Relays$ = "Alarm"  'Trip Counter Alarm Relays
Trip_Counter_Alarm_Level = 25  'Trip Counter Alarm Level
Trip_Counter_Alarm_Events$ = "Off/No"  'Trip Counter Alarm Events
Starter_Failure_Alarm_Starter_Failure_$ = "Off"  'Starter Failure Alarm (Starter
Failure)
Starter_Type$ = "Breaker"  'Starter Type
Starter_Failure_Alarm_Relays$ = "Alarm"  'Starter Failure Alarm Relays
Starter_Failure_Alarm_Delay = 100  'Starter Failure Alarm Delay
Supervision_of_Trip_Coil$ = "Disabled"  'Supervision of Trip Coil
Starter_Failure_Alarm_Events$ = "Off/No"  'Starter Failure Alarm Events
Current_Demand_Period = 15  'Current Demand Period
Current_Demand_Alarm$ = "Off"  'Current Demand Alarm
Current_Demand_Alarm_Relays$ = "Alarm"  'Current Demand Alarm Relays
Current_Demand_Alarm_Level = 100  'Current Demand Alarm Level
Current_Demand_Alarm_Events$ = "Off/No"  'Current Demand Alarm Events
kW_Demand_Period = 15  'kW Demand Period
kW_Demand_Alarm$ = "Off"  'kW Demand Alarm
kW_Demand_Alarm_Relays$ = "Alarm"  'kW Demand Alarm Relays
kW_Demand_Alarm_Level = 100  'kW Demand Alarm Level
kW_Demand_Alarm_Events$ = "Off/No"  'kW Demand Alarm Events
kvar_Demand_Period = 15  'kvar Demand Period
kvar_Demand_Alarm$ = "Off"  'kvar Demand Alarm
kvar_Demand_Alarm_Relays$ = "Alarm"  'kvar Demand Alarm Relays
kvar_Demand_Alarm_Level = 100  'kvar Demand Alarm Level
kvar_Demand_Alarm_Events$ = "Off/No"  'kvar Demand Alarm Events
kVA_Demand_Period = 15  'kVA Demand Period
kVA_Demand_Alarm$ = "Off"  'kVA Demand Alarm
kVA_Demand_Alarm_Relays$ = "Alarm"  'kVA Demand Alarm Relays
kVA_Demand_Alarm_Level = 100  'kVA Demand Alarm Level
kVA_Demand_Alarm_Events$ = "Off/No"  'kVA Demand Alarm Events
Positive_kWh_Pulse_Output_Relay$ = "Off"  'Positive kWh Pulse Output Relay
Positive_kWh_Pulse_Output_Interval = 1  'Positive kWh Pulse Output Interval
Positive_kvarh_Pulse_Output_Relay$ = "Off"  'Positive kvarh Pulse Output Relay
Positive_kvarh_Pulse_Output_Interval = 1  'Positive kvarh Pulse Output Interval
Negative_kvarh_Pulse_Output_Relay$ = "Off"  'Negative kvarh Pulse Output Relay
Negative_kvarh_Pulse_Output_Interval = 1  'Negative kvarh Pulse Output Interval
Analog_Output_1_Selection$ = "Phase B Current"  'Analog Output 1 Selection
Analog_Output_2_Selection$ = "Phase A Current"  'Analog Output 2 Selection
Analog_Output_3_Selection$ = "None"  'Analog Output 3 Selection
Analog_Output_4_Selection$ = "None"  'Analog Output 4 Selection
RTD_1_Minimum = -50  'RTD #1 Minimum
RTD_1_Maximum = 250  'RTD #1 Maximum
RTD_2_Minimum = -50  'RTD #2 Minimum
RTD_2_Maximum = 250  'RTD #2 Maximum
RTD_3_Minimum = -50  'RTD #3 Minimum
RTD_3_Maximum = 250  'RTD #3 Maximum
RTD_4_Minimum = -50  'RTD #4 Minimum
RTD_4_Maximum = 250  'RTD #4 Maximum
RTD_5_Minimum = -50  'RTD #5 Minimum
RTD_5_Maximum = 250  'RTD #5 Maximum
RTD_6_Minimum = -50  'RTD #6 Minimum
RTD_6_Maximum = 250  'RTD #6 Maximum
RTD_7_Minimum = -50  'RTD #7 Minimum
RTD_7_Maximum = 250  'RTD #7 Maximum
RTD_8_Minimum = -50  'RTD #8 Minimum
RTD_8_Maximum = 250  'RTD #8 Maximum
RTD_9_Minimum = -50  'RTD #9 Minimum
RTD_9_Maximum = 250  'RTD #9 Maximum
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RTD_10_Minimum = -50  'RTD #10 Minimum
RTD_10_Maximum = 250  'RTD #10 Maximum
RTD_11_Minimum = -50  'RTD #11 Minimum
RTD_11_Maximum = 250  'RTD #11 Maximum
RTD_12_Minimum = -50  'RTD #12 Minimum
RTD_12_Maximum = 250  'RTD #12 Maximum
Power_Factor_Minimum = 0.80  'Power Factor Minimum
Power_Factor_Maximum = -0.80  'Power Factor Maximum
Reactive_Power_Minimum = 0  'Reactive Power Minimum
Reactive_Power_Maximum = 750  'Reactive Power Maximum
Real_Power_Minimum = 0  'Real Power Minimum
Real_Power_Maximum = 1000  'Real Power Maximum
Apparent_Power_Minimum = 0  'Apparent Power Minimum
Apparent_Power_Maximum = 1250  'Apparent Power Maximum
Thermal_Capacity_Used_Minimum = 0  'Thermal Capacity Used Minimum
Thermal_Capacity_Used_Maximum = 100  'Thermal Capacity Used Maximum
Relay_Lockout_Time_Minimum = 0  'Relay Lockout Time Minimum
Relay_Lockout_Time_Maximum = 150  'Relay Lockout Time Maximum
Current_Demand_Minimum = 0  'Current Demand Minimum
Current_Demand_Maximum = 700  'Current Demand Maximum
kvar_Demand_Minimum = 0  'kvar Demand Minimum
kvar_Demand_Maximum = 1000  'kvar Demand Maximum
kW_Demand_Minimum = 0  'kW Demand Minimum
kW_Demand_Maximum = 1250  'kW Demand Maximum
kVA_Demand_Minimum = 0  'kVA Demand Minimum
kVA_Demand_Maximum = 1500  'kVA Demand Maximum
Speed2_Standard_Overload_Curve_Number = 4  'Speed2 Standard Overload Curve Number
Speed2_Undercurrent_Alarm$ = "Off"  'Speed2 Undercurrent Alarm
Speed2_Undercurrent_Alarm_Pickup = 0.70  'Speed2 Undercurrent Alarm Pickup
Speed2_Undercurrent_Alarm_Delay = 1  'Speed2 Undercurrent Alarm Delay
Speed2_Undercurrent_Alarm_Events$ = "Off/No"  'Speed2 Undercurrent Alarm Events
Speed2_Undercurrent_Trip$ = "Off"  'Speed2 Undercurrent Trip
Speed2_Undercurrent_Trip_Pickup = 0.70  'Speed2 Undercurrent Trip Pickup
Speed2_Undercurrent_Trip_Delay = 1  'Speed2 Undercurrent Trip Delay
Speed2_Acceleration_Timer_From_Start = 10.0  'Speed2 Acceleration Timer From
Start
Acceleration_Timer_From_Speed_One_to_Two = 10.0  'Acceleration Timer From Speed
One to Two
Ground_CT_Primary = 50  'Ground CT Primary
Phase_Differential_CT_Primary = 100  'Phase Differential CT Primary
Speed_2_Phase_Sequence$ = "ABC"  'Speed 2 Phase Sequence
Remote_Alarm_Name = 0  'Remote Alarm Name
Remote_Alarm_Function$ = "Unlatched"  'Remote Alarm Function
Remote_Alarm_Relays$ = "Alarm"  'Remote Alarm Relays
Remote_Alarm_Events$ = "Off/No"  'Remote Alarm Events
Remote_Trip_Name = 0  'Remote Trip Name
Remote_Trip_Relays$ = "Trip"  'Remote Trip Relays
Speed_Switch_Trip_Relays$ = "Trip"  'Speed Switch Trip Relays
Speed_Switch_Trip_Delays = 5.0  'Speed Switch Trip Delays
Load_Shed_Trip_Relays$ = "Trip"  'Load Shed Trip Relays
Block_Pressure_Switch_Alarm_from_Start = 0  'Block Pressure Switch Alarm from
Start
Pressure_Switch_Alarm_Function$ = "Unlatched"  'Pressure Switch Alarm Function
Pressure_Switch_Alarm_Relays$ = "Alarm"  'Pressure Switch Alarm Relays
Pressure_Switch_Alarm_Delay = 5.0  'Pressure Switch Alarm Delay
Pressure_Switch_Alarm_Events$ = "Off/No"  'Pressure Switch Alarm Events
Block_Pressure_Switch_Trip_from_Start = 0  'Block Pressure Switch Trip from Start
Pressure_Switch_Trip_Relays$ = "Trip"  'Pressure Switch Trip Relays
Pressure_Switch_Trip_Delay = 5.0  'Pressure Switch Trip Delay
Vibration_Switch_Alarm_Function$ = "Unlatched"  'Vibration Switch Alarm Function
Vibration_Switch_Alarm_Relays$ = "Alarm"  'Vibration Switch Alarm Relays
Vibration_Switch_Alarm_Delay = 5.0  'Vibration Switch Alarm Delay
Vibration_Switch_Alarm_Events$ = "Off/No"  'Vibration Switch Alarm Events
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Vibration_Switch_Trip_Relays$ = "Trip"  'Vibration Switch Trip Relays
Vibration_Switch_Trip_Delay = 5.0  'Vibration Switch Trip Delay
Counter_Units_Name = 0  'Counter Units Name
Counter_Preset_Value = 0  'Counter Preset Value
Counter_Type$ = "Increment"  'Counter Type
Counter_Alarm$ = "Off"  'Counter Alarm
Counter_Alarm_Relays$ = "Alarm"  'Counter Alarm Relays
Counter_Alarm_Level = 100  'Counter Alarm Level
Counter_Alarm_Pickup$ = "Over"  'Counter Alarm Pickup
Time_to_Trip_at_1_01_FLA = 17414.5  'Time to Trip at 1.01 x FLA
Time_to_Trip_at_1_05_FLA = 3414.9  'Time to Trip at 1.05 x FLA
Time_to_Trip_at_1_10_FLA = 1666.7  'Time to Trip at 1.10 x FLA
Time_to_Trip_at_1_20_FLA = 795.4  'Time to Trip at 1.20 x FLA
Time_to_Trip_at_1_30_FLA = 507.2  'Time to Trip at 1.30 x FLA
Time_to_Trip_at_1_40_FLA = 364.6  'Time to Trip at 1.40 x FLA
Time_to_Trip_at_1_50_FLA = 280.0  'Time to Trip at 1.50 x FLA
Time_to_Trip_at_1_75_FLA = 169.7  'Time to Trip at 1.75 x FLA
Time_to_Trip_at_2_00_FLA = 116.6  'Time to Trip at 2.00 x FLA
Time_to_Trip_at_2_25_FLA = 86.1  'Time to Trip at 2.25 x FLA
Time_to_Trip_at_2_50_FLA = 66.6  'Time to Trip at 2.50 x FLA
Time_to_Trip_at_2_75_FLA = 53.3  'Time to Trip at 2.75 x FLA
Time_to_Trip_at_3_00_FLA = 43.7  'Time to Trip at 3.00 x FLA
Time_to_Trip_at_3_25_FLA = 36.6  'Time to Trip at 3.25 x FLA
Time_to_Trip_at_3_50_FLA = 31.1  'Time to Trip at 3.50 x FLA
Time_to_Trip_at_3_75_FLA = 26.8  'Time to Trip at 3.75 x FLA
TIme_to_Trip_at_4_00_FLA = 23.3  'TIme to Trip at 4.00 x FLA
Time_to_Trip_at_4_25_FLA = 20.5  'Time to Trip at 4.25 x FLA
Time_to_Trip_at_4_50_FLA = 18.2  'Time to Trip at 4.50 x FLA
Time_to_Trip_at_4_75_FLA = 16.2  'Time to Trip at 4.75 x FLA
Time_to_Trip_at_5_00_FLA = 14.6  'Time to Trip at 5.00 x FLA
Time_to_Trip_at_5_50_FLA = 12.0  'Time to Trip at 5.50 x FLA
Time_to_Trip_at_6_00_FLA = 10.0  'Time to Trip at 6.00 x FLA
Time_to_Trip_at_6_50_FLA = 8.5  'Time to Trip at 6.50 x FLA
Time_to_Trip_at_7_00_FLA = 7.3  'Time to Trip at 7.00 x FLA
Time_to_Trip_at_7_50_FLA = 6.3  'Time to Trip at 7.50 x FLA
Time_to_Trip_at_8_00_FLA = 5.6  'Time to Trip at 8.00 x FLA
Time_to_Trip_at_10_0_FLA = 5.6  'Time to Trip at 10.0 x FLA
Time_to_Trip_at_15_0_FLA = 5.6  'Time to Trip at 15.0 x FLA
Time_to_Trip_at_20_0_FLA = 5.6  'Time to Trip at 20.0 x FLA
Overreach_Filter$ = "Off/No"  'Overreach Filter
Short_Circuit_Trip_Relays$ = "Trip"  'Short Circuit Trip Relays
Short_Circuit_Trip_Pickup = 4.0  'Short Circuit Trip Pickup
Intentional_Short_Circuit_Trip_Delay = 200  'Intentional Short Circuit Trip Delay
Ground_Fault_Trip_Backup_Relays$ = "Aux2"  'Ground Fault Trip Backup Relays
Ground_FaultTrip_Backup_Delay = 200  'Ground FaultTrip Backup Delay
Running_Time_Pulse_Relay$ = "Off"  'Running Time Pulse Relay
Running_Time_Pulse_Interval = 1  'Running Time Pulse Interval
Loss_Of_Comms_Function$ = "Off"  'Loss Of Comms Function
Loss_Of_Comms_Function_Type$ = "Alarm"  'Loss Of Comms Function Type
Loss_Of_Comms_Port$ = "COMP_RS485"  'Loss Of Comms Port
Assign_Loss_Of_Comms_Alarm_Relay$ = "Alarm"  'Assign Loss Of Comms Alarm Relay
Assign_Loss_Of_Comms_Trip_Relay$ = "Trip"  'Assign Loss Of Comms Trip Relay
Loss_Of_Comms_Delay = 1  'Loss Of Comms Delay
Loss_Of_Comms_Alarm_Event$ = "Off/No"  'Loss Of Comms Alarm Event
Phase_A_Current_Minimum = 0  'Phase A Current Minimum
Phase_A_Current_Maximum = 100  'Phase A Current Maximum
Phase_B_Current_Minimum = 0  'Phase B Current Minimum
Phase_B_Current_Maximum = 100  'Phase B Current Maximum
Phase_C_Current_Minimum = 0  'Phase C Current Minimum
Phase_C_Current_Maximum = 100  'Phase C Current Maximum
Average_Phase_Current_Minimum = 0  'Average Phase Current Minimum
Average_Phase_Current_Maximum = 100  'Average Phase Current Maximum
AB_Line_Voltage_Minimum = 3200  'AB Line Voltage Minimum
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AB_Line_Voltage_Maximum = 4500  'AB Line Voltage Maximum
BC_Line_Voltage_Minimum = 3200  'BC Line Voltage Minimum
BC_Line_Voltage_Maximum = 4500  'BC Line Voltage Maximum
CA_Line_Voltage_Minimum = 3200  'CA Line Voltage Minimum
CA_Line_Voltage_Maximum = 4500  'CA Line Voltage Maximum
Average_Line_Voltage_Minimum = 3200  'Average Line Voltage Minimum
Average_Line_Voltage_Maximum = 4500  'Average Line Voltage Maximum
Phase_AN_Voltage_Minimum = 1900  'Phase AN Voltage Minimum
Phase_AN_Voltage_Maximum = 2500  'Phase AN Voltage Maximum
Phase_BN_Voltage_Minimum = 1900  'Phase BN Voltage Minimum
Phase_BN_Voltage_Maximum = 2500  'Phase BN Voltage Maximum
Phase_CN_Voltage_Minimum = 1900  'Phase CN Voltage Minimum
Phase_CN_Voltage_Maximum = 2500  'Phase CN Voltage Maximum
Average_Phase_Voltage_Minimum = 1900  'Average Phase Voltage Minimum
Average_Phase_Voltage_Maximum = 2500  'Average Phase Voltage Maximum
Hottest_Stator_RTD_Minimum = 0  'Hottest Stator RTD Minimum
Hottest_Stator_RTD_Maximum = 200  'Hottest Stator RTD Maximum
Hottest_Bearing_RTD_Minimum = 0  'Hottest Bearing RTD Minimum
Hottest_Bearing_RTD_Maximum = 200  'Hottest Bearing RTD Maximum
Hottest_Ambient_RTD_Minimum = -50  'Hottest Ambient RTD Minimum
Hottest_Ambient_RTD_Maximum = 60  'Hottest Ambient RTD Maximum
Analog_Input_1_Minimum = 0  'Analog Input 1 Minimum
Analog_Input_1_Maximum = 50000  'Analog Input 1 Maximum
Analog_Input_2_Minimum = 0  'Analog Input 2 Minimum
Analog_Input_2_Maximum = 50000  'Analog Input 2 Maximum
Analog_Input_3_Minimum = 0  'Analog Input 3 Minimum
Analog_Input_3_Maximum = 50000  'Analog Input 3 Maximum
Analog_Input_4_Minimum = 0  'Analog Input 4 Minimum
Analog_Input_4_Maximum = 50000  'Analog Input 4 Maximum
Tachometer_Min = 3500  'Tachometer Min
Tachometer_Max = 3700  'Tachometer Max
MWh_Minimum = 50.000  'MWh Minimum
MWh_Maximum = 100.000  'MWh Maximum
Torque_Minimum = 0.0  'Torque Minimum
Torque_Maximum = 0.0  'Torque Maximum
Analog_Input_Diff_1_2_Minimum = 0  'Analog Input Diff 1-2 Minimum
Analog_Input_Diff_1_2_Maximum = 100  'Analog Input Diff 1-2 Maximum
Analog_Input_Diff_3_4_Minimum = 0  'Analog Input Diff 3-4 Minimum
Analog_Input_Diff_3_4_Maximum = 100  'Analog Input Diff 3-4 Maximum
Analog_Input_1_Setup$ = "4-20 mA"  'Analog Input 1 Setup
Analog_Input_1_Units = 0  'Analog Input 1 Units
Analog_Input_1_Minimum_analog_in_1_ = 0  'Analog Input 1 Minimum (analog in 1)
Analog_Input_1_Maximum_analog_in_1_ = 100  'Analog Input 1 Maximum (analog in 1)
Block_Analog_Input_1_From_Start = 0  'Block Analog Input 1 From Start
Analog_Input_1_Alarm$ = "Off"  'Analog Input 1 Alarm
Analog_Input_1_Alarm_Relays$ = "Alarm"  'Analog Input 1 Alarm Relays
Analog_Input_1_Alarm_Level = 10  'Analog Input 1 Alarm Level
Analog_Input_1_Alarm_Pickup$ = "Over"  'Analog Input 1 Alarm Pickup
Analog_Input_1_Alarm_Delay = 0.1  'Analog Input 1 Alarm Delay
Analog_Input_1_Alarm_Events$ = "Off/No"  'Analog Input 1 Alarm Events
Analog_Input_1_Trip$ = "Off"  'Analog Input 1 Trip
Analog_Input_1_Trip_Relays$ = "Trip"  'Analog Input 1 Trip Relays
Analog_Input_1_Trip_Level = 20  'Analog Input 1 Trip Level
Analog_Input_1_Trip_Pickup$ = "Over"  'Analog Input 1 Trip Pickup
Analog_Input_1_Trip_Delay = 0.1  'Analog Input 1 Trip Delay
Analog_Input_1_Name = 0  'Analog Input 1 Name
Analog_Input_2_Setup$ = "4-20 mA"  'Analog Input 2 Setup
Analog_Input_2_Units = 0  'Analog Input 2 Units
Analog_Input_2_Minimum_analog_in_2_ = 0  'Analog Input 2 Minimum (analog in 2)
Analog_Input_2_Maximum_analog_in_2_ = 100  'Analog Input 2 Maximum (analog in 2)
Block_Analog_Input_2_From_Start = 0  'Block Analog Input 2 From Start
Analog_Input_2_Alarm$ = "Off"  'Analog Input 2 Alarm
Analog_Input_2_Alarm_Relays$ = "Alarm"  'Analog Input 2 Alarm Relays
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Analog_Input_2_Alarm_Level = 10  'Analog Input 2 Alarm Level
Analog_Input_2_Alarm_Pickup$ = "Over"  'Analog Input 2 Alarm Pickup
Analog_Input_2_Alarm_Delay = 0.1  'Analog Input 2 Alarm Delay
Analog_Input_2_Alarm_Events$ = "Off/No"  'Analog Input 2 Alarm Events
Analog_Input_2_Trip$ = "Off"  'Analog Input 2 Trip
Analog_Input_2_Trip_Relays$ = "Trip"  'Analog Input 2 Trip Relays
Analog_Input_2_Trip_Level = 20  'Analog Input 2 Trip Level
Analog_Input_2_Trip_Pickup$ = "Over"  'Analog Input 2 Trip Pickup
Analog_Input_2_Trip_Delay = 0.1  'Analog Input 2 Trip Delay
Analog_Input_2_Name = 0  'Analog Input 2 Name
Analog_Input_3_Setup$ = "Disabled"  'Analog Input 3 Setup
Analog_Input_3_Units = 0  'Analog Input 3 Units
Analog_Input_3_Minimum_analog_in_3_ = 0  'Analog Input 3 Minimum (analog in 3)
Analog_Input_3_Maximum_analog_in_3_ = 100  'Analog Input 3 Maximum (analog in 3)
Block_Analog_Input_3_From_Start = 0  'Block Analog Input 3 From Start
Analog_Input_3_Alarm$ = "Off"  'Analog Input 3 Alarm
Analog_Input_3_Alarm_Relays$ = "Alarm"  'Analog Input 3 Alarm Relays
Analog_Input_3_Alarm_Level = 10  'Analog Input 3 Alarm Level
Analog_Input_3_Alarm_Pickup$ = "Over"  'Analog Input 3 Alarm Pickup
Analog_Input_3_Alarm_Delay = 0.1  'Analog Input 3 Alarm Delay
Analog_Input_3_Alarm_Events$ = "Off/No"  'Analog Input 3 Alarm Events
Analog_Input_3_Trip$ = "Off"  'Analog Input 3 Trip
Analog_Input_3_Trip_Relays$ = "Trip"  'Analog Input 3 Trip Relays
Analog_Input_3_Trip_Level = 20  'Analog Input 3 Trip Level
Analog_Input_3_Trip_Pickup$ = "Over"  'Analog Input 3 Trip Pickup
Analog_Input_3_Trip_Delay = 0.1  'Analog Input 3 Trip Delay
Analog_Input_3_Name = 0  'Analog Input 3 Name
Analog_Input_4_Setup$ = "Disabled"  'Analog Input 4 Setup
Analog_Input_4_Units = 0  'Analog Input 4 Units
Analog_Input_4_Minimum_analog_in_4_ = 0  'Analog Input 4 Minimum (analog in 4)
Analog_Input_4_Maximum_analog_in_4_ = 100  'Analog Input 4 Maximum (analog in 4)
Block_Analog_Input_4_From_Start = 0  'Block Analog Input 4 From Start
Analog_Input_4_Alarm$ = "Off"  'Analog Input 4 Alarm
Analog_Input_4_Alarm_Relays$ = "Alarm"  'Analog Input 4 Alarm Relays
Analog_Input_4_Alarm_Level = 10  'Analog Input 4 Alarm Level
Analog_Input_4_Alarm_Pickup$ = "Over"  'Analog Input 4 Alarm Pickup
Analog_Input_4_Alarm_Delay = 0.1  'Analog Input 4 Alarm Delay
Analog_Input_4_Alarm_Events$ = "Off/No"  'Analog Input 4 Alarm Events
Analog_Input_4_Trip$ = "Off"  'Analog Input 4 Trip
Analog_Input_4_Trip_Relays$ = "Trip"  'Analog Input 4 Trip Relays
Analog_Input_4_Trip_Level = 20  'Analog Input 4 Trip Level
Analog_Input_4_Trip_Pickup$ = "Over"  'Analog Input 4 Trip Pickup
Analog_Input_4_Trip_Delay = 0.1  'Analog Input 4 Trip Delay
Analog_Input_4_Name = 0  'Analog Input 4 Name
Speed2_Time_to_Trip_at_1_01_FLA = 17414.5  'Speed2 Time to Trip at 1.01 x FLA
Speed2_Time_to_Trip_at_1_05_FLA = 3414.9  'Speed2 Time to Trip at 1.05 x FLA
Speed2_Time_to_Trip_at_1_10_FLA = 1666.7  'Speed2 Time to Trip at 1.10 x FLA
Speed2_Time_to_Trip_at_1_20_FLA = 795.4  'Speed2 Time to Trip at 1.20 x FLA
Speed2_Time_to_Trip_at_1_30_FLA = 507.2  'Speed2 Time to Trip at 1.30 x FLA
Speed2_Time_to_Trip_at_1_40_FLA = 364.6  'Speed2 Time to Trip at 1.40 x FLA
Speed2_Time_to_Trip_at_1_50_FLA = 280.0  'Speed2 Time to Trip at 1.50 x FLA
Speed2_Time_to_Trip_at_1_75_FLA = 169.7  'Speed2 Time to Trip at 1.75 x FLA
Speed2_Time_to_Trip_at_2_00_FLA = 116.6  'Speed2 Time to Trip at 2.00 x FLA
Speed2_Time_to_Trip_at_2_25_FLA = 86.1  'Speed2 Time to Trip at 2.25 x FLA
Speed2_Time_to_Trip_at_2_50_FLA = 66.6  'Speed2 Time to Trip at 2.50 x FLA
Speed2_Time_to_Trip_at_2_75_FLA = 53.3  'Speed2 Time to Trip at 2.75 x FLA
Speed2_Time_to_Trip_at_3_00_FLA = 43.7  'Speed2 Time to Trip at 3.00 x FLA
Speed2_Time_to_Trip_at_3_25_FLA = 36.6  'Speed2 Time to Trip at 3.25 x FLA
Speed2_Time_to_Trip_at_3_50_FLA = 31.1  'Speed2 Time to Trip at 3.50 x FLA
Speed2_Time_to_Trip_at_3_75_FLA = 26.8  'Speed2 Time to Trip at 3.75 x FLA
Speed2_Time_to_Trip_at_4_00_FLA = 23.3  'Speed2 Time to Trip at 4.00 x FLA
Speed2_Time_to_Trip_at_4_25_FLA = 20.5  'Speed2 Time to Trip at 4.25 x FLA
Speed2_Time_to_Trip_at_4_50_FLA = 18.2  'Speed2 Time to Trip at 4.50 x FLA
```

```
Speed2_Time_to_Trip_at_4_75_FLA = 16.2  'Speed2 Time to Trip at 4.75 x FLA
Speed2_Time_to_Trip_at_5_00_FLA = 14.6  'Speed2 Time to Trip at 5.00 x FLA
Speed2_Time_to_Trip_at_5_50_FLA = 12.0  'Speed2 Time to Trip at 5.50 x FLA
Speed2_Time_to_Trip_at_6_00_FLA = 10.0  'Speed2 Time to Trip at 6.00 x FLA
Speed2_Time_to_Trip_at_6_50_FLA = 8.5  'Speed2 Time to Trip at 6.50 x FLA
Speed2_Time_to_Trip_at_7_00_FLA = 7.3  'Speed2 Time to Trip at 7.00 x FLA
Speed2_Time_to_Trip_at_7_50_FLA = 6.3  'Speed2 Time to Trip at 7.50 x FLA
Speed2_Time_to_Trip_at_8_00_FLA = 5.6  'Speed2 Time to Trip at 8.00 x FLA
Speed2_Time_to_Trip_at_10_0_FLA = 5.6  'Speed2 Time to Trip at 10.0 x FLA
Speed2_Time_to_Trip_at_15_0_FLA = 5.6  'Speed2 Time to Trip at 15.0 x FLA
Speed2_Time_to_Trip_at_20_0_FLA = 5.6  'Speed2 Time to Trip at 20.0 x FLA
Speed2_Minimum_Allowable_Line_Voltage = 80  'Speed2 Minimum Allowable Line
Voltage
Speed2_Stall_Current_at_Min_Vline = 4.80  'Speed2 Stall Current at Min Vline
Speed2_Safe_Stall_Time_at_Min_Vline = 20.0  'Speed2 Safe Stall Time at Min Vline
Speed2_Accel_Intersect_at_Min_Vline = 3.80  'Speed2 Accel. Intersect at Min Vline
Speed2_Stall_Current_at_100_Vline = 6.00  'Speed2 Stall Current at 100% Vline
Speed2_Safe_Stall_Time_at_100_Vline = 10.0  'Speed2 Safe Stall Time at 100% Vline
Speed2_Accel_Intersect_at_100_Vline = 5.00  'Speed2 Accel. Intersect at 100%
Vline
Block_Speed2_Undercurrent_from_Start = 0  'Block Speed2 Undercurrent from Start
Speed_Switch_Trip_Speed2_Delay = 5.0  'Speed Switch Trip Speed2 Delay
Speed2_Rated_Speed = 3600  'Speed2 Rated Speed
Analog_In_Differential_1_2_Enable$ = "Disabled"  'Analog In Differential 1-2
Enable
Analog_In_Diff_1_2_Name = 0  'Analog In Diff 1-2 Name
Analog_In_Differential_1_2_Comparison$ = "% Difference"  'Analog In Differential
1-2 Comparison
Analog_In_Differential_1_2_Logic$ = "1<>2 (or 3<>4)"  'Analog In Differential 1-
2 Logic
Analog_In_Differential_1_2_Active_When$ = "Always"  'Analog In Differential 1-2
Active When
Analog_In_Differential_1_2_Block_from_Start = 0  'Analog In Differential 1-2
Block from Start
Analog_In_Differential_1_2_Alarm$ = "Off"  'Analog In Differential 1-2 Alarm
Analog_In_Differential_1_2_Alarm_Relays$ = "Alarm"  'Analog In Differential 1-2
Alarm Relays
Analog_In_Differential_1_2_Percent_Alarm = 10  'Analog In Differential 1-2
Percent Alarm
Analog_In_Differential_1_2_Absolute_Alarm = 10  'Analog In Differential 1-2
Absolute Alarm
Analog_In_Differential_1_2_Alarm_Delay = 0.1  'Analog In Differential 1-2 Alarm
Delay
Analog_In_Differential_1_2_Alarm_Events$ = "Off/No"  'Analog In Differential 1-2
Alarm Events
Analog_In_Differential_1_2_Trip$ = "Off"  'Analog In Differential 1-2 Trip
Analog_In_Differential_1_2_Trip_Relays$ = "Trip"  'Analog In Differential 1-2
Trip Relays
Analog_In_Differential_1_2_Percent_Trip = 10  'Analog In Differential 1-2
Percent Trip
Analog_In_Differential_1_2_Absolute_Trip = 10  'Analog In Differential 1-2
Absolute Trip
Analog_In_Differential_1_2_Trip_Delay = 0.1  'Analog In Differential 1-2 Trip
Delay
Analog_In_Differential_3_4_Enable$ = "Disabled"  'Analog In Differential 3-4
Enable
Analog_In_Diff_3_4_Name = 0  'Analog In Diff. 3-4 Name
Analog_In_Differential_3_4_Comparison$ = "% Difference"  'Analog In Differential
3-4 Comparison
Analog_In_Differential_3_4_Logic$ = "1<>2 (or 3<>4)"  'Analog In Differential 3-
4 Logic
Analog_In_Differential_3_4_Active_When$ = "Always"  'Analog In Differential 3-4
Active When
```

```
Analog_In_Differential_3_4_Block_from_Start = 0  'Analog In Differential 3-4
Block from Start
Analog_In_Differential_3_4_Alarm$ = "Off"  'Analog In Differential 3-4 Alarm
Analog_In_Differential_3_4_Alarm_Relays$ = "Alarm"  'Analog In Differential 3-4
Alarm Relays
Analog_In_Differential_3_4_Percent_Alarm = 10  'Analog In Differential 3-4
Percent Alarm
Analog_In_Differential_3_4_Absolute_Alarm = 10  'Analog In Differential 3-4
Absolute Alarm
Analog_In_Differential_3_4_Alarm_Delay = 0.1  'Analog In Differential 3-4 Alarm
Delay
Analog_In_Differential_3_4_Alarm_Events$ = "Off/No"  'Analog In Differential 3-4
Alarm Events
Analog_In_Differential_3_4_Trip$ = "Off"  'Analog In Differential 3-4 Trip
Analog_In_Differential_3_4_Trip_Relays$ = "Trip"  'Analog In Differential 3-4
Trip Relays
Analog_In_Differential_3_4_Percent_Trip = 10  'Analog In Differential 3-4
Percent Trip
Analog_In_Differential_3_4_Absolute_Trip = 10  'Analog In Differential 3-4
Absolute Trip
Analog_In_Differential_3_4_Trip_Delay = 0.1  'Analog In Differential 3-4 Trip
Delay
Ground_Fault_Overreach_Filter$ = "Off/No"  'Ground Fault Overreach Filter
User_Map_Address_1 = 512  'User Map Address #1
User_Map_Address_2 = 528  'User Map Address #2
User_Map_Address_3 = 529  'User Map Address #3
User_Map_Address_4 = 551  'User Map Address #4
User_Map_Address_5 = 552  'User Map Address #5
User_Map_Address_6 = 553  'User Map Address #6
User_Map_Address_7 = 554  'User Map Address #7
User_Map_Address_8 = 555  'User Map Address #8
User_Map_Address_9 = 556  'User Map Address #9
User_Map_Address_10 = 720  'User Map Address #10
User_Map_Address_11 = 721  'User Map Address #11
User_Map_Address_12 = 722  'User Map Address #12
User_Map_Address_13 = 723  'User Map Address #13
User_Map_Address_14 = 724  'User Map Address #14
User_Map_Address_15 = 729  'User Map Address #15
User_Map_Address_16 = 768  'User Map Address #16
User_Map_Address_17 = 769  'User Map Address #17
User_Map_Address_18 = 770  'User Map Address #18
User_Map_Address_19 = 771  'User Map Address #19
User_Map_Address_20 = 772  'User Map Address #20
User_Map_Address_21 = 773  'User Map Address #21
User_Map_Address_22 = 774  'User Map Address #22
User_Map_Address_23 = 775  'User Map Address #23
User_Map_Address_24 = 779  'User Map Address #24
User_Map_Address_25 = 780  'User Map Address #25
User_Map_Address_26 = 801  'User Map Address #26
User_Map_Address_27 = 802  'User Map Address #27
User_Map_Address_28 = 803  'User Map Address #28
User_Map_Address_29 = 804  'User Map Address #29
User_Map_Address_30 = 805  'User Map Address #30
User_Map_Address_31 = 806  'User Map Address #31
User_Map_Address_32 = 807  'User Map Address #32
User_Map_Address_33 = 808  'User Map Address #33
User_Map_Address_34 = 809  'User Map Address #34
User_Map_Address_35 = 810  'User Map Address #35
User_Map_Address_36 = 811  'User Map Address #36
User_Map_Address_37 = 812  'User Map Address #37
User_Map_Address_38 = 832  'User Map Address #38
User_Map_Address_39 = 833  'User Map Address #39
User_Map_Address_40 = 834  'User Map Address #40
```

```
User_Map_Address_41 = 835  'User Map Address #41
User_Map_Address_42 = 840  'User Map Address #42
User_Map_Address_43 = 880  'User Map Address #43
User_Map_Address_44 = 881  'User Map Address #44
User_Map_Address_45 = 882  'User Map Address #45
User_Map_Address_46 = 884  'User Map Address #46
User_Map_Address_47 = 885  'User Map Address #47
User_Map_Address_48 = 886  'User Map Address #48
User_Map_Address_49 = 781  'User Map Address #49
User_Map_Address_50 = 782  'User Map Address #50
User_Map_Address_51 = 783  'User Map Address #51
User_Map_Address_52 = 725  'User Map Address #52
User_Map_Address_53 = 726  'User Map Address #53
User_Map_Address_54 = 727  'User Map Address #54
User_Map_Address_55 = 728  'User Map Address #55
User_Map_Address_56 = 0  'User Map Address #56
User_Map_Address_57 = 0  'User Map Address #57
User_Map_Address_58 = 0  'User Map Address #58
User_Map_Address_59 = 0  'User Map Address #59
User_Map_Address_60 = 0  'User Map Address #60
User_Map_Address_61 = 0  'User Map Address #61
User_Map_Address_62 = 0  'User Map Address #62
User_Map_Address_63 = 0  'User Map Address #63
User_Map_Address_64 = 0  'User Map Address #64
User_Map_Address_65 = 0  'User Map Address #65
User_Map_Address_66 = 0  'User Map Address #66
User_Map_Address_67 = 0  'User Map Address #67
User_Map_Address_68 = 0  'User Map Address #68
User_Map_Address_69 = 0  'User Map Address #69
User_Map_Address_70 = 0  'User Map Address #70
User_Map_Address_71 = 0  'User Map Address #71
User_Map_Address_72 = 0  'User Map Address #72
User_Map_Address_73 = 0  'User Map Address #73
User_Map_Address_74 = 0  'User Map Address #74
User_Map_Address_75 = 0  'User Map Address #75
User_Map_Address_76 = 0  'User Map Address #76
User_Map_Address_77 = 0  'User Map Address #77
User_Map_Address_78 = 0  'User Map Address #78
User_Map_Address_79 = 0  'User Map Address #79
User_Map_Address_80 = 0  'User Map Address #80
User_Map_Address_81 = 0  'User Map Address #81
User_Map_Address_82 = 0  'User Map Address #82
User_Map_Address_83 = 0  'User Map Address #83
User_Map_Address_84 = 0  'User Map Address #84
User_Map_Address_85 = 0  'User Map Address #85
User_Map_Address_86 = 0  'User Map Address #86
User_Map_Address_87 = 0  'User Map Address #87
User_Map_Address_88 = 0  'User Map Address #88
User_Map_Address_89 = 0  'User Map Address #89
User_Map_Address_90 = 0  'User Map Address #90
User_Map_Address_91 = 0  'User Map Address #91
User_Map_Address_92 = 0  'User Map Address #92
User_Map_Address_93 = 0  'User Map Address #93
User_Map_Address_94 = 0  'User Map Address #94
User_Map_Address_95 = 0  'User Map Address #95
User_Map_Address_96 = 0  'User Map Address #96
User_Map_Address_97 = 0  'User Map Address #97
User_Map_Address_98 = 0  'User Map Address #98
User_Map_Address_99 = 0  'User Map Address #99
User_Map_Address_100 = 0  'User Map Address #100
User_Map_Address_101 = 0  'User Map Address #101
User_Map_Address_102 = 0  'User Map Address #102
User_Map_Address_103 = 0  'User Map Address #103
```

```
User_Map_Address_104 = 0  'User Map Address #104
User_Map_Address_105 = 0  'User Map Address #105
User_Map_Address_106 = 0  'User Map Address #106
User_Map_Address_107 = 0  'User Map Address #107
User_Map_Address_108 = 0  'User Map Address #108
User_Map_Address_109 = 0  'User Map Address #109
User_Map_Address_110 = 0  'User Map Address #110
User_Map_Address_111 = 0  'User Map Address #111
User_Map_Address_112 = 0  'User Map Address #112
User_Map_Address_113 = 0  'User Map Address #113
User_Map_Address_114 = 0  'User Map Address #114
User_Map_Address_115 = 0  'User Map Address #115
User_Map_Address_116 = 0  'User Map Address #116
User_Map_Address_117 = 0  'User Map Address #117
User_Map_Address_118 = 0  'User Map Address #118
User_Map_Address_119 = 0  'User Map Address #119
User_Map_Address_120 = 0  'User Map Address #120
User_Map_Address_121 = 0  'User Map Address #121
User_Map_Address_122 = 0  'User Map Address #122
User_Map_Address_123 = 0  'User Map Address #123
User_Map_Address_124 = 0  'User Map Address #124
User_Map_Address_125 = 0  'User Map Address #125
Motor_Load_Minimum = 0.00  'Motor Load Minimum
Motor_Load_Maximum = 1.25  'Motor Load Maximum
```

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: **READ TEST NOTES**

OK?
RAN

Relay Test Results for: **TURN ON BATTERY SIMULATOR**

OK?
RAN

Relay Test Results for: *** GET SETTINGS FILE FROM DEVICE ***

OK?
RAN

Relay Test Results for: ***RELAY SETTINGS TO SETTINGS TAB***

OK?
RAN

Relay Test Results for: MODIFY RELAY TRIP SETTINGS

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: ***CURRENT CONNECTIONS***

OK?
RAN

Relay Test Results for: CURRENT METER TEST

	EXPECTED CURRENT	CURRENT READ	RANGE			OK?
A PHASE	75.0	75.0	71.2	TO	78.8	PASS
B PHASE	75.0	75.0	71.2	TO	78.8	PASS
C PHASE	75.0	75.0	71.2	TO	78.8	PASS

Relay Test Results for: OVERLOAD PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	2.791	2.760	1.12	PASS

Relay Test Results for: OVERLOAD TIMING TEST

Relay Test Results for: OVERLOAD TIMING TEST

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
3.00	7.200	2635.36	43.923	43.728	0.44	PASS
4.00	9.600	1404.02	23.400	23.319	0.35	PASS
5.00	12.000	877.04	14.617	14.573	0.30	PASS

Relay Test Results for: SHORT CIRCUIT TRIP PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	20.200	20.000	1.00	PASS

Relay Test Results for: SHORT CIRCUIT TRIP DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	24.000	13.18	0.220	0.150 TO 0.250	PASS

Relay Test Results for: UNDERCURRENT TRIP PICKUP

OK?
RAN

Relay Test Results for: MECHANICAL JAM PICKUP

OK?
RAN

Relay Test Results for: MECHANICAL JAM DELAY

OK?
RAN

Relay Test Results for: CURRENT UNBALANCE PICKUP

UNBALANCE% PU	RANGE	OK?
0.00	0.00 TO 0.00	RAN

Relay Test Results for: CURRENT UNBALANCE DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
0.32	12.800	72.35	1.206	0.500 TO 1.500	PASS

Relay Test Results for: ACCELERATION TIMER

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
1.20	3.312	600.62	10.010	10.000	0.10	PASS

Relay Test Results for: ***VOLTAGE INPUT TEST***

	EXPECTED VOLTAGE	VOLATGE READ	RANGE	OK?
APH-BPH	4200.0	4196.0	4116.0 TO 4284.0	PASS
BPH-CPH	4200.0	4201.0	4116.0 TO 4284.0	PASS
CPH-APH	4200.0	4190.0	4116.0 TO 4284.0	PASS

Relay Test Results for: UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: UNDERVOLTAGE DELAY

OK?
RAN

Relay Test Results for: OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: OVERVOLTAGE DELAY

OK?
RAN

Relay Test Results for: VOLTAGE PHASE REVERSAL

OK?
RAN

Relay Test Results for: UNDERFREQUENCY PICKUP

OK?
RAN

Relay Test Results for: UNDERFREQUENCY DELAY

OK?
RAN

Relay Test Results for: OVERFREQUENCY PICKUP

OK?
RAN

Relay Test Results for: OVERFREQUENCY DELAY

OK?
RAN

Relay Test Results for: ***POWER INPUT TEST***

EXPECTED POWER FACTOR	POWER FACTOR READ	EXPECTED KILOWATTS	KILOWATTS READ	RANGE	OK?
0.549	0.550	498.1	498.0	480.0 TO 516.3	PASS

Relay Test Results for: POWER FACTOR LEAD PICKUP

ANG(LAG)	VOLTAGE	CURRENT	POWER FACTOR	RANGE	OK?
0.00	0.00	0.000	0.000	0.000 TO 0.000	RAN

Relay Test Results for: POWER FACTOR LAG PICKUP

ANG(LAG)	VOLTAGE	CURRENT	POWER FACTOR	RANGE	OK?
0.00	0.00	0.000	0.000	0.000 TO 0.000	RAN

Relay Test Results for: REACTIVE POS KVAR TRIP PU

OK?
RAN

Relay Test Results for: REACTIVE NEG KVAR TRIP PU

OK?
RAN

Relay Test Results for: REACTIVE KVAR TRIP DELAY

OK?
RAN

Relay Test Results for: REVERSE POWER TRIP PU

OK?
RAN

Relay Test Results for: REVERSE POWER TRIP DELAY

OK?
RAN

Relay Test Results for: UNDERPOWER TRIP PU

OK?
RAN

Relay Test Results for: UNDERPOWER TRIP DELAY

OK?
RAN

Relay Test Results for: ***GROUND(1A/5A) INPUT TEST***

EXPECTED CURRENT	CURRENT READ	RANGE	OK?
50.0	49.8	49.0 TO 51.0	PASS

Relay Test Results for: GROUND(1A/5A) FAULT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	2.530	2.500	1.20	PASS

Relay Test Results for: GROUND(1A/5A) FAULT DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.10	2.750	14.02	0.234	0.000 TO 0.700	PASS

Relay Test Results for: ***DIFFERENTIAL INPUT TEST***

0.0	0.0	0.0 TO 0.0		RAN

Relay Test Results for: DIFFERENTIAL PICKUP PH A

OK?
RAN

Relay Test Results for: DIFFERENTIAL PICKUP PH B

Relay Test Results for:	DIFFERENTIAL PICKUP PH B	OK? RAN
Relay Test Results for:	DIFFERENTIAL PICKUP PH C	OK? RAN
Relay Test Results for:	DIFFERENTIAL FAULT DELAY	OK? RAN
Relay Test Results for:	RETURN RELAY SETTING	OK? RAN
Relay Test Results for:	**TURN OFF BATTERY SIMULATOR**	OK? RAN

Test Results Report

Powered by: ENOSERV

Lib Routine:	SEL-351A.FST_LIB	**AF/AL:**	AL	**Pass/Fail:**	PASS
Lib Version:	8.3	**Test Date:**	03/04/2020		

Relay Data:

TESTED_BY:	Kate Murphy	SUBSTATION:	13.2kV
CUSTOMER:	Ann Arbor City	USER:	AAWWTP
LOCATION:	CEB	POSITION:	Bus 1 - Bus 3 Tie Bkr
RELAY_MANF:	SEL	RELAY_TYPE:	SEL-351A
MODEL_STYLE:	0351a050x3a54x1	IEEE_DEVICE:	MF
IL_IB:	SEL-351A	SERIAL_NUMBER:	1132770401
FIRMWARE:	SEL-351A-R515-V0-Z105104-D20130620	RELAY_ID:	52GT1
CURRENT_TESTDATE:	3/4/2020	TESTSET_CALDATE:	11/2/2018

Global Defines:

```
SET_GROUP$="1"       'SET GROUP TO TEST
CONTACT$="107"       'OUTPUT CONTACT TO MASK
SEL_AUTO=1           '0=MANUAL, 1=AUTO MASK, 2=MANUAL W/MESSAGES
SKIP_TST=1           'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1             'NO ERROR MESSAGE IF NO OPERATION
DIR_TEST_VOLTS=30    'TEST VOLTAGE FOR DIRECTIONAL ELEMENTS
NORM_VOLTS=67        'NORM VOLTAGE
NORM_FREQ=60         'NORMAL VOLTAGE FREQUENCY
ZONE_TEST_AMPS=3   'TEST CURRENT FOR LOAD ENCHROACHMENT TESTS
```

Routine Notes:

Relay Settings Used for Testing:

```
RID$ = "GT 1 MAIN"
TID$ = "TEST SETTING"
CTR = 120
CTRN = 120
PTR = 110.00
PTRS = 110.00
VNOM = 69.29
Z1MAG = 2.14
Z1ANG = 68.86
Z0MAG = 6.38
Z0ANG = 72.47
LL = 4.84
E50P = 1
E50N$ = "N"
E50G = 1
E50Q$ = "N"
E51P = 1
E51N$ = "N"
E51G = 1
E51Q$ = "N"
EHBL2$ = "N"
E32$ = "N"
ELOAD$ = "N"
ESOTF$ = "N"
```

```
EVOLT$ = "Y"
E25$ = "Y"
EFLOC$ = "Y"
ELOP$ = "N"
E81$ = "N"
E81R$ = "N"
E79$ = "N"
ESV = 10
EDEM$ = "THM"
s50P1P = 28.66
s67P1D = 0.00
s50PP1P$ = "OFF"
s50G1P = 8.620
s67G1D = 6.00
s51PP = 1.90
s51PC$ = "C3"
s51PTD = 0.37
s51PRS$ = "N"
s51GP = 0.60
s51GC$ = "U1"
s51GTD = 1.09
s51GRS$ = "N"
s27P1P = 62.00
s27P2P$ = "OFF"
s59P1P = 76.00
s59P2P$ = "OFF"
s59N1P$ = "OFF"
s59N2P$ = "OFF"
s59QP$ = "OFF"
s59V1P$ = "OFF"
s27SP = 10.00
s59S1P = 55.00
s59S2P$ = "OFF"
s27PP$ = "OFF"
s59PP$ = "OFF"
s25VLO = 62.00
s25VHI = 76.00
s25RCF = 1.00
s25SF = 0.050
s25ANG1 = 15
s25ANG2 = 15
SYNCP$ = "VA"
TCLOSD = 3.00
DMTC = 5
PDEMP = 5.00
NDEMP = 1.500
GDEMP = 1.50
QDEMP = 1.50
TDURD = 9.00
CFD = 60.00
s3POD = 1.50
s50LP = 0.25
SV1PU = 0.00
SV1DO = 0.00
SV2PU = 0.00
```

```
SV2DO = 0.00
SV3PU = 0.00
SV3DO = 0.00
SV4PU = 0.00
SV4DO = 0.00
SV5PU = 0.00
SV5DO = 0.00
SV6PU = 0.00
SV6DO = 0.00
SV7PU = 0.00
SV7DO = 0.00
SV8PU = 0.00
SV8DO = 0.00
SV9PU = 0.00
SV9DO = 0.00
SV10PU = 0.00
SV10DO = 0.00
TR$ = "50P1 + 51PT + 51GT + 50G1 + 67G1T"
TRQUAL = 0
TRSOTF = 0
DTT = 0
ULTR$ = "!(51P + 51G)"
s52A$ = "IN101"
CL$ = "CC + LB4"
ULCL$ = "TRIP"
s79RI$ = "TRIP"
s79RIS$ = "52A + 79CY"
s79DTL$ = "OC + !IN102 + LB3"
s79DLS$ = "79LO"
s79SKP = 0
s79STL$ = "TRIP"
s79BRS = 0
s79SEQ = 0
s79CLS = 1
SET1 = 0
RST1 = 0
SET2 = 0
RST2 = 0
SET3 = 0
RST3 = 0
SET4 = 0
RST4 = 0
SET5 = 0
RST5 = 0
SET6 = 0
RST6 = 0
SET7 = 0
RST7 = 0
SET8 = 0
RST8 = 0
SET9 = 0
RST9 = 0
SET10 = 0
RST10 = 0
SET11 = 0
```

```
RST11 = 0
SET12 = 0
RST12 = 0
SET13 = 0
RST13 = 0
SET14 = 0
RST14 = 0
SET15 = 0
RST15 = 0
SET16 = 0
RST16 = 0
s67P1TC = 1
s67P2TC = 1
s67P3TC = 1
s67P4TC = 1
s67N1TC = 1
s67N2TC = 1
s67N3TC = 1
s67N4TC = 1
s67G1TC = 1
s67G2TC = 1
s67G3TC = 1
s67G4TC = 1
s67Q1TC = 1
s67Q2TC = 1
s67Q3TC = 1
s67Q4TC = 1
s51ATC = 1
s51BTC = 1
s51CTC = 1
s51PTC = 1
s51NTC = 1
s51GTC = 1
s51G2TC = 1
s51QTC = 1
HBL2TC = 1
s81RTC$ = "!27B81"
LV1 = 0
LV2 = 0
LV3 = 0
LV4 = 0
LV5 = 0
LV6 = 0
LV7 = 0
LV8 = 0
LV9 = 0
LV10 = 0
LV11 = 0
LV12 = 0
LV13 = 0
LV14 = 0
LV15 = 0
LV16 = 0
LV17 = 0
LV18 = 0
```

```
LV19 = 0
LV20 = 0
LV21 = 0
LV22 = 0
LV23 = 0
LV24 = 0
LV25 = 0
LV26 = 0
LV27 = 0
LV28 = 0
LV29 = 0
LV30 = 0
LV31 = 0
LV32 = 0
SV1 = 0
SV2$ = "27A1 + 27B1 + 27C1 + 59A1 + 59B1 + 59C1"
SV3$ = "27A1 * 27B1 * 27C1"
SV4$ = "25A1 + (27S * !SV2)"
SV5$ = "25A1 + (27S * !SV2) + (59S1 * SV3) + (27S * SV3) "
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
SV15 = 0
SV16 = 0
OUT101$ = "SV4T"
OUT102$ = "TRIP"
OUT103 = 0
OUT104 = 0
OUT105$ = "SV4T"
OUT106 = 0
OUT107 = 0
ALRMOUT$ = "!(SALARM + HALARM)"
DP1$ = "IN101"
DP2 = 0
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
DP9 = 0
DP10 = 0
DP11 = 0
DP12 = 0
DP13 = 0
DP14 = 0
DP15 = 0
DP16 = 0
SS1 = 1
```

```
SS2 = 0
SS3 = 0
SS4 = 0
SS5 = 0
SS6 = 0
ER$ = "51P + 51G + 51N + 50P1 + 50G1 + 50N1"
FAULT$ = "51P + 51G"
BSYNCH$ = "52A"
CLMON = 0
BKMON$ = "TRIP"
BKCLS$ = "CLOSE"
E32IV = 1
LOPBLK = 0
SALARM$ = "BADPASS + CHGPASS + SETCHG + GRPSW + ACCESSP + PASNVAL "
RSTTRGT = 0
RST_DEM = 0
RST_PDM = 0
RST_BK = 0
RST_HIS = 0
RST_ENE = 0
RST_MML = 0
RST_HAL = 0
RSTDNPE = 0
PMTRIG = 0
TREA1 = 0
TREA2 = 0
TREA3 = 0
TREA4 = 0
PTCONN$ = "WYE"
VSCONN$ = "VS"
TGR = 0.00
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
FP_TO = 15
SCROLD = 2
FPNGD$ = "IG"
METHRES$ = "Y"
LER = 15
PRE = 4
FLTDISP$ = "MAX"
DCLOP$ = "OFF"
DCHIP$ = "OFF"
IN101D = 0.50
IN102D = 0.50
IN103D = 0.50
IN104D = 0.50
IN105D = 0.50
IN106D = 0.50
EBMON$ = "Y"
COSP1 = 10000
COSP2 = 150
COSP3 = 12
KASP1 = 1.20
KASP2 = 8.00
```

```
KASP3 = 20.00
ESTRT = 50
ESCLT = 120
MSTRT = 50
MSCLT = 120
EPMU$ = "N"
EVELOCK = 0
DNPSRC$ = "UTC"
BOOPTCC$ = "SET"
BOOPPUL$ = "SET"
IRIGC$ = "NONE"
UTC_OFF = 0.00
DST_BEGM$ = "NA"
P2_EPORT$ = "Y"
P2_PROTO$ = "SEL"
P2_MAXACC = 2
P2_SPEED = 2400
P2_BITS = 8
P2_PARITY$ = "N"
P2_STOP = 1
P2_RTSCTS$ = "N"
P2_T_OUT = 15
P2_AUTO$ = "N"
P2_FASTOP$ = "N"
P3_EPORT$ = "Y"
P3_PROTO$ = "SEL"
P3_MAXACC = 2
P3_SPEED = 2400
P3_BITS = 8
P3_PARITY$ = "N"
P3_STOP = 1
P3_RTSCTS$ = "N"
P3_T_OUT = 0
P3_AUTO$ = "N"
P3_FASTOP$ = "N"
PF_EPORT$ = "Y"
PF_PROTO$ = "SEL"
PF_MAXACC$ = "C"
PF_SPEED = 19200
PF_BITS = 8
PF_PARITY$ = "N"
PF_STOP = 1
PF_RTSCTS$ = "N"
PF_T_OUT = 15
PF_AUTO$ = "N"
PF_FASTOP$ = "N"
```

Relay Test Results for:

ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for:

LOG INTO THE RELAY

OK?
RAN

Relay Test Results for:

DOWNLOAD RELAY SETTINGS

Relay Test Results for:
DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for:
SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for:
UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for:
RELAY STATUS CHECK

N/A

Additional Data:
STA

GT 1 MAIN Date: 03/04/20 Time: 06:58:05.552
TEST SETTING

FID=SEL-351A-R515-V0-Z105104-D20130620 CID=F6EC

SELF TESTS

W=Warn F=Fail

	IA	IB	IC	IN	VA	VB	VC	VS	MOF
OS	-0	-0	-0	-0	-1	-1	-1	-1	-0
OSH	-0	-0	-0	0					

	15V_PS	5V_REG	3.3V_REG
PS	14.87	5.03	3.31

RAM	ROM	FPGA	EEPROM	FLASH	A/D	USB_BRD	COM_BRD
OK	OK	OK	OK	OK	OK	NA	NA

TEMP	RTC	HMI
30.5	OK	OK

Relay Enabled

=>>

Relay Test Results for:
COMPONENT MAINTENANCE NOTES

OK?
RAN

Relay Test Results for:
CURRENT\VOLTAGE INJECTION METER TEST

Relay Test Results for:

CURRENT\VOLTAGE INJECTION METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
67.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	7.2	7.1	-0.1	216.0	215.8	-0.1	PASS
B-N	7.4	7.4	0.0	240.0	239.6	-0.2	PASS
C-N	7.6	7.6	-0.1	264.0	263.8	-0.1	PASS

	CALCULATED MEGA WATT	MEASURED MEGA WATT	% ERROR	CALCULATED MEGA VAR	MEASURED MEGA VAR	% ERROR	OK?
	4.6	4.6	-0.2	2.7	2.7	-0.1	PASS

Relay Test Results for:

RELAY OUTPUT VERIFICATION

Verify operation of the RELAY OUTPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that OUTPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:
Verified operation of all in-service outputs.

Relay Test Results for:

RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for:

SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for:

SEL 351A SPECIFIC TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for:

RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for:

GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for:
MODIFY RELAY SETTINGS

OK?
RAN

Relay Test Results for:
POTENTIAL TESTING ISSUES CHECK

OK?
RAN

Relay Test Results for:
CONNECTION CHANGE FOR ELEMENT TESTS

OK?
RAN

Relay Test Results for:
METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
67.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	7.2	7.1	-0.1	216.0	215.8	-0.1	PASS
B-N	7.4	7.4	0.0	240.0	239.6	-0.2	PASS
C-N	7.6	7.6	-0.1	264.0	263.8	-0.1	PASS

CALCULATED MEGA WATT	MEASURED MEGA WATT	% ERROR	CALCULATED MEGA VAR	MEASURED MEGA VAR	% ERROR	OK?
4.6	4.6	-0.2	2.7	2.7	-0.0	PASS

Relay Test Results for:
ZLF FORWARD LOAD IMPEDANCE

OK?
RAN

Relay Test Results for:
ZLF FORWARD LOAD ANGLE

OK?
RAN

Relay Test Results for:
ZLR REVERSE LOAD IMPEDANCE

OK?
RAN

Relay Test Results for:
ZLR REVERSE LOAD ANGLE

OK?
RAN

Relay Test Results for:
27P1P PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.000	62.000	0.00	PASS

Relay Test Results for:
27P1P THREE PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
61.380	62.000	-1.00	PASS

Relay Test Results for:
27P2P PHASE UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for:
27PP PHASE TO PHASE UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for:
27PP2P PHASE TO PHASE UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for:
50QFP FORWARD DIRECTIONAL NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
Z2F FORWARD DIRECTIONAL NEGATIVE SEQUENCE IMPEDANCE

OK?
RAN

Relay Test Results for:
50QRP REVERSE DIRECTIONAL NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
Z2R REVERSE DIRECTIONAL NEGATIVE SEQUENCE IMPEDANCE

OK?
RAN

Relay Test Results for:
50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		28.943	28.660	0.99	PASS
B-N		28.656	28.660	-0.01	PASS
C-N		28.656	28.660	-0.01	PASS

Relay Test Results for:
50P2P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50P3P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50P4P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50P5P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50P6P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
67P1D PHASE DIRECTIONAL OVERCURRENT TIME DELAY

Relay Test Results for:
67P1D PHASE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:
67P2D PHASE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:
67P3D PHASE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:
67P4D PHASE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:
50PP1P PHASE TO PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50PP2P PHASE TO PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50PP3P PHASE TO PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50PP4P PHASE TO PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50Q3P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50Q4P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50Q5P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50Q6P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
67Q1D NEGATIVE SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:
67Q2D NEGATIVE SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:
67Q3D NEGATIVE SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:
67Q4D NEGATIVE SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:
50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	8.623	8.620	0.04	PASS

Relay Test Results for:
50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50G3P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50G4P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50G5P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50G6P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
67G1D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(SEC)	TIME(CY)	RANGE	OK?
1.20	10.344	0.120	7.20	4.20 TO 7.80	PASS

Relay Test Results for:
67G2D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:

67G3D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:

67G4D ZERO SEQUENCE DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:

51PP PHASE TO PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		1.903	1.900	0.16	PASS
B-N		1.903	1.900	0.16	PASS
C-N		1.903	1.900	0.16	PASS

Relay Test Results for:

51P PHASE TIME OVERCURRENT CURVE

51P PHASE TIME OVERCURRENT CURVE (PHASE A-N)

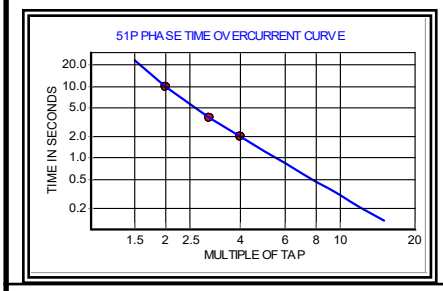
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	3.800	594.00	9.900	9.867	0.34	PASS
3.00	5.700	223.17	3.720	3.700	0.53	PASS
4.00	7.600	119.09	1.985	1.973	0.59	PASS

51P PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	3.800	594.32	9.905	9.867	0.39	PASS
3.00	5.700	222.57	3.710	3.700	0.26	PASS
4.00	7.600	118.95	1.982	1.973	0.46	PASS

51P PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	3.800	594.28	9.905	9.867	0.38	PASS
3.00	5.700	222.92	3.715	3.700	0.42	PASS
4.00	7.600	119.31	1.988	1.973	0.77	PASS



Relay Test Results for:

51AP PHASE A TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:

51A PHASE A TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for:

51BP PHASE B TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
51B PHASE B TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for:
51CP PHASE C TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
51C PHASE C TIME OVERCURRENT CURVE

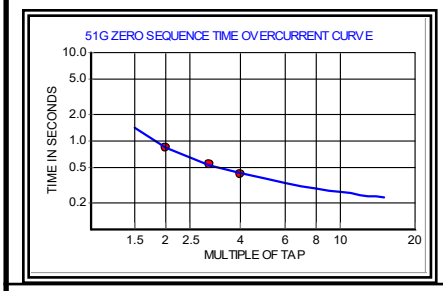
OK?
RAN

Relay Test Results for:
51GP ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.596	0.600	-0.67	PASS

Relay Test Results for:
51G ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	50.46	0.841	0.837	0.51	PASS
3.00	1.800	32.65	0.544	0.535	1.72	PASS
4.00	2.400	25.66	0.428	0.428	-0.04	PASS



Relay Test Results for:
51G2P ZERO SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
51G2 ZERO SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for:
51QP NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
51Q NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for:
CONNECTION CHANGE FOR NEUTRAL TESTS

OK?
RAN

Relay Test Results for:
50N1P NEUTRAL OVERCURRENT PICKUP

Relay Test Results for:
50N1P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50N2P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50N3P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50N4P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50N5P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
50N6P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
67N1D NEUTRAL DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:
67N2D NEUTRAL DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:
67N3D NEUTRAL DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:
67N4D NEUTRAL DIRECTIONAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for:
51NP NEUTRAL TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for:
51N NEUTRAL TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for:
59P1P PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.760	76.000	1.00	PASS

Relay Test Results for:
59P1P THREE PHASE OVERVOLTAGE PICKUP

PICKUP	VOLTS	IDEAL	%ERROR	OK?
	76.760	76.000	1.00	PASS

Relay Test Results for:
59P2P PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for:
59PP PHASE TO PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for:
59PP2P PHASE TO PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for:
59N1P ZERO SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for:
59N2P ZERO SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for:
59QP NEGATIVE SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for:
59Q2P NEGATIVE SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for:
59V1P POSITIVE SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for:
27B81P UNDERVOLTAGE FRQEUENCY BLOCK

OK?
RAN

Relay Test Results for:
81D1P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for:
81D1D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for:
81D2P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for:
81D2D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for:
81D3P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for:
81D3D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for:
81D4P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for:
81D4D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for:
81D5P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for:
81D5D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for:
81D6P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for:
81D6D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for:
25VLO SOURCE VP SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.620	62.000	1.00	PASS

Relay Test Results for:
25VHI SOURCE VP SYNCHRONIZING PHASE HIGH VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.000	76.000	-0.00	PASS

Relay Test Results for:
<SYNCHRONIZING TEST CONNECTIONS>

OK?
RAN

Relay Test Results for:
27SP SYNCHRONIZING PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
10.000	10.000	0.00	PASS

Relay Test Results for:
59S1P SYNCHRONIZING PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
55.550	55.000	1.00	PASS

Relay Test Results for:
59S2P SYNCHRONIZING PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for:
25VLO SOURCE VS SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.620	62.000	1.00	PASS

Relay Test Results for:
25VHI SOURCE VS SYNCHRONIZING PHASE HIGH VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.000	76.000	-0.00	PASS

Relay Test Results for:
25ANG1 SYNCHRONIZING ANGLE 1

LAGGING ANGLE	IDEAL	RANGE	OK?
15.00	15.00	11.00 TO 19.00	PASS

LEADING ANGLE	IDEAL	RANGE	OK?
346.00	345.00	341.00 TO 349.00	PASS

Relay Test Results for:
25ANG2 SYNCHRONIZING ANGLE 2

LAGGING ANGLE	IDEAL	RANGE	OK?
15.00	15.00	11.00 TO 19.00	PASS

LEADING ANGLE	IDEAL	RANGE	OK?
346.00	345.00	341.00 TO 349.00	PASS

Relay Test Results for:
25SF SYNCHRONIZING SLIP FREQUENCY

DROPOUT HZ	IDEAL	RANGE	OK?
59.950	59.950	59.900 TO 60.000	PASS

Relay Test Results for:
RESTORE RELAY SETTINGS

OK?
RAN

Relay Test Results for:
RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for:
COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

OK?
RAN

Relay Test Results for:
LOG OUT OF THE RELAY

OK?
RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-300G.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 8.4 **Test Date:** 03/04/2020

Relay Data:

TESTED_BY:	KERRY HAYSLIP	SUBSTATION:	GEN
CUSTOMER:	CITY OF ANN ARBOR	USER:	ANN ARBOR WASTEWATER
LOCATION:	CEP	POSITION:	52G1
RELAY_MANF:	SEL	RELAY_TYPE:	SEL-300G
MODEL_STYLE:	0300G305325XX4XXX	IEEE_DEVICE:	MF
IL_IB:	SEL-300G	SERIAL_NUMBER:	1133040321
FIRMWARE:	SEL-300G-R331-V305325XX4XXX-Z303303-D20141017	RELAY_ID:	300G
CURRENT_TESTDATE:	3/4/2020	TESTSET_CALDATE:	10/29/2019

Global Defines:

```
BAC$="EDITH"          'BREAKER ACCESS LEVEL TO CHANGE GROUPS
SET_GROUP$="1"        'RELAY SET GROUP TO TEST
CONTACT$="107"        'OUTPUT CONTACT TO MASK
SEL_AUTO=1            '0=MANUAL, 1=AUTO MASK, 2=MANUAL W/MESSAGES
SKIP_TST=1            'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1              'NO ERROR MESSAGE IF NO OPERATION
NORM_FREQ=60          'NORMAL VOLTAGE FREQUENCY
```

Routine Notes:

Relay Settings Used for Testing:

```
RID$ = "GENERATOR #1"
TID$ = "TERMINAL"
CTR = 40
CTRD = 40
CTRN = 40
PTR = 110.00
PTRN = 110.00
PTRS = 100.00
VNOM = 120.0
INOM = 2.8
PHROT$ = "ABC"
EBUP$ = "V"
E24$ = "N"
E25$ = "Y"
E27$ = "Y"
E32$ = "N"
E40$ = "N"
E46$ = "N"
E50$ = "Y"
E50_87$ = "Y"
E51$ = "Y"
E59$ = "Y"
E64$ = "N"
E78$ = "N"
E81 = 6
E81AC$ = "N"
E87$ = "G"
ESV = 3
ESL = 3
EDEM$ = "ROL"
SYNCP$ = "VA"
```

```
s25VLO = 62.3
s25VHI = 76.2
s25VDIF = 10.0
s25RCF = 1.000
GENV_$ = "N"
s25SLO = -0.05
s25SHI = 0.10
COMPA = 0
s25ANG1 = 15
s25ANG2 = 15
CANGLE = -3
TCLOSD = 0.150
CFANGL = 30
s27VSP = 10.0
BSYNCH$ = "IN101"
s27P1P = 62.3
s27P2P$ = "OFF"
s27V1P$ = "OFF"
s27PP1$ = "OFF"
s27PP2$ = "OFF"
s50P1P = 3.20
s50P1D = 0.35
s50P2P = 9.20
s50P2D = 0.13
s50N1P = 3.20
s50N1D = 0.35
s50N2P$ = "OFF"
s50G1P = 49.60
s50G1D = 0.20
s50G2P$ = "OFF"
s50H1P = 3.20
s50H1D = 0.35
s50H2PA = 9.20
s50H2PB = 9.20
s50H2PC = 9.20
s50H2D = 0.13
s50Q1P$ = "OFF"
s50Q2P$ = "OFF"
s50R1P = 3.20
s50R1D = 0.35
s50R2P = 9.20
s50R2D = 0.13
s51NP$ = "OFF"
s51GP = 2.10
s51GC$ = "U1"
s51GTD = 2.12
s51GRS$ = "N"
s51GTC = 1
s51VCA = 0
s51VP = 3.50
s51VC$ = "C5"
s51VTD = 0.40
s51VRS$ = "N"
s51VTC$ = "IN101"
s3POD = 0.00
s50LP = 0.25
s52A$ = "IN101"
s59P1P = 76.2
s59P2P$ = "OFF"
s59G1P$ = "OFF"
s59G2P$ = "OFF"
s59QP$ = "OFF"
```

```
s59V1P$ = "OFF"
s59PP1$ = "OFF"
s59PP2$ = "OFF"
s64FOPT$ = "NONE"
s27B81P = 50.00
s81D1P = 55.00
s81D1D = 0.20
s81D2P = 65.00
s81D2D = 0.20
s81D3P$ = "OFF"
s81D4P$ = "OFF"
s81D5P$ = "OFF"
s81D6P$ = "OFF"
TAP1 = 2.80
TAPD = 2.80
U87P = 10.0
O87P = 0.30
SLP1 = 25
s87B = 0
HSM$ = "(DRDOPT + HRT) * !RHSM"
O87P2 = 1.25
HSMDOT = 10.00
DMTC = 15
PDEMP = 5.50
NDEMP = 1.00
GDEMP = 1.00
QDEMP = 2.50
INAD$ = "SV2T * 50L"
INADPU = 0.25
INADDO = 0.13
SV1 = 0
SV1PU = 0.00
SV1DO = 0.00
SV2$ = "IN101 * (50P1T + 50P2T + 50N1T + 50G1T + 51VT) "
SV2PU = 0.00
SV2DO = 1.00
SV3$ = "87U + 87R"
SV3PU = 0.00
SV3DO = 1.00
SET1 = 0
RST1 = 0
SET2 = 0
RST2 = 0
SET3 = 0
RST3 = 0
TDURD = 0.16
TR1$ = "SV2T + SV3T"
ULTR1$ = "TRGTR"
TR2 = 0
ULTR2 = 0
TR3 = 0
ULTR3 = 0
TR4 = 0
ULTR4 = 0
CLEN = 1
CL = 0
ULCL = 1
CLSD = 0.00
ER$ = "SV2 + SV3T + SV4T + SV5T + SV6T + SV7T"
OUT101$ = "TRIP1"
OUT102$ = "25A1 + (!27P1 * !59P1 * 27VS)"
OUT103 = 0
```

```
OUT104 = 0
OUT105 = 0
OUT106 = 0
OUT107 = 0
LER = 15
PRE = 4
FP_TO = 15
DATE_F$ = "MDY"
DCLOP$ = "OFF"
DCHIP$ = "OFF"
FNOM = 60
DELTA_Y$ = "Y"
TGR = 3
SS1 = 1
SS2 = 0
BKMON$ = "TRIP"
COSP1 = 10000
COSP2 = 150
COSP3 = 12
KASP1 = 1.2
KASP2 = 8.0
KASP3 = 20.0
IN101D = 0.50
IN102D = 0.50
IN103D = 0.50
IN104D = 0.50
IN105D = 0.50
IN106D = 0.50
NLB1$ = " "
NLB2$ = " "
NLB3$ = " "
NLB4$ = " "
NLB5$ = " "
NLB6$ = " "
NLB7$ = " "
NLB8$ = " "
NLB9$ = " "
NLB10$ = " "
NLB11$ = " "
NLB12$ = " "
NLB13$ = " "
NLB14$ = " "
NLB15$ = " "
NLB16$ = " "
FP_I$ = "Y"
FP_VPP$ = "Y"
FP_VP$ = "Y"
FP_MW$ = "Y"
FP_FR$ = "Y"
FP_87$ = "Y"
DP1$ = "IN101"
DP1_1$ = "GEN BKR CLOSED"
DP1_0$ = "GEN BKR OPEN"
DP2$ = "LT2"
DP2_1$ = "PHASEOVERCURRENT"
DP2_0$ = " "
DP3$ = "LT3"
DP3_1$ = "27_FAULT"
DP3_0$ = " "
DP4$ = "LT4"
DP4_1$ = "81U_FAULT"
DP4_0$ = " "
```

```
DP5$ = "LT5"
DP5_1$ = "87_DIFF_CUR_FLT"
DP5_0$ = " "
DP6$ = "LT6"
DP6_1$ = "59_FAULT"
DP6_0$ = " "
DP7$ = "LT7"
DP7_1$ = "81O_FAULT"
DP7_0$ = " "
DP8 = 0
DP8_1$ = " "
DP8_0$ = " "
DP9 = 0
DP9_1$ = " "
DP9_0$ = " "
DP10 = 0
DP10_1$ = " "
DP10_0$ = " "
DP11 = 0
DP11_1$ = " "
DP11_0$ = " "
DP12 = 0
DP12_1$ = " "
DP12_0$ = " "
DP13 = 0
DP13_1$ = " "
DP13_0$ = " "
DP14 = 0
DP14_1$ = " "
DP14_0$ = " "
DP15 = 0
DP15_1$ = " "
DP15_0$ = " "
DP16 = 0
DP16_1$ = " "
DP16_0$ = " "
P1_PROTO$ = "SEL"
P1_SPEED = 2400
P1_BITS = 8
P1_PARITY$ = "N"
P1_STOP = 1
P1_T_OUT = 15
P1_AUTO$ = "N"
P1_FASTOP$ = "N"
P2_PROTO$ = "SEL"
P2_SPEED = 2400
P2_BITS = 8
P2_PARITY$ = "N"
P2_STOP = 1
P2_T_OUT = 0
P2_AUTO$ = "N"
P2_RTSCTS$ = "N"
P2_FASTOP$ = "N"
P3_PROTO$ = "SEL"
P3_SPEED = 2400
P3_BITS = 8
P3_PARITY$ = "N"
P3_STOP = 1
P3_T_OUT = 15
P3_AUTO$ = "N"
P3_RTSCTS$ = "N"
P3_FASTOP$ = "N"
```

```
PF_PROTO$ = "SEL"
PF_SPEED = 19200
PF_BITS = 8
PF_PARITY$ = "N"
PF_STOP = 1
PF_T_OUT = 0
PF_AUTO$ = "N"
PF_RTSCTS$ = "N"
PF_FASTOP$ = "N"
```

Relay Test Results for: ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for: LOG INTO THE RELAY

OK?
RAN

Relay Test Results for: DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for: SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

N/A

Additional Data:

```
STA

GENERATOR #1                        Date: 03/04/20   Time: 08:44:15.668
TERMINAL

FID=SEL-300G-R331-V305325XX4XXX-Z303303-D20141017       CID=3A7F

SELF TESTS

W=Warn    F=Fail

       IA      IB      IC      IN      VA      VB      VC      VN      MOF
OS    -1      -2      -3      -2      -2      -3      -2      -3      -2

       IA87    IB87    IC87    VS
OS    -1      -2      -1      0

       +5V_PS  +5V_REG -5V_REG +12V_PS -12V_PS +15V_PS -15V_PS
PS      5.01    4.99   -4.95    12.08  -11.94   14.99  -15.12

       TEMP    RAM     ROM     A/D     CR_RAM  EEPROM  IO_BRD
        37.4   OK      OK      OK      OK      OK      OK

 Relay Enabled

=>>
```

Relay Test Results for: COMPONENT MAINTENANCE NOTES

OK?
RAN

Relay Test Results for: RELAY SETTING VERIFICATION

OK?
RAN

Relay Test Results for: CURRENT\VOLTAGE INJECTION TEST CONNECTIONS

Relay Test Results for: CURRENT\VOLTAGE INJECTION TEST CONNECTIONS

	OK? RAN

Relay Test Results for: CURRENT\VOLTAGE INJECTION METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
69.28	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	7.4	7.4	-0.1	72.0	72.0	-0.1	PASS
B-N	7.6	7.6	-0.1	80.0	79.8	-0.2	PASS
C-N	7.8	7.8	-0.1	88.0	87.8	-0.2	PASS

CALCULATED MEGA WATT	MEASURED MEGA WATT	% ERROR	CALCULATED MEGA VAR	MEASURED MEGA VAR	% ERROR	OK?
1.6	1.6	-0.3	0.9	0.9	-0.5	PASS

Relay Test Results for: RELAY OUTPUT VERIFICATION

Verify operation of the RELAY OUTPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that OUTPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Relay Test Results for: CURRENT SIGNAL VALUE VERIFICATION

Verify CURRENT SIGNAL VALUES are provided to the relay

(O) PASS

( ) FAIL

By selecting PASS you have determined that CURRENT SIGNAL VALUES are provided to the protective relay.

If selecting FAIL, add an explanation below.

NOTES:

Relay Test Results for: VOLTAGE SIGNAL VALUE VERIFICATION

Relay Test Results for: VOLTAGE SIGNAL VALUE VERIFICATION

Verify VOLTAGE SIGNAL VALUES are
provided to the relay

(O) PASS

( ) FAIL

By selecting PASS you have determined that VOLTAGE
SIGNAL VALUES are provided to the protective relay.

If selecting FAIL, add an explanation below.

NOTES:

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR DIFFERENTIAL TESTS

OK?
RAN

Relay Test Results for: <87 PHASE A DIFFERENTIAL TEST CONNECTIONS>

OK?
RAN

Relay Test Results for: U87P PHASE A CURRENT DIFFERENTIAL UNRESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	28.000	28.000	0.00	PASS

Relay Test Results for: U87P PHASE 87A CURRENT DIFFERENTIAL UNRESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	28.000	28.000	0.00	PASS

Relay Test Results for: O87P PHASE A CURRENT DIFFERENTIAL RESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.847	0.840	0.86	PASS

Relay Test Results for: O87P PHASE 87A CURRENT DIFFERENTIAL RESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.847	0.840	0.86	PASS

Relay Test Results for: 87 PHASE A CURRENT DIFFERENTIAL SLOPE 1 PERCENTAGE

RESTRAINT CURRENT	OPERATE CURRENT	IDEAL	RANGE	OK?
7.560	5.88	5.88	5.59 TO 6.17	PASS

Relay Test Results for: 87 PHASE A CURRENT DIFFERENTIAL SLOPE 2 PERCENTAGE

RESTRAINT CURRENT	OPERATE CURRENT	IDEAL	RANGE	OK?
11.970	6.83	6.83	6.48 TO 7.17	PASS

Relay Test Results for: <87 PHASE B DIFFERENTIAL TEST CONNECTIONS>

OK?
RAN

Relay Test Results for: U87P PHASE B CURRENT DIFFERENTIAL UNRESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	28.000	28.000	0.00	PASS

Relay Test Results for: U87P PHASE 87B CURRENT DIFFERENTIAL UNRESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	28.000	28.000	0.00	PASS

Relay Test Results for: O87P PHASE B CURRENT DIFFERENTIAL RESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.839	0.840	-0.14	PASS

Relay Test Results for: O87P PHASE 87B CURRENT DIFFERENTIAL RESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.847	0.840	0.86	PASS

Relay Test Results for: 87 PHASE B CURRENT DIFFERENTIAL SLOPE 1 PERCENTAGE

RESTRAINT CURRENT	OPERATE CURRENT	IDEAL	RANGE	OK?
7.560	5.88	5.88	5.59 TO 6.17	PASS

Relay Test Results for: 87 PHASE B CURRENT DIFFERENTIAL SLOPE 2 PERCENTAGE

RESTRAINT CURRENT	OPERATE CURRENT	IDEAL	RANGE	OK?
11.970	6.83	6.83	6.48 TO 7.17	PASS

Relay Test Results for: <87 PHASE C DIFFERENTIAL TEST CONNECTIONS>

OK?
RAN

Relay Test Results for: U87P PHASE C CURRENT DIFFERENTIAL UNRESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	28.000	28.000	0.00	PASS

Relay Test Results for: U87P PHASE 87C CURRENT DIFFERENTIAL UNRESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	28.000	28.000	0.00	PASS

Relay Test Results for: O87P PHASE C CURRENT DIFFERENTIAL RESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.847	0.840	0.86	PASS

Relay Test Results for: O87P PHASE 87C CURRENT DIFFERENTIAL RESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.847	0.840	0.86	PASS

Relay Test Results for: 87 PHASE C CURRENT DIFFERENTIAL SLOPE 1 PERCENTAGE

RESTRAINT CURRENT	OPERATE CURRENT	IDEAL	RANGE	OK?
7.560	5.94	5.88	5.59 TO 6.17	PASS

Relay Test Results for: 87 PHASE C CURRENT DIFFERENTIAL SLOPE 2 PERCENTAGE

RESTRAINT CURRENT	OPERATE CURRENT	IDEAL	RANGE	OK?
11.970	6.83	6.83	6.48 TO 7.17	PASS

Relay Test Results for: 50H1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		3.204	3.200	0.12	PASS
B-N		3.204	3.200	0.12	PASS
C-N		3.204	3.200	0.12	PASS

Relay Test Results for: 50H1D PHASE OVERCURRENT TIME DELAY

50H1D PHASE OVERCURRENT TIME DELAY (PHASE A-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	3.840	22.34	0.372	0.307 TO 0.393	PASS

50H1D PHASE OVERCURRENT TIME DELAY (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	3.840	22.31	0.372	0.307 TO 0.393	PASS

Relay Test Results for: 50H1D PHASE OVERCURRENT TIME DELAY

50H1D PHASE OVERCURRENT TIME DELAY (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	3.840	22.32	0.372	0.307 TO 0.393	PASS

Relay Test Results for: 50H2PA PHASE A OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	9.204	9.200	0.04	PASS

Relay Test Results for: 50H2PB PHASE B OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50H2PC PHASE C OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50H2D PHASE OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	11.040	9.60	0.160	0.099 TO 0.162	PASS

Relay Test Results for: 50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q1D NEGATIVE SEQUENCE OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q2D NEGATIVE SEQUENCE OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 50R1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	3.204	3.200	0.12	PASS

Relay Test Results for: 50R1D ZERO SEQUENCE OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	3.840	22.37	0.373	0.307 TO 0.393	PASS

Relay Test Results for: 50R2P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	9.204	9.200	0.04	PASS

Relay Test Results for: 50R2D ZERO SEQUENCE OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	11.040	9.25	0.154	0.099 TO 0.162	PASS

Relay Test Results for: CONNECTION CHANGE FOR ELEMENT TESTS

OK?
RAN

Relay Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
69.28	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	7.4	7.4	-0.1	72.0	72.0	-0.0	PASS
B-N	7.6	7.6	-0.0	80.0	79.9	-0.1	PASS
C-N	7.8	7.8	-0.1	88.0	87.9	-0.1	PASS

CALCULATED MEGA WATT	MEASURED MEGA WATT	% ERROR	CALCULATED MEGA VAR	MEASURED MEGA VAR	% ERROR	OK?
1.6	1.6	-0.1	0.9	0.9	-0.2	PASS

Relay Test Results for: Z1R ZONE 1 THREE PHASE MHO IMPEDANCE OK? RAN
Relay Test Results for: Z1O ZONE 1 THREE PHASE OFFSET MHO IMPEDANCE OK? RAN
Relay Test Results for: Z1D ZONE 1 THREE PHASE MHO IMPEDANCE TIME DELAY OK? RAN
Relay Test Results for: Z2R ZONE 2 THREE PHASE MHO IMPEDANCE OK? RAN
Relay Test Results for: Z2O ZONE 2 THREE PHASE OFFSET MHO IMPEDANCE OK? RAN
Relay Test Results for: Z2D ZONE 2 THREE PHASE MHO IMPEDANCE TIME DELAY OK? RAN
Relay Test Results for: Z1C ZONE 1 THREE PHASE COMPENSATOR MHO IMPEDANCE OK? RAN
Relay Test Results for: Z1CO ZONE 1 THREE PHASE COMPENSATOR OFFSET MHO IMPEDANCE OK? RAN
Relay Test Results for: Z1CD ZONE 1 THREE PHASE COMPENSATOR MHO IMPEDANCE TIME DE OK? RAN
Relay Test Results for: Z2C ZONE 2 THREE PHASE COMPENSATOR MHO IMPEDANCE OK? RAN
Relay Test Results for: Z2CO ZONE 2 THREE PHASE COMPENSATOR OFFSET MHO IMPEDANCE OK? RAN
Relay Test Results for: Z2CD ZONE 2 THREE PHASE COMPENSATOR MHO IMPEDANCE TIME DE OK? RAN
Relay Test Results for: 24D1P LEVEL 1 VOLTS PER HERTZ PICKUP OK? RAN
Relay Test Results for: 24D1D LEVEL 1 VOLTS PER HERTZ TIME DELAY OK? RAN
Relay Test Results for: 24D2P1 LEVEL 2 VOLTS PER HERTZ PICKUP OK? RAN
Relay Test Results for: 24D2D1 LEVEL 2 VOLTS PER HERTZ TIME DELAY OK? RAN
Relay Test Results for: 24D2D2 LEVEL 2 VOLTS PER HERTZ TIME DELAY OK? RAN
Relay Test Results for: 24IP (I) VOLTS PER HERTZ PICKUP OK? RAN
Relay Test Results for: 24IP (I) VOLTS PER HERTZ TIME CURVE

Relay Test Results for: 24IP (I) VOLTS PER HERTZ TIME CURVE

OK?
RAN

Relay Test Results for: 24IP (ID) VOLTS PER HERTZ PICKUP

OK?
RAN

Relay Test Results for: 24IP (ID) VOLTS PER HERTZ TIME CURVE

OK?
RAN

Relay Test Results for: 27P1P PHASE UNDERVOLTAGE PICKUP

PICKUP	VOLTS	IDEAL	%ERROR	OK?
	62.299	62.300	-0.00	PASS

Relay Test Results for: 27P2P PHASE UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 27V1P POSITIVE SEQUENCE UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 27PP1 PHASE TO PHASE UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 27PP2 PHASE TO PHASE UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 32P1P THREE PHASE POWER PICKUP

OK?
RAN

Relay Test Results for: 32P1D THREE PHASE POWER TIME DELAY

OK?
RAN

Relay Test Results for: 32P2P THREE PHASE POWER PICKUP

OK?
RAN

Relay Test Results for: 32P2D THREE PHASE POWER TIME DELAY

OK?
RAN

Relay Test Results for: 40Z1P LOSS OF FIELD IMPEDANCE

OK?
RAN

Relay Test Results for: 40Z1D LOSS OF FIELD TIME DELAY

OK?
RAN

Relay Test Results for: 40Z2P LOSS OF FIELD IMPEDANCE

OK?
RAN

Relay Test Results for: 40Z2D LOSS OF FIELD TIME DELAY

OK?
RAN

Relay Test Results for: 46Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 46Q1D NEGATIVE SEQUENCE OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 46Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

Relay Test Results for: 46Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 46Q2D NEGATIVE SEQUENCE OVERCURRENT TIME DELAY 100% INOM

OK?
RAN

Relay Test Results for: 46Q2D NEGATIVE SEQUENCE OVERCURRENT TIME DELAY 50% INOM

OK?
RAN

Relay Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		3.204	3.200	0.12	PASS
B-N		3.204	3.200	0.12	PASS
C-N		3.204	3.200	0.12	PASS

Relay Test Results for: 50P1D PHASE OVERCURRENT TIME DELAY

50P1D PHASE OVERCURRENT TIME DELAY (PHASE A-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	3.840	22.66	0.378	0.307 TO 0.393	PASS

50P1D PHASE OVERCURRENT TIME DELAY (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	3.840	22.45	0.374	0.307 TO 0.393	PASS

50P1D PHASE OVERCURRENT TIME DELAY (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	3.840	22.42	0.374	0.307 TO 0.393	PASS

Relay Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		9.204	9.200	0.04	PASS
B-N		9.204	9.200	0.04	PASS
C-N		9.204	9.200	0.04	PASS

Relay Test Results for: 50P2D PHASE OVERCURRENT TIME DELAY

50P2D PHASE OVERCURRENT TIME DELAY (PHASE A-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	11.040	9.61	0.160	0.099 TO 0.162	PASS

50P2D PHASE OVERCURRENT TIME DELAY (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	11.040	9.33	0.155	0.099 TO 0.162	PASS

50P2D PHASE OVERCURRENT TIME DELAY (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	11.040	9.50	0.158	0.099 TO 0.162	PASS

Relay Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	49.592	49.600	-0.02	PASS

Relay Test Results for: 50G1D ZERO SEQUENCE OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	59.520	13.43	0.224	0.165 TO 0.235	PASS

Relay Test Results for: 50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G2D ZERO SEQUENCE OVERCURRENT TIME DELAY

Relay Test Results for: 50G2D ZERO SEQUENCE OVERCURRENT TIME DELAY

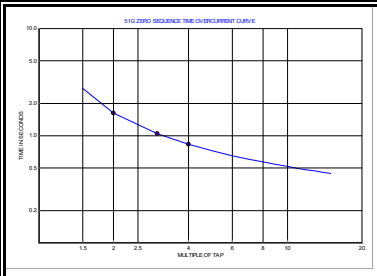
	OK?
	RAN

Relay Test Results for: 51GP ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	2.097	2.100	-0.14	PASS

Relay Test Results for: 51G ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.200	97.75	1.629	1.627	0.11	PASS
3.00	6.300	62.54	1.042	1.040	0.18	PASS
4.00	8.400	49.99	0.833	0.832	0.13	PASS



Relay Test Results for: 51VP VOLTAGE RESTRAINED TIME OVERCURRENT PICKUP 100% VNOM

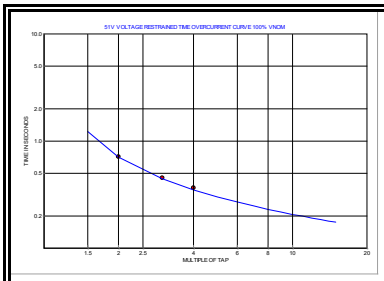
PICKUP	CURRENT	IDEAL	%ERROR	OK?
	3.505	3.500	0.14	PASS

Relay Test Results for: 51VP VOLTAGE RESTRAINED TIME OVERCURRENT PICKUP 75% VNOM

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	2.650	2.625	0.95	PASS

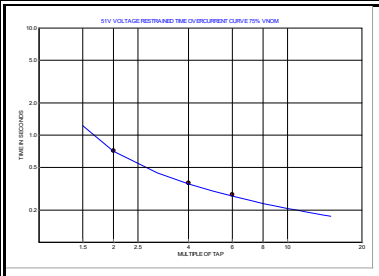
Relay Test Results for: 51V VOLTAGE RESTRAINED TIME OVERCURRENT CURVE 100% VNOM

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	7.000	43.00	0.717	0.711	0.75	PASS
3.00	10.500	27.15	0.453	0.445	1.64	PASS
4.00	14.000	21.88	0.365	0.351	3.97	PASS



Relay Test Results for: 51V VOLTAGE RESTRAINED TIME OVERCURRENT CURVE 75% VNOM

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	5.250	43.09	0.718	0.711	0.96	PASS
4.00	10.500	21.44	0.357	0.351	1.86	PASS
6.00	15.750	16.68	0.278	0.269	3.28	PASS



Relay Test Results for: 51CP PHASE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51C PHASE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 59P1P PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.204	76.200	0.01	PASS

Relay Test Results for: 59P2P PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59G1P ZERO SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59G2P ZERO SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59Q1P NEGATIVE SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59V1P POSITIVE SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59PP1 PHASE TO PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59PP2 PHASE TO PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 78 OUT OF STEP MHO ELEMENT

OK?
RAN

Relay Test Results for: 78 OUT OF STEP SINGLE BLINDER

OK?
RAN

Relay Test Results for: 78TD OUT OF STEP SINGLE BLINDER TIME DELAY

OK?
RAN

Relay Test Results for: 78 OUT OF STEP TWO BLINDER INNER OHMS

OK?
RAN

Relay Test Results for: 78 OUT OF STEP TWO BLINDER OUTER OHMS

OK?
RAN

Relay Test Results for: 78TD OUT OF STEP TWO BLINDER TIME DELAY

OK?
RAN

Relay Test Results for: 27B81P UNDERVOLTAGE FRQEUENCY BLOCK

PICKUP VOLTS	IDEAL	%ERROR	OK?
50.000	50.000	0.00	PASS

Relay Test Results for: 81D1P FRQEUENCY PICKUP

PICKUP HZ	IDEAL	RANGE	OK?
54.990	55.000	54.950 TO 55.050	PASS

Relay Test Results for: 81D1D FRQEUENCY TIME DELAY

APPLIED VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
54.500	14.98	0.275	0.200 TO 0.275	PASS

Relay Test Results for: 81D2P FRQEUENCY PICKUP

PICKUP HZ	IDEAL	RANGE	OK?
65.000	65.000	64.950 TO 65.050	PASS

Relay Test Results for: 81D2D FRQEUENCY TIME DELAY

APPLIED VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
65.200	17.29	0.265	0.200 TO 0.275	PASS

Relay Test Results for: 81D3P FRQEUENCY PICKUP

Relay Test Results for: 81D3P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for: 81D3D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for: 81D4P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for: 81D4D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for: 81D5P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for: 81D5D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for: 81D6P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for: 81D6D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR SYNCHRONIZING TESTS

OK?
RAN

Relay Test Results for: 27VSP SYNCHRONIZING PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
10.000	10.000	0.00	PASS

Relay Test Results for: 25VLO SOURCE VS SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.301	62.300	0.00	PASS

Relay Test Results for: 25VHI SOURCE VS SYNCHRONIZING PHASE HIGH VOLTAGE THRESHOL

PICKUP VOLTS	IDEAL	%ERROR	OK?
75.434	76.200	-1.01	PASS

Relay Test Results for: 25ANG1 SYNCHRONIZING ANGLE 1

LAGGING ANGLE	IDEAL	RANGE	OK?
16.00	15.00	11.00 TO 19.00	PASS

LEADING ANGLE	IDEAL	RANGE	OK?
346.00	345.00	341.00 TO 349.00	PASS

Relay Test Results for: 25ANG2 SYNCHRONIZING ANGLE 2

LAGGING ANGLE	IDEAL	RANGE	OK?
15.00	15.00	11.00 TO 19.00	PASS

LEADING ANGLE	IDEAL	RANGE	OK?
346.00	345.00	341.00 TO 349.00	PASS

Relay Test Results for: 25SLO MINIMUM SYNCHRONIZING SLIP FREQUENCY

DROPOUT HZ	IDEAL	RANGE	OK?
59.950	59.950	59.900 TO 60.000	PASS

Relay Test Results for: 25SHI MAXIMUM SYNCHRONIZING SLIP FREQUENCY

DROPOUT HZ	IDEAL	RANGE	OK?
60.100	60.100	60.050 TO 60.150	PASS

Relay Test Results for: CONNECTION CHANGE FOR NEUTRAL CURRENT TESTS

OK?
RAN

Relay Test Results for: 50N1P NEUTRAL OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	3.204	3.200	0.12	PASS

Relay Test Results for: 50N1D NEUTRAL OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	3.840	22.67	0.378	0.307 TO 0.393	PASS

Relay Test Results for: 50N2P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N2D NEUTRAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 51NP NEUTRAL TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N NEUTRAL TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR NEUTRAL VOLTAGE TESTS

OK?
RAN

Relay Test Results for: 64G1P STATOR NEUTRAL OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 64G1D STATOR NEUTRAL OVERVOLTAGE TIME DELAY

OK?
RAN

Relay Test Results for: 64G2P/64RAT STATOR VOLTAGE DIFFERENTIAL PICKUP

OK?
RAN

Relay Test Results for: 64G2D/64RAT STATOR VOLTAGE DIFFERENTIAL TIME DELAY

OK?
RAN

Relay Test Results for: 64G2P STATOR VOLTAGE DIFFERENTIAL PICKUP

OK?
RAN

Relay Test Results for: 64G2D STATOR VOLTAGE DIFFERENTIAL TIME DELAY

OK?
RAN

Relay Test Results for: RESTORE LOGIC SETTINGS

OK?
RAN

Relay Test Results for: RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

OK?
PASS

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

```
Additional Data:
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE
```

Relay Test Results for: LOG OUT OF THE RELAY

OK?
RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-300G.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 8.5 **Test Date:** 03/04/2020

Relay Data:

TESTED_BY:	KERRY HAYSLIP	SUBSTATION:	GEN
CUSTOMER:	CITY OF ANN ARBOR	USER:	ANN ARBOR WASTEWATER
LOCATION:	CEP	POSITION:	52G2
RELAY_MANF:	SEL	RELAY_TYPE:	SEL-300G
MODEL_STYLE:	0300G305325XX4XXX	IEEE_DEVICE:	MF
IL_IB:	SEL-300G	SERIAL_NUMBER:	1133040322
FIRMWARE:	SEL-300G-R331-V305325XX4XXX-Z303303-D20141017RELAY_ID:		
300G			
CURRENT_TESTDATE:	3/4/2020	TESTSET_CALDATE:	10/29/2019

Global Defines:

```
BAC$="EDITH"          'BREAKER ACCESS LEVEL TO CHANGE GROUPS
SET_GROUP$="1"        'RELAY SET GROUP TO TEST
CONTACT$="107"        'OUTPUT CONTACT TO MASK
SEL_AUTO=1            '0=MANUAL, 1=AUTO MASK, 2=MANUAL W/MESSAGES
SKIP_TST=1            'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1              'NO ERROR MESSAGE IF NO OPERATION
NORM_FREQ=60          'NORMAL VOLTAGE FREQUENCY
```

Routine Notes:

Relay Settings Used for Testing:

```
RID$ = "GENERATOR #2"
TID$ = "TERMINAL"
CTR = 40
CTRD = 40
CTRN = 40
PTR = 110.00
PTRN = 110.00
PTRS = 100.00
VNOM = 120.0
INOM = 2.8
PHROT$ = "ABC"
EBUP$ = "V"
E24$ = "N"
E25$ = "Y"
E27$ = "Y"
E32$ = "N"
E40$ = "N"
E46$ = "N"
E50$ = "Y"
E50_87$ = "Y"
E51$ = "Y"
E59$ = "Y"
E64$ = "N"
E78$ = "N"
E81 = 6
E81AC$ = "N"
E87$ = "G"
ESV = 3
ESL = 3
EDEM$ = "ROL"
SYNCP$ = "VA"
```

```
s25VLO = 62.3
s25VHI = 76.2
s25VDIF = 10.0
s25RCF = 1.000
GENV_$ = "N"
s25SLO = -0.05
s25SHI = 0.10
COMPA = 0
s25ANG1 = 15
s25ANG2 = 15
CANGLE = -3
TCLOSD = 0.150
CFANGL = 30
s27VSP = 10.0
BSYNCH$ = "IN101"
s27P1P = 62.3
s27P2P$ = "OFF"
s27V1P$ = "OFF"
s27PP1$ = "OFF"
s27PP2$ = "OFF"
s50P1P = 3.20
s50P1D = 0.35
s50P2P = 9.20
s50P2D = 0.13
s50N1P = 3.20
s50N1D = 0.35
s50N2P$ = "OFF"
s50G1P = 49.60
s50G1D = 0.20
s50G2P$ = "OFF"
s50H1P = 3.20
s50H1D = 0.35
s50H2PA = 9.20
s50H2PB = 9.20
s50H2PC = 9.20
s50H2D = 0.13
s50Q1P$ = "OFF"
s50Q2P$ = "OFF"
s50R1P = 3.20
s50R1D = 0.35
s50R2P = 9.20
s50R2D = 0.13
s51NP$ = "OFF"
s51GP = 2.10
s51GC$ = "U1"
s51GTD = 2.12
s51GRS$ = "N"
s51GTC = 1
s51VCA = 0
s51VP = 3.50
s51VC$ = "C5"
s51VTD = 0.40
s51VRS$ = "N"
s51VTC$ = "IN101"
s3POD = 0.00
s50LP = 0.25
s52A$ = "IN101"
s59P1P = 76.2
s59P2P$ = "OFF"
s59G1P$ = "OFF"
s59G2P$ = "OFF"
s59QP$ = "OFF"
s59V1P$ = "OFF"
```

```
s59PP1$ = "OFF"
s59PP2$ = "OFF"
s64FOPT$ = "NONE"
s27B81P = 50.00
s81D1P = 55.00
s81D1D = 0.20
s81D2P = 65.00
s81D2D = 0.20
s81D3P$ = "OFF"
s81D4P$ = "OFF"
s81D5P$ = "OFF"
s81D6P$ = "OFF"
TAP1 = 2.80
TAPD = 2.80
U87P = 10.0
O87P = 0.30
SLP1 = 25
s87B = 0
HSM$ = "(DRDOPT + HRT) * !RHSM"
O87P2 = 1.25
HSMDOT = 10.00
DMTC = 15
PDEMP = 5.50
NDEMP = 1.00
GDEMP = 1.00
QDEMP = 2.50
INAD$ = "SV2T * 50L"
INADPU = 0.25
INADDO = 0.13
SV1 = 0
SV1PU = 0.00
SV1DO = 0.00
SV2$ = "IN101 * (50P1T + 50P2T + 50N1T + 50G1T + 51VT) "
SV2PU = 0.00
SV2DO = 1.00
SV3$ = "87U + 87R"
SV3PU = 0.00
SV3DO = 1.00
SET1 = 0
RST1 = 0
SET2 = 0
RST2 = 0
SET3 = 0
RST3 = 0
TDURD = 0.16
TR1$ = "SV2T + SV3T"
ULTR1$ = "TRGTR"
TR2 = 0
ULTR2 = 0
TR3 = 0
ULTR3 = 0
TR4 = 0
ULTR4 = 0
CLEN = 1
CL = 0
ULCL = 1
CLSD = 0.00
ER$ = "SV2 + SV3T + SV4T + SV5T + SV6T + SV7T"
OUT101$ = "TRIP1"
OUT102$ = "25A1 + (!27P1 * !59P1 * 27VS)"
OUT103 = 0
OUT104 = 0
OUT105 = 0
```

```
OUT106 = 0
OUT107 = 0
LER = 15
PRE = 4
FP_TO = 15
DATE_F$ = "MDY"
DCLOP$ = "OFF"
DCHIP$ = "OFF"
FNOM = 60
DELTA_Y$ = "Y"
TGR = 3
SS1 = 1
SS2 = 0
BKMON$ = "TRIP"
COSP1 = 10000
COSP2 = 150
COSP3 = 12
KASP1 = 1.2
KASP2 = 8.0
KASP3 = 20.0
IN101D = 0.50
IN102D = 0.50
IN103D = 0.50
IN104D = 0.50
IN105D = 0.50
IN106D = 0.50
NLB1$ = " "
NLB2$ = " "
NLB3$ = " "
NLB4$ = " "
NLB5$ = " "
NLB6$ = " "
NLB7$ = " "
NLB8$ = " "
NLB9$ = " "
NLB10$ = " "
NLB11$ = " "
NLB12$ = " "
NLB13$ = " "
NLB14$ = " "
NLB15$ = " "
NLB16$ = " "
FP_I$ = "Y"
FP_VPP$ = "Y"
FP_VP$ = "Y"
FP_MW$ = "Y"
FP_FR$ = "Y"
FP_87$ = "Y"
DP1$ = "IN101"
DP1_1$ = "GEN BKR CLOSED"
DP1_0$ = "GEN BKR OPEN"
DP2$ = "LT2"
DP2_1$ = "PHASEOVERCURRENT"
DP2_0$ = " "
DP3$ = "LT3"
DP3_1$ = "27_FAULT"
DP3_0$ = " "
DP4$ = "LT4"
DP4_1$ = "81U_FAULT"
DP4_0$ = " "
DP5$ = "LT5"
DP5_1$ = "87_DIFF_CUR_FLT"
DP5_0$ = " "
```

```
DP6$ = "LT6"
DP6_1$ = "59_FAULT"
DP6_0$ = " "
DP7$ = "LT7"
DP7_1$ = "81O_FAULT"
DP7_0$ = " "
DP8 = 0
DP8_1$ = " "
DP8_0$ = " "
DP9 = 0
DP9_1$ = " "
DP9_0$ = " "
DP10 = 0
DP10_1$ = " "
DP10_0$ = " "
DP11 = 0
DP11_1$ = " "
DP11_0$ = " "
DP12 = 0
DP12_1$ = " "
DP12_0$ = " "
DP13 = 0
DP13_1$ = " "
DP13_0$ = " "
DP14 = 0
DP14_1$ = " "
DP14_0$ = " "
DP15 = 0
DP15_1$ = " "
DP15_0$ = " "
DP16 = 0
DP16_1$ = " "
DP16_0$ = " "
P1_PROTO$ = "SEL"
P1_SPEED = 2400
P1_BITS = 8
P1_PARITY$ = "N"
P1_STOP = 1
P1_T_OUT = 15
P1_AUTO$ = "N"
P1_FASTOP$ = "N"
P2_PROTO$ = "SEL"
P2_SPEED = 2400
P2_BITS = 8
P2_PARITY$ = "N"
P2_STOP = 1
P2_T_OUT = 0
P2_AUTO$ = "N"
P2_RTSCTS$ = "N"
P2_FASTOP$ = "N"
P3_PROTO$ = "SEL"
P3_SPEED = 2400
P3_BITS = 8
P3_PARITY$ = "N"
P3_STOP = 1
P3_T_OUT = 15
P3_AUTO$ = "N"
P3_RTSCTS$ = "N"
P3_FASTOP$ = "N"
PF_PROTO$ = "SEL"
PF_SPEED = 19200
PF_BITS = 8
PF_PARITY$ = "N"
```

```
PF_STOP = 1
PF_T_OUT = 15
PF_AUTO$ = "N"
PF_RTSCTS$ = "N"
PF_FASTOP$ = "N"
```

Relay Test Results for: ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for: LOG INTO THE RELAY

OK?
RAN

Relay Test Results for: DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for: SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

GENERATOR #2                        Date: 03/04/20   Time: 11:47:30.174
TERMINAL

FID=SEL-300G-R331-V305325XX4XXX-Z303303-D20141017       CID=3A7F

SELF TESTS

W=Warn    F=Fail

       IA      IB      IC      IN      VA      VB      VC      VN      MOF
OS     0       1       2       1       2       1      -0      -1       0

       IA87    IB87    IC87    VS
OS     1       0       2       0

       +5V_PS  +5V_REG -5V_REG +12V_PS -12V_PS +15V_PS -15V_PS
PS      5.02    4.96   -4.97    12.11  -11.84   15.01  -15.06

       TEMP    RAM     ROM     A/D     CR_RAM  EEPROM  IO_BRD
        37.6   OK      OK      OK      OK      OK      OK

 Relay Enabled

=>>
```

Relay Test Results for: COMPONENT MAINTENANCE NOTES

OK?
RAN

Relay Test Results for: CURRENT\VOLTAGE INJECTION TEST CONNECTIONS

OK?
RAN

Relay Test Results for: CURRENT\VOLTAGE INJECTION METER TEST

Relay Test Results for: CURRENT\VOLTAGE INJECTION METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
69.28	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	7.4	7.4	-0.0	72.0	72.0	0.0	PASS
B-N	7.6	7.6	-0.0	80.0	79.9	-0.1	PASS
C-N	7.8	7.8	-0.0	88.0	87.9	-0.1	PASS

CALCULATED MEGA WATT	MEASURED MEGA WATT	% ERROR	CALCULATED MEGA VAR	MEASURED MEGA VAR	% ERROR	OK?
1.6	1.6	0.1	0.9	0.9	-0.2	PASS

Relay Test Results for: RELAY OUTPUT VERIFICATION

Verify operation of the RELAY OUTPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that OUTPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Relay Test Results for: CURRENT SIGNAL VALUE VERIFICATION

Verify CURRENT SIGNAL VALUES are provided to the relay

(O) PASS

( ) FAIL

By selecting PASS you have determined that CURRENT SIGNAL VALUES are provided to the protective relay.

If selecting FAIL, add an explanation below.

NOTES:

Relay Test Results for: VOLTAGE SIGNAL VALUE VERIFICATION

Verify VOLTAGE SIGNAL VALUES are provided to the relay

(O) PASS

( ) FAIL

By selecting PASS you have determined that VOLTAGE SIGNAL VALUES are provided to the protective relay.

If selecting FAIL, add an explanation below.

NOTES:

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR DIFFERENTIAL TESTS

OK?
RAN

Relay Test Results for: <87 PHASE A DIFFERENTIAL TEST CONNECTIONS>

OK?
RAN

Relay Test Results for: U87P PHASE A CURRENT DIFFERENTIAL UNRESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	28.280	28.000	1.00	PASS

Relay Test Results for: U87P PHASE 87A CURRENT DIFFERENTIAL UNRESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	28.280	28.000	1.00	PASS

Relay Test Results for: O87P PHASE A CURRENT DIFFERENTIAL RESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.847	0.840	0.86	PASS

Relay Test Results for: O87P PHASE 87A CURRENT DIFFERENTIAL RESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.847	0.840	0.86	PASS

Relay Test Results for: 87 PHASE A CURRENT DIFFERENTIAL SLOPE 1 PERCENTAGE

RESTRAINT CURRENT	OPERATE CURRENT	IDEAL	RANGE	OK?
7.560	5.88	5.88	5.59 TO 6.17	PASS

Relay Test Results for: 87 PHASE A CURRENT DIFFERENTIAL SLOPE 2 PERCENTAGE

RESTRAINT CURRENT	OPERATE CURRENT	IDEAL	RANGE	OK?
11.970	6.83	6.82	6.48 TO 7.17	PASS

Relay Test Results for: <87 PHASE B DIFFERENTIAL TEST CONNECTIONS>

OK?
RAN

Relay Test Results for: U87P PHASE B CURRENT DIFFERENTIAL UNRESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	28.000	28.000	0.00	PASS

Relay Test Results for: U87P PHASE 87B CURRENT DIFFERENTIAL UNRESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	28.280	28.000	1.00	PASS

Relay Test Results for: O87P PHASE B CURRENT DIFFERENTIAL RESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.847	0.840	0.86	PASS

Relay Test Results for: O87P PHASE 87B CURRENT DIFFERENTIAL RESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.847	0.840	0.86	PASS

Relay Test Results for: 87 PHASE B CURRENT DIFFERENTIAL SLOPE 1 PERCENTAGE

Relay Test Results for: 87 PHASE B CURRENT DIFFERENTIAL SLOPE 1 PERCENTAGE

RESTRAINT CURRENT	OPERATE CURRENT	IDEAL	RANGE	OK?
7.560	5.88	5.88	5.59 TO 6.17	PASS

Relay Test Results for: 87 PHASE B CURRENT DIFFERENTIAL SLOPE 2 PERCENTAGE

RESTRAINT CURRENT	OPERATE CURRENT	IDEAL	RANGE	OK?
11.970	6.83	6.82	6.48 TO 7.17	PASS

Relay Test Results for: <87 PHASE C DIFFERENTIAL TEST CONNECTIONS>

OK?
RAN

Relay Test Results for: U87P PHASE C CURRENT DIFFERENTIAL UNRESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	28.000	28.000	0.00	PASS

Relay Test Results for: U87P PHASE 87C CURRENT DIFFERENTIAL UNRESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	28.280	28.000	1.00	PASS

Relay Test Results for: O87P PHASE C CURRENT DIFFERENTIAL RESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.847	0.840	0.86	PASS

Relay Test Results for: O87P PHASE 87C CURRENT DIFFERENTIAL RESTRAINED PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.847	0.840	0.86	PASS

Relay Test Results for: 87 PHASE C CURRENT DIFFERENTIAL SLOPE 1 PERCENTAGE

RESTRAINT CURRENT	OPERATE CURRENT	IDEAL	RANGE	OK?
7.560	5.88	5.88	5.59 TO 6.17	PASS

Relay Test Results for: 87 PHASE C CURRENT DIFFERENTIAL SLOPE 2 PERCENTAGE

RESTRAINT CURRENT	OPERATE CURRENT	IDEAL	RANGE	OK?
11.970	6.83	6.82	6.48 TO 7.17	PASS

Relay Test Results for: <50 OVERCURRENT TEST CONNECTIONS>

OK?
RAN

Relay Test Results for: 50H1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		3.204	3.200	0.12	PASS
B-N		3.204	3.200	0.12	PASS
C-N		3.204	3.200	0.12	PASS

Relay Test Results for: 50H1D PHASE OVERCURRENT TIME DELAY

50H1D PHASE OVERCURRENT TIME DELAY (PHASE A-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	3.840	22.38	0.373	0.307 TO 0.393	PASS

50H1D PHASE OVERCURRENT TIME DELAY (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	3.840	22.28	0.371	0.308 TO 0.392	PASS

50H1D PHASE OVERCURRENT TIME DELAY (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	3.840	22.51	0.375	0.308 TO 0.392	PASS

Relay Test Results for: 50H2PA PHASE A OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	9.204	9.200	0.04	PASS

Relay Test Results for: 50H2PB PHASE B OVERCURRENT PICKUP

Relay Test Results for: 50H2PB PHASE B OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50H2PC PHASE C OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50H2D PHASE OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	11.040	9.61	0.160	0.098 TO 0.162	PASS

Relay Test Results for: 50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q1D NEGATIVE SEQUENCE OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q2D NEGATIVE SEQUENCE OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 50R1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	3.204	3.200	0.12	PASS

Relay Test Results for: 50R1D ZERO SEQUENCE OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	3.840	22.40	0.373	0.308 TO 0.392	PASS

Relay Test Results for: 50R2P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	9.204	9.200	0.04	PASS

Relay Test Results for: 50R2D ZERO SEQUENCE OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	11.040	9.46	0.158	0.098 TO 0.162	PASS

Relay Test Results for: CONNECTION CHANGE FOR ELEMENT TESTS

OK?
RAN

Relay Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
69.28	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	7.4	7.4	-0.0	72.0	72.0	-0.0	PASS
B-N	7.6	7.6	-0.0	80.0	80.0	-0.0	PASS
C-N	7.8	7.8	-0.0	88.0	88.0	-0.1	PASS

CALCULATED MEGA WATT	MEASURED MEGA WATT	% ERROR	CALCULATED MEGA VAR	MEASURED MEGA VAR	% ERROR	OK?
1.6	1.6	0.1	0.9	0.9	-0.2	PASS

Relay Test Results for: Z1R ZONE 1 THREE PHASE MHO IMPEDANCE

OK?
RAN

Relay Test Results for: Z1O ZONE 1 THREE PHASE OFFSET MHO IMPEDANCE

OK?
RAN

Relay Test Results for: Z1D ZONE 1 THREE PHASE MHO IMPEDANCE TIME DELAY

Relay Test Results for:	Z1D ZONE 1 THREE PHASE MHO IMPEDANCE TIME DELAY
	OK? RAN
Relay Test Results for:	Z2R ZONE 2 THREE PHASE MHO IMPEDANCE
	OK? RAN
Relay Test Results for:	Z2O ZONE 2 THREE PHASE OFFSET MHO IMPEDANCE
	OK? RAN
Relay Test Results for:	Z2D ZONE 2 THREE PHASE MHO IMPEDANCE TIME DELAY
	OK? RAN
Relay Test Results for:	Z1C ZONE 1 THREE PHASE COMPENSATOR MHO IMPEDANCE
	OK? RAN
Relay Test Results for:	Z1CO ZONE 1 THREE PHASE COMPENSATOR OFFSET MHO IMPEDANCE
	OK? RAN
Relay Test Results for:	Z1CD ZONE 1 THREE PHASE COMPENSATOR MHO IMPEDANCE TIME DEl
	OK? RAN
Relay Test Results for:	Z2C ZONE 2 THREE PHASE COMPENSATOR MHO IMPEDANCE
	OK? RAN
Relay Test Results for:	Z2CO ZONE 2 THREE PHASE COMPENSATOR OFFSET MHO IMPEDANCE
	OK? RAN
Relay Test Results for:	Z2CD ZONE 2 THREE PHASE COMPENSATOR MHO IMPEDANCE TIME DEl
	OK? RAN
Relay Test Results for:	24D1P LEVEL 1 VOLTS PER HERTZ PICKUP
	OK? RAN
Relay Test Results for:	24D1D LEVEL 1 VOLTS PER HERTZ TIME DELAY
	OK? RAN
Relay Test Results for:	24D2P1 LEVEL 2 VOLTS PER HERTZ PICKUP
	OK? RAN
Relay Test Results for:	24D2D1 LEVEL 2 VOLTS PER HERTZ TIME DELAY
	OK? RAN
Relay Test Results for:	24D2D2 LEVEL 2 VOLTS PER HERTZ TIME DELAY
	OK? RAN
Relay Test Results for:	24IP (I) VOLTS PER HERTZ PICKUP
	OK? RAN
Relay Test Results for:	24IP (I) VOLTS PER HERTZ TIME CURVE
	OK? RAN
Relay Test Results for:	24IP (ID) VOLTS PER HERTZ PICKUP
	OK? RAN
Relay Test Results for:	24IP (ID) VOLTS PER HERTZ TIME CURVE

Relay Test Results for: 24IP (ID) VOLTS PER HERTZ TIME CURVE

OK?
RAN

Relay Test Results for: 27P1P PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
61.676	62.300	-1.00	PASS

Relay Test Results for: 27P2P PHASE UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 27V1P POSITIVE SEQUENCE UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 27PP1 PHASE TO PHASE UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 27PP2 PHASE TO PHASE UNDERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 32P1P THREE PHASE POWER PICKUP

OK?
RAN

Relay Test Results for: 32P1D THREE PHASE POWER TIME DELAY

OK?
RAN

Relay Test Results for: 32P2P THREE PHASE POWER PICKUP

OK?
RAN

Relay Test Results for: 32P2D THREE PHASE POWER TIME DELAY

OK?
RAN

Relay Test Results for: 40Z1P LOSS OF FIELD IMPEDANCE

OK?
RAN

Relay Test Results for: 40Z1D LOSS OF FIELD TIME DELAY

OK?
RAN

Relay Test Results for: 40Z2P LOSS OF FIELD IMPEDANCE

OK?
RAN

Relay Test Results for: 40Z2D LOSS OF FIELD TIME DELAY

OK?
RAN

Relay Test Results for: 46Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 46Q1D NEGATIVE SEQUENCE OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 46Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 46Q2D NEGATIVE SEQUENCE OVERCURRENT TIME DELAY 100% INOM

OK?
RAN

Relay Test Results for: 46Q2D NEGATIVE SEQUENCE OVERCURRENT TIME DELAY 50% INOM

Relay Test Results for: 46Q2D NEGATIVE SEQUENCE OVERCURRENT TIME DELAY 50% INOM

OK?
RAN

Relay Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		3.204	3.200	0.12	PASS
B-N		3.204	3.200	0.12	PASS
C-N		3.204	3.200	0.12	PASS

Relay Test Results for: 50P1D PHASE OVERCURRENT TIME DELAY

50P1D PHASE OVERCURRENT TIME DELAY (PHASE A-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	3.840	22.60	0.377	0.308 TO 0.392	PASS

50P1D PHASE OVERCURRENT TIME DELAY (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	3.840	22.36	0.373	0.308 TO 0.392	PASS

50P1D PHASE OVERCURRENT TIME DELAY (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	3.840	22.32	0.372	0.307 TO 0.393	PASS

Relay Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		9.204	9.200	0.04	PASS
B-N		9.204	9.200	0.04	PASS
C-N		9.204	9.200	0.04	PASS

Relay Test Results for: 50P2D PHASE OVERCURRENT TIME DELAY

50P2D PHASE OVERCURRENT TIME DELAY (PHASE A-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	11.040	9.59	0.160	0.098 TO 0.162	PASS

50P2D PHASE OVERCURRENT TIME DELAY (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	11.040	9.44	0.157	0.098 TO 0.162	PASS

50P2D PHASE OVERCURRENT TIME DELAY (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	11.040	9.26	0.154	0.098 TO 0.162	PASS

Relay Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	49.592	49.600	-0.02	PASS

Relay Test Results for: 50G1D ZERO SEQUENCE OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	59.520	13.46	0.224	0.165 TO 0.235	PASS

Relay Test Results for: 50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G2D ZERO SEQUENCE OVERCURRENT TIME DELAY

OK?
RAN

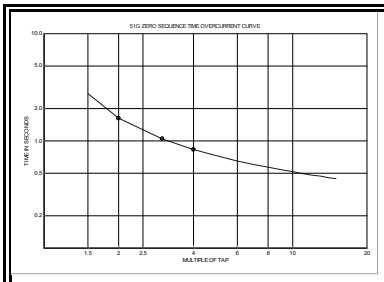
Relay Test Results for: 51GP ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	2.097	2.100	-0.14	PASS

Relay Test Results for: 51G ZERO SEQUENCE TIME OVERCURRENT CURVE

Relay Test Results for: 51G ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	4.200	97.79	1.630	1.627	0.16	PASS
3.00	6.300	62.35	1.039	1.040	-0.11	PASS
4.00	8.400	49.86	0.831	0.832	-0.14	PASS



Relay Test Results for: 51VP VOLTAGE RESTRAINED TIME OVERCURRENT PICKUP 100% VNOM

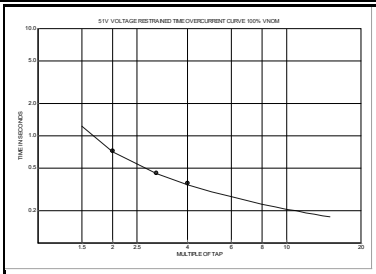
PICKUP	CURRENT	IDEAL	%ERROR	OK?
	3.505	3.500	0.14	PASS

Relay Test Results for: 51VP VOLTAGE RESTRAINED TIME OVERCURRENT PICKUP 75% VNOM

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	2.650	2.625	0.95	PASS

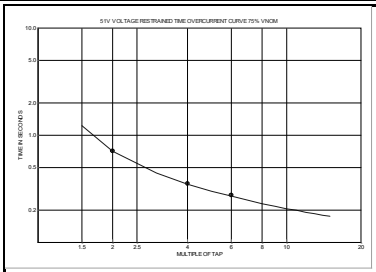
Relay Test Results for: 51V VOLTAGE RESTRAINED TIME OVERCURRENT CURVE 100% VNOM

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	7.000	43.16	0.719	0.711	1.13	PASS
3.00	10.500	27.08	0.451	0.445	1.39	PASS
4.00	14.000	21.66	0.361	0.351	2.92	PASS



Relay Test Results for: 51V VOLTAGE RESTRAINED TIME OVERCURRENT CURVE 75% VNOM

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	5.250	43.05	0.718	0.711	0.86	PASS
4.00	10.500	21.25	0.354	0.351	0.95	PASS
6.00	15.750	16.64	0.277	0.269	3.06	PASS



Relay Test Results for: 51CP PHASE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51C PHASE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 59P1P PHASE OVERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
76.204	76.200	0.01	PASS

Relay Test Results for: 59P2P PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59G1P ZERO SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59G2P ZERO SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59Q1P NEGATIVE SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59V1P POSITIVE SEQUENCE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59PP1 PHASE TO PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 59PP2 PHASE TO PHASE OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 78 OUT OF STEP MHO ELEMENT

OK?
RAN

Relay Test Results for: 78 OUT OF STEP SINGLE BLINDER

OK?
RAN

Relay Test Results for: 78TD OUT OF STEP SINGLE BLINDER TIME DELAY

OK?
RAN

Relay Test Results for: 78 OUT OF STEP TWO BLINDER INNER OHMS

OK?
RAN

Relay Test Results for: 78 OUT OF STEP TWO BLINDER OUTER OHMS

OK?
RAN

Relay Test Results for: 78TD OUT OF STEP TWO BLINDER TIME DELAY

OK?
RAN

Relay Test Results for: 27B81P UNDERVOLTAGE FRQEUENCY BLOCK

PICKUP VOLTS	IDEAL	%ERROR	OK?
50.000	50.000	0.00	PASS

Relay Test Results for: 81D1P FRQEUENCY PICKUP

PICKUP HZ	IDEAL	RANGE	OK?
54.990	55.000	54.950 TO 55.050	PASS

Relay Test Results for: 81D1D FRQEUENCY TIME DELAY

APPLIED VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
54.500	14.92	0.274	0.200 TO 0.275	PASS

Relay Test Results for: 81D2P FRQEUENCY PICKUP

PICKUP HZ	IDEAL	RANGE	OK?
65.000	65.000	64.950 TO 65.050	PASS

Relay Test Results for: 81D2D FRQEUENCY TIME DELAY

APPLIED VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
65.500	17.58	0.268	0.200 TO 0.275	PASS

Relay Test Results for: 81D3P FRQEUENCY PICKUP

Relay Test Results for: 81D3P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for: 81D3D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for: 81D4P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for: 81D4D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for: 81D5P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for: 81D5D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for: 81D6P FRQEUENCY PICKUP

OK?
RAN

Relay Test Results for: 81D6D FRQEUENCY TIME DELAY

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR SYNCHRONIZING TESTS

OK?
RAN

Relay Test Results for: 27VSP SYNCHRONIZING PHASE UNDERVOLTAGE PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
9.900	10.000	-1.00	PASS

Relay Test Results for: 25VLO SOURCE VS SYNCHRONIZING PHASE LOW VOLTAGE THRESHOLD

PICKUP VOLTS	IDEAL	%ERROR	OK?
62.301	62.300	0.00	PASS

Relay Test Results for: 25VHI SOURCE VS SYNCHRONIZING PHASE HIGH VOLTAGE THRESHOLI

PICKUP VOLTS	IDEAL	%ERROR	OK?
75.434	76.200	-1.01	PASS

Relay Test Results for: 25ANG1 SYNCHRONIZING ANGLE 1

LAGGING ANGLE	IDEAL	RANGE	OK?
15.00	15.00	11.00 TO 19.00	PASS

LEADING ANGLE	IDEAL	RANGE	OK?
345.00	345.00	341.00 TO 349.00	PASS

Relay Test Results for: 25ANG2 SYNCHRONIZING ANGLE 2

LAGGING ANGLE	IDEAL	RANGE	OK?
15.00	15.00	11.00 TO 19.00	PASS

LEADING ANGLE	IDEAL	RANGE	OK?
346.00	345.00	341.00 TO 349.00	PASS

Relay Test Results for: 25SLO MINIMUM SYNCHRONIZING SLIP FREQUENCY

DROPOUT HZ	IDEAL	RANGE	OK?
59.950	59.950	59.900 TO 60.000	PASS

Relay Test Results for: 25SHI MAXIMUM SYNCHRONIZING SLIP FREQUENCY

DROPOUT HZ	IDEAL	RANGE	OK?
60.100	60.100	60.050 TO 60.150	PASS

Relay Test Results for: CONNECTION CHANGE FOR NEUTRAL CURRENT TESTS

OK?
RAN

Relay Test Results for: 50N1P NEUTRAL OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	3.204	3.200	0.12	PASS

Relay Test Results for: 50N1D NEUTRAL OVERCURRENT TIME DELAY

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	RANGE	OK?
1.20	3.840	22.45	0.374	0.308 TO 0.392	PASS

Relay Test Results for: 50N2P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N2D NEUTRAL OVERCURRENT TIME DELAY

OK?
RAN

Relay Test Results for: 51NP NEUTRAL TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N NEUTRAL TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR NEUTRAL VOLTAGE TESTS

OK?
RAN

Relay Test Results for: 64G1P STATOR NEUTRAL OVERVOLTAGE PICKUP

OK?
RAN

Relay Test Results for: 64G1D STATOR NEUTRAL OVERVOLTAGE TIME DELAY

OK?
RAN

Relay Test Results for: 64G2P/64RAT STATOR VOLTAGE DIFFERENTIAL PICKUP

OK?
RAN

Relay Test Results for: 64G2D/64RAT STATOR VOLTAGE DIFFERENTIAL TIME DELAY

OK?
RAN

Relay Test Results for: 64G2P STATOR VOLTAGE DIFFERENTIAL PICKUP

OK?
RAN

Relay Test Results for: 64G2D STATOR VOLTAGE DIFFERENTIAL TIME DELAY

OK?
RAN

Relay Test Results for: RESTORE LOGIC SETTINGS

OK?
RAN

Relay Test Results for: RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

OK?
PASS

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

```
Additional Data:
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE
```

Relay Test Results for: LOG OUT OF THE RELAY

OK?
RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-551.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 8.2 **Test Date:** 03/11/2020

Relay Data:

```
0:                                  TESTED_BY:        RICK WALLS
DIVISION:         UIS               SUBSTATION:       13.3KV
CUSTOMER:         AACI207024        USER:             AAWWTP
LOCATION:         CEB               POSITION:         52F18 UNIT SUB 8-EBB
RELAY_MANF:       SEL               RELAY_TYPE:       SEL-551
MODEL_STYLE:      0551003X551X      IEEE_DEVICE:      MF
IL_IB:            SEL-551           SERIAL_NUMBER:    1132620121
FIRMWARE:         SEL-551-R514-VF-Z002002-D20110408RELAY_ID:         SEL-
551
CURRENT_TESTDATE: 3/11/2020         TESTSET_CALDATE:  10/29/2020
APPROVED_BY:      R WALLS
```

Global Defines:

```
CONTACT$="4"          'OUTPUT CONTACT TO MASK
SEL_AUTO=1            '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION
MESSAGES
SKIP_TST=1            'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1              'NO ERROR MESSAGE IF NO OPERATION
```

Routine Notes:

Relay Settings Used for Testing:

```
RID$ = "FDR-52F18"
TID$ = "SUB 8 EBB"
CTR = 120
CTRN = 120
TDURD = 9.000
s50P1P = 12.4
s50P2P = 3.0
s50P3P$ = "OFF"
s50P4P$ = "OFF"
s50P5P$ = "OFF"
s50P6P$ = "OFF"
s50ABCP$ = "OFF"
s51P1P = 1.1
s51P1C$ = "C3"
s51P1TD = 0.37
s51P1RS$ = "N"
s51P2P$ = "OFF"
s51P2C$ = "U3"
s51P2TD = 15.00
s51P2RS$ = "N"
s50N1P$ = "OFF"
s50N2P$ = "OFF"
s51N1P$ = "OFF"
s51N1C$ = "U4"
s51N1TD = 3.00
s51N1RS$ = "N"
```

```
s50G1P = 5.4
s50G2P$ = "OFF"
s51G1P = 0.5
s51G1C$ = "U1"
s51G1TD = 0.50
s51G1RS$ = "N"
s50Q1P$ = "OFF"
s50Q2P$ = "OFF"
s51Q1P$ = "OFF"
s51Q1C$ = "U3"
s51Q1TD = 15.00
s51Q1RS$ = "N"
s51Q2P$ = "OFF"
s51Q2C$ = "U3"
s51Q2TD = 15.00
s51Q2RS$ = "N"
s79OI1 = 0.000
s79OI2 = 600.000
s79OI3 = 0.000
s79OI4 = 0.000
s79RSD = 1800.000
s79RSLD = 300.000
CFD = 60.000
DMTC = 5
PDEMP = 5.00
NDEMP = 1.50
GDEMP = 1.50
QDEMP = 1.50
SV5PU = 0.000
SV5DO = 0.000
SV6PU = 0.000
SV6DO = 0.000
SV7PU = 0.000
SV7DO = 0.000
SV8PU = 0.000
SV8DO = 0.000
SV9PU = 0.000
SV9DO = 0.000
SV10PU = 0.000
SV10DO = 0.000
SV11PU = 0.000
SV11DO = 0.000
SV12PU = 0.000
SV12DO = 0.000
SV13PU = 0.000
SV13DO = 0.000
SV14PU = 0.000
SV14DO = 0.000
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
TR$ = "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "
ULTR$ = "!(51P1 + 51G1)"
s51P1TC = 1
s51P2TC = 1
```

```
s51N1TC = 1
s51G1TC = 1
s51Q1TC = 1
s51Q2TC = 1
s52A$ = "IN1"
CL$ = "LB4"
ULCL$ = "TRIP"
s79RI$ = "TRIP"
s79RIS$ = "IN1"
s79DTL$ = "!LB1 + LB3"
s79DLS$ = "79LO"
s79SKP$ = "50P2 * SH0"
s79STL$ = "TRIP"
s79BRS$ = "(51P1 + 51G1) * (79RS + 79CY)"
s79SEQ = 0
ER1$ = "51P1 + 51G1 + 51N1"
ER2 = 0
SV1 = 0
SV2 = 0
SV3 = 0
SV4 = 0
SV5 = 0
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
OUT1$ = "TRIP"
OUT2 = 0
OUT3 = 0
OUT4 = 0
DP1$ = "IN1"
DP2$ = "LB2"
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
```

Relay Test Results for:	ROUTINE ORGANIZATION NOTES	
		OK?
		RAN
Relay Test Results for:	LOG INTO THE RELAY	
		OK?
		RAN
Relay Test Results for:	DOWNLOAD RELAY SETTINGS	
		OK?
		RAN
Relay Test Results for:	SET PORT TIMEOUT AND AUTO	
		OK?
		RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

N/A

Additional Data:
STA

FDR-52F18 Date: 03/11/20 Time: 05:59:17.502
SUB 8 EBB

FID=SEL-551-R514-Vf-Z002002-D20110408 CID=CCFD

SELF TESTS

W=Warn F=Fail

	IA	IB	IC	IN	MOF
OS	3	3	3	3	0

	+5V_PS	+5V_REG	-5V_REG	+10V_PS	-10V_PS	VBAT
PS	4.98	5.03	-4.99	9.92	-9.92	3.46

TEMP	RAM	ROM	CR_RAM	EEPROM
30.7	OK	OK	OK	OK

Relay Enabled

=>>

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	215.0	-0.5	PASS
B-N	0.0	0.0	0.0	240.0	239.0	-0.4	PASS
C-N	0.0	0.0	0.0	264.0	265.0	0.4	PASS

Relay Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		12.398	12.400	-0.02	PASS

Relay Test Results for: 50P1P PHASE OVERCURRENT PICKUP

B-N	12.398	12.400	-0.02	PASS
C-N	12.398	12.400	-0.02	PASS

Relay Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		3.000	3.000	-0.00	PASS
B-N		3.000	3.000	-0.00	PASS
C-N		3.000	3.000	-0.00	PASS

Relay Test Results for: 50P3P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P4P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P5P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P6P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE A OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE B OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE C OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.398	5.400	-0.04	PASS

Relay Test Results for: 50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		1.130	1.100	2.73	PASS
B-N		1.119	1.100	1.73	PASS
C-N		1.086	1.100	-1.27	PASS

Relay Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.200	600.64	10.011	9.867	1.46	PASS
3.00	3.300	222.13	3.702	3.700	0.06	PASS

Relay Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

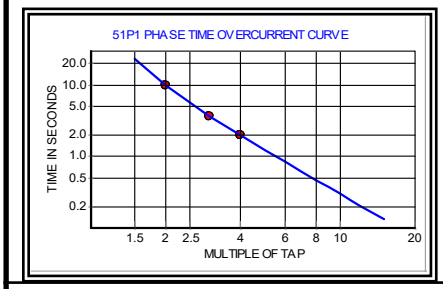
4.00	4.400	118.91	1.982	1.973	0.43	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.200	594.83	9.914	9.867	0.48	PASS
3.00	3.300	223.07	3.718	3.700	0.48	PASS
4.00	4.400	117.99	1.966	1.973	-0.35	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	2.200	592.78	9.880	9.867	0.13	PASS
3.00	3.300	221.01	3.684	3.700	-0.45	PASS
4.00	4.400	117.88	1.965	1.973	-0.44	PASS



Relay Test Results for: 51P2P PHASE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P2 PHASE TIME OVERCURRENT CURVE

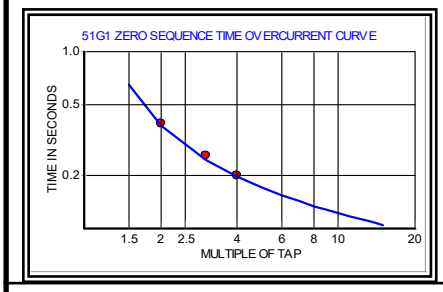
OK?
RAN

Relay Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.505	0.500	1.00	PASS

Relay Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.000	23.48	0.391	0.384	1.98	PASS
3.00	1.500	15.46	0.258	0.245	4.98	PASS
4.00	2.000	11.99	0.200	0.196	1.80	PASS



Relay Test Results for: 51Q1P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q1 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51Q2P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q2 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: NEUTRAL TEST CONNECTIONS

OK?
RAN

Relay Test Results for: 50N1P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N2P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1P NEUTRAL TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1 NEUTRAL TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: RESTORE LOGIC SETTINGS

OK?
RAN

Relay Test Results for: RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

OK?
PASS

Additional Data:
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

Relay Test Results for: LOG OUT OF THE RELAY

Relay Test Results for: LOG OUT OF THE RELAY

	OK?
	RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-587Z.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 8.1 **Test Date:** 03/04/2020

Relay Data:

TESTED_BY:	KERRY HAYSLIP	SUBSTATION:	GEN
CUSTOMER:	CITY OF ANN ARBOR	USER:	ANN ARBOR WASTEWATER
LOCATION:	CEP	POSITION:	BUS 3 DIFFERENTIAL
RELAY_MANF:	SEL	RELAY_TYPE:	SEL-587Z
MODEL_STYLE:	0587Z0X325512XX	IEEE_DEVICE:	MF
IL_IB:	SEL-587Z	SERIAL_NUMBER:	1132660420
FIRMWARE:	SEL-587Z-R102-V0-Z001001-D20020903	RELAY_ID:	587Z
CURRENT_TESTDATE:	3/4/2020	TESTSET_CALDATE:	10/29/2019

Global Defines:

```
CONTACT$="1"        'OUTPUT CONTACT TO MASK
SEL_AUTO=1          '0=MANUAL, 1=AUTO MASK, 2=MANUAL W/MESSAGES
SKIP_TST=1          'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1            'NO ERROR MESSAGE IF NO OPERATION
```

Routine Notes:

Relay Settings Used for Testing:

```
RID$ = "BUS 3 587Z"
TID$ = "STATION A"
CTR = 240
TDURD = 9.000
s87A1P = 200
s87A2P = 90
s87B1P = 200
s87B2P = 90
s87C1P = 200
s87C2P = 90
s50P1P$ = "OFF"
s50P2P$ = "OFF"
s50P3P$ = "OFF"
s50A1P$ = "OFF"
s50A2P$ = "OFF"
s50B1P$ = "OFF"
s50B2P$ = "OFF"
s50C1P$ = "OFF"
s50C2P$ = "OFF"
s51PP$ = "OFF"
s51PC$ = "U3"
s51PTD = 15.00
s51PRS$ = "N"
s51AP$ = "OFF"
s51AC$ = "U3"
s51ATD = 15.00
s51ARS$ = "N"
s51BP$ = "OFF"
s51BC$ = "U3"
s51BTD = 15.00
s51BRS$ = "N"
s51CP$ = "OFF"
s51CC$ = "U3"
s51CTD = 15.00
```

```
s51CRS$ = "N"
s50G1P$ = "OFF"
s50G2P$ = "OFF"
s51GP$ = "OFF"
s51GC$ = "U3"
s51GTD = 15.00
s51GRS$ = "N"
s50Q1P$ = "OFF"
s50Q2P$ = "OFF"
s51QP$ = "OFF"
s51QC$ = "U3"
s51QTD = 15.00
s51QRS$ = "N"
CFD = 60.000
DMTC = 5
PDEMP = 5.00
GDEMP = 1.50
QDEMP = 1.50
SV5PU = 120.000
SV5DO = 0.000
SV6PU = 15.000
SV6DO = 0.000
SV7PU = 0.000
SV7DO = 0.000
SV8PU = 0.000
SV8DO = 0.000
SV9PU = 0.000
SV9DO = 0.000
SV10PU = 0.000
SV10DO = 0.000
SV11PU = 0.000
SV11DO = 0.000
SV12PU = 0.000
SV12DO = 0.000
SV13PU = 0.000
SV13DO = 0.000
SV14PU = 0.000
SV14DO = 0.000
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
TR1$ = "87A1 + 87B1 + 87C1"
TR2 = 0
TR3 = 0
ULTR1$ = "!87A2 * !87B2 * !87C2 * !50A2 * !50B2 * !50C2 "
ULTR2 = 1
ULTR3 = 1
s51PTC = 1
s51ATC = 1
s51BTC = 1
s51CTC = 1
s51GTC = 1
s51QTC = 1
s52A = 0
CL = 0
ULCL$ = "TRIP1"
ER1$ = "87A1 + 87B1 + 87C1"
ER2$ = "87A2 + 87B2 + 87C2"
SV1 = 0
SV2 = 0
SV3 = 0
SV4 = 0
SV5 = 0
```

```
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
OUT1 = 0
OUT2 = 0
OUT3$ = "TRIP1"
OUT4$ = "TRIP1"
DP1 = 0
DP2 = 0
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
P1_PROTO$ = "SEL"
P1_SPEED = 2400
P1_BITS = 8
P1_PARITY$ = "N"
P1_STOP = 1
P1_T_OUT = 15
P1_AUTO$ = "N"
P1_RTSCTS$ = "N"
P1_FASTOP$ = "N"
PF_PROTO$ = "SEL"
PF_SPEED = 19200
PF_BITS = 8
PF_PARITY$ = "N"
PF_STOP = 1
PF_T_OUT = 15
PF_AUTO$ = "N"
PF_RTSCTS$ = "N"
PF_FASTOP$ = "N"
```

Relay Test Results for: ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for: LOG INTO THE RELAY

OK?
RAN

Relay Test Results for: DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for: SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

Relay Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

BUS 3 587Z                          Date: 03/04/2020    Time: 11:54:20.533
STATION A

FID=SEL-587Z-R102-V0-Z001001-D20020903      CID=0C9F

SELF TESTS

W=Warn    F=Fail

       87A      87B      87C      IA       IB       IC       MOF
OS      3        3        3        3        3        3        0

       +5V_PS   +5V_REG  -5V_REG  +10V_PS  -10V_PS  VBAT
PS      4.98     5.01    -4.94     9.94    -9.97     3.44

       TEMP     RAM      ROM      CR_RAM   EEPROM
        27.6    OK       OK       OK       OK

 Relay Enabled

=>>
```

Relay Test Results for: COMPONENT MAINTENANCE NOTES

OK?
RAN

Relay Test Results for: RELAY OUTPUT VERIFICATION

Verify operation of the RELAY OUTPUTS

(O) PASS

( ) FAIL

By selecting PASS you have determined that OUTPUTS on this relay essential to proper functioning of the Protection System are operational.

If selecting FAIL, add an explanation below.

NOTES:

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR ELEMENT TESTS

OK?
RAN

Relay Test Results for: 87A1P PHASE A VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
198.000	200.000	-1.00	PASS

Relay Test Results for: 87A2P PHASE A VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
90.000	90.000	0.00	PASS

Relay Test Results for: 87B1P PHASE B VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
198.000	200.000	-1.00	PASS

Relay Test Results for: 87B2P PHASE B VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
89.100	90.000	-1.00	PASS

Relay Test Results for: 87C1P PHASE C VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
198.000	200.000	-1.00	PASS

Relay Test Results for: 87C2P PHASE C VOLTAGE DIFFERENTIAL PICKUP

PICKUP VOLTS	IDEAL	%ERROR	OK?
90.000	90.000	0.00	PASS

Relay Test Results for: 50P1P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P2P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P3P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50A1P PHASE A OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50A2P PHASE A OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50B1P PHASE B OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50B2P PHASE B OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50C1P PHASE C OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50C2P PHASE C OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

Relay Test Results for:	50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP	OK? RAN
Relay Test Results for:	51PP PHASE TO PHASE TIME OVERCURRENT PICKUP	OK? RAN
Relay Test Results for:	51P PHASE TIME OVERCURRENT CURVE	OK? RAN
Relay Test Results for:	51AP PHASE A TIME OVERCURRENT PICKUP	OK? RAN
Relay Test Results for:	51A PHASE A TIME OVERCURRENT CURVE	OK? RAN
Relay Test Results for:	51BP PHASE B TIME OVERCURRENT PICKUP	OK? RAN
Relay Test Results for:	51B PHASE B TIME OVERCURRENT CURVE	OK? RAN
Relay Test Results for:	51CP PHASE C TIME OVERCURRENT PICKUP	OK? RAN
Relay Test Results for:	51C PHASE C TIME OVERCURRENT CURVE	OK? RAN
Relay Test Results for:	51GP ZERO SEQUENCE TIME OVERCURRENT PICKUP	OK? RAN
Relay Test Results for:	51G ZERO SEQUENCE TIME OVERCURRENT CURVE	OK? RAN
Relay Test Results for:	51QP NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP	OK? RAN
Relay Test Results for:	51Q NEGATIVE SEQUENCE TIME OVERCURRENT CURVE	OK? RAN
Relay Test Results for:	RESTORE LOGIC SETTINGS	OK? RAN
Relay Test Results for:	RESTORE PORT SETTINGS	OK? RAN
Relay Test Results for:	COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS	OK? PASS

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

```
Additional Data:
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE
```

Relay Test Results for: LOG OUT OF THE RELAY

OK?
RAN

Utilities Instrumentation Service
2290 Bishop Circle East
Dexter, MI 48130
734-424-1200

RTS Relay Test Results

Powered by: ENOSERV

Lib Routine: SEL-551.FST_LIB **AF/AL:** AL **Pass/Fail:** PASS

Lib Version: 8.2 **Test Date:** 05/08/2020

Relay Data:

TESTED_BY:	D FLEMING	DIVISION:	TEAM RELAY
SUBSTATION:	13.2 KV	CUSTOMER:	ANN ARBOR CITY OF
USER:	AAWWTP	LOCATION:	CENTRAL ELECTRICAL BUILDING
POSITION:	52F110 SPACE 6 BOT	RELAY_MANF:	SEL
RELAY_TYPE:	SEL-551	MODEL_STYLE:	0551003X551X
IEEE_DEVICE:	MF	IL_IB:	SEL-551
SERIAL_NUMBER:	1132620126	FIRMWARE:	SEL-551-R514-VF-Z002002-D20110408
RELAY_ID:	50/51	CURRENT_TESTDATE:	5/8/2020
TESTSET_CALDATE:	10/30/2019	APPROVED_BY:	

Global Defines:

```
CONTACT$="4"          'OUTPUT CONTACT TO MASK
SEL_AUTO=1            '1= ALLOWS COMMUNICATION TO SEL, 2=MANUAL MODIFICATION MESSAGES
SKIP_TST=1            'DEFEAT DISPLAYED MESSAGES FOR ALL TESTS SKIPPED
NO_TOE=1              'NO ERROR MESSAGE IF NO OPERATION
```

Routine Notes:

»Fri May 08, 2020
JOB # AACI207024

Relay Settings Used for Testing:

```
RID$ = "52F110"
TID$ = "SPACE 6-BOT"
CTR = 120
CTRN = 120
TDURD = 9.000
s50P1P = 13.0
s50P2P = 1.3
s50P3P$ = "OFF"
s50P4P$ = "OFF"
s50P5P$ = "OFF"
s50P6P$ = "OFF"
s50ABCP$ = "OFF"
s51P1P = 0.6
s51P1C$ = "C3"
s51P1TD = 1.00
s51P1RS$ = "N"
s51P2P$ = "OFF"
s51P2C$ = "U3"
s51P2TD = 15.00
s51P2RS$ = "N"
s50N1P$ = "OFF"
s50N2P$ = "OFF"
s51N1P$ = "OFF"
s51N1C$ = "U4"
s51N1TD = 3.00
s51N1RS$ = "N"
s50G1P = 5.4
s50G2P$ = "OFF"
s51G1P = 0.5
s51G1C$ = "U1"
s51G1TD = 0.50
```

```
s51G1RS$ = "N"
s50Q1P$ = "OFF"
s50Q2P$ = "OFF"
s51Q1P$ = "OFF"
s51Q1C$ = "U3"
s51Q1TD = 15.00
s51Q1RS$ = "N"
s51Q2P$ = "OFF"
s51Q2C$ = "U3"
s51Q2TD = 15.00
s51Q2RS$ = "N"
s79OI1 = 0.000
s79OI2 = 600.000
s79OI3 = 0.000
s79OI4 = 0.000
s79RSD = 1800.000
s79RSLD = 300.000
CFD = 60.000
DMTC = 5
PDEMP = 5.00
NDEMP = 1.50
GDEMP = 1.50
QDEMP = 1.50
SV5PU = 0.000
SV5DO = 0.000
SV6PU = 0.000
SV6DO = 0.000
SV7PU = 0.000
SV7DO = 0.000
SV8PU = 0.000
SV8DO = 0.000
SV9PU = 0.000
SV9DO = 0.000
SV10PU = 0.000
SV10DO = 0.000
SV11PU = 0.000
SV11DO = 0.000
SV12PU = 0.000
SV12DO = 0.000
SV13PU = 0.000
SV13DO = 0.000
SV14PU = 0.000
SV14DO = 0.000
NFREQ = 60
PHROT$ = "ABC"
DATE_F$ = "MDY"
TR$ = "51P1T + 51G1T + 50P1 + 50G1 + (50P2 * LB2) "
ULTR$ = "!(51P1 + 51G1)"
s51P1TC = 1
s51P2TC = 1
s51N1TC = 1
s51G1TC = 1
s51Q1TC = 1
s51Q2TC = 1
s52A$ = "IN1"
CL$ = "LB4"
ULCL$ = "TRIP"
s79RI$ = "TRIP"
s79RIS$ = "IN1"
s79DTL$ = "!LB1 + LB3"
s79DLS$ = "79LO"
s79SKP$ = "50P2 * SH0"
s79STL$ = "TRIP"
```

```
s79BRS$ = "(51P1 + 51G1) * (79RS + 79CY)"
s79SEQ = 0
ER1$ = "51P1 + 51G1 + 51N1"
ER2 = 0
SV1 = 0
SV2 = 0
SV3 = 0
SV4 = 0
SV5 = 0
SV6 = 0
SV7 = 0
SV8 = 0
SV9 = 0
SV10 = 0
SV11 = 0
SV12 = 0
SV13 = 0
SV14 = 0
OUT1$ = "TRIP"
OUT2 = 0
OUT3 = 0
OUT4 = 0
DP1$ = "IN1"
DP2$ = "LB2"
DP3 = 0
DP4 = 0
DP5 = 0
DP6 = 0
DP7 = 0
DP8 = 0
```

Relay Test Results for: ROUTINE ORGANIZATION NOTES

OK?
RAN

Relay Test Results for: LOG INTO THE RELAY

OK?
RAN

Relay Test Results for: DOWNLOAD RELAY SETTINGS

OK?
RAN

Relay Test Results for: SET PORT TIMEOUT AND AUTO

OK?
RAN

Relay Test Results for: UPDATE DEVICE DATA ENTRIES WITH RELAY FIRMWARE

OK?
RAN

Relay Test Results for: RELAY STATUS CHECK

Relay Test Results for: RELAY STATUS CHECK

```
  N/A

Additional Data:
STA

52F110                              Date: 05/08/20    Time: 08:42:29.711
SPACE 6-BOT

FID=SEL-551-R514-Vf-Z002002-D20110408      CID=CCFD

SELF TESTS

W=Warn    F=Fail

       IA       IB       IC       IN       MOF
OS      3        3        3        3        0

       +5V_PS   +5V_REG  -5V_REG  +10V_PS  -10V_PS  VBAT
PS      5.01     5.06    -4.99     9.99    -10.00    3.45

       TEMP     RAM      ROM      CR_RAM   EEPROM
        25.5    OK       OK       OK       OK

 Relay Enabled

=>>
```

Relay Test Results for: RUN AND READ SETTING NOTIFICATION MESSAGE

OK?
RAN

Relay Test Results for: SEL TEST PROCEDURE NOTES

OK?
RAN

Relay Test Results for: RESET TRIP VARIABLE IN MEMORY

OK?
RAN

Relay Test Results for: GLOBAL DEFINES VERIFICATION

OK?
RAN

Relay Test Results for: CONNECTION CHANGE FOR ELEMENT TEST

OK?
RAN

Relay Test Results for: METER TEST

APPLIED SEC VOLT	APPLIED SEC AMP	CURRENT PH LAG
0.00	2.00	30.00

PHASE	CALCULATED PRI KV	MEASURED PRI KV	% ERROR	CALCULATED PRI CUR	MEASURED PRI CUR	% ERROR	OK?
A-N	0.0	0.0	0.0	216.0	216.0	0.0	PASS
B-N	0.0	0.0	0.0	240.0	237.0	-1.2	PASS
C-N	0.0	0.0	0.0	264.0	266.0	0.8	PASS

Relay Test Results for: 50P1P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		13.000	13.000	0.00	PASS
B-N		13.000	13.000	0.00	PASS
C-N		13.130	13.000	1.00	PASS

Relay Test Results for: 50P2P PHASE OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		1.301	1.300	0.08	PASS
B-N		1.314	1.300	1.08	PASS
C-N		1.314	1.300	1.08	PASS

Relay Test Results for: 50P3P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P4P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P5P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50P6P PHASE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE A OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE B OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50ABCP PHASE C OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50G1P ZERO SEQUENCE OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	5.398	5.400	-0.04	PASS

Relay Test Results for: 50G2P ZERO SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q1P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50Q2P NEGATIVE SEQUENCE OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P1P PHASE TIME OVERCURRENT PICKUP

PHASE	PICKUP	CURRENT	IDEAL	%ERROR	OK?
A-N		0.614	0.600	2.33	PASS
B-N		0.626	0.600	4.33	PASS
C-N		0.608	0.600	1.33	PASS

Relay Test Results for: 51P1 PHASE TIME OVERCURRENT CURVE

51P1 PHASE TIME OVERCURRENT CURVE (PHASE A-N)

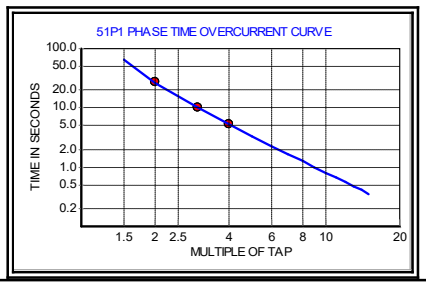
MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1645.57	27.426	26.667	2.85	PASS
3.00	1.800	608.08	10.135	10.000	1.35	PASS
4.00	2.400	324.47	5.408	5.333	1.40	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE B-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1620.63	27.010	26.667	1.29	PASS
3.00	1.800	619.43	10.324	10.000	3.24	PASS
4.00	2.400	321.34	5.356	5.333	0.42	PASS

51P1 PHASE TIME OVERCURRENT CURVE (PHASE C-N)

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.200	1645.99	27.433	26.667	2.87	PASS
3.00	1.800	606.15	10.102	10.000	1.02	PASS
4.00	2.400	324.14	5.402	5.333	1.29	PASS



Relay Test Results for: 51P2P PHASE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51P2 PHASE TIME OVERCURRENT CURVE

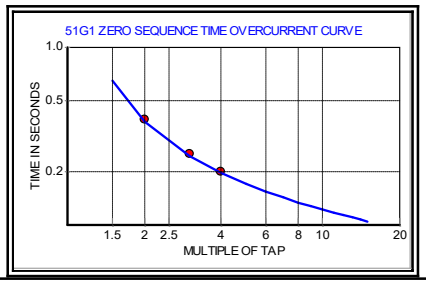
OK?
RAN

Relay Test Results for: 51G1P ZERO SEQUENCE TIME OVERCURRENT PICKUP

PICKUP	CURRENT	IDEAL	%ERROR	OK?
	0.495	0.500	-1.00	PASS

Relay Test Results for: 51G1 ZERO SEQUENCE TIME OVERCURRENT CURVE

MULTIPLE	VALUE	TIME(CY)	TIME(SEC)	IDEAL	%ERROR	OK?
2.00	1.000	23.57	0.393	0.384	2.37	PASS
3.00	1.500	15.03	0.250	0.245	2.09	PASS
4.00	2.000	12.05	0.201	0.196	2.31	PASS



Relay Test Results for: 51Q1P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q1 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: 51Q2P NEGATIVE SEQUENCE TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51Q2 NEGATIVE SEQUENCE TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: NEUTRAL TEST CONNECTIONS

OK?
RAN

Relay Test Results for: 50N1P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 50N2P NEUTRAL OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1P NEUTRAL TIME OVERCURRENT PICKUP

OK?
RAN

Relay Test Results for: 51N1 NEUTRAL TIME OVERCURRENT CURVE

OK?
RAN

Relay Test Results for: RESTORE LOGIC SETTINGS

OK?
RAN

Relay Test Results for: RESTORE PORT SETTINGS

OK?
RAN

Relay Test Results for: COMPARE AS FOUND SETTINGS TO AS LEFT SETTINGS

```
COMPARING SETTING FILES
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWSET.SET
  FILE 2: SHOWAL.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE

COMPARING SETTING FILES
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

FILE 1 TO FILE 2 MATCH EXACTLY
  FILE 1: SHOWAL.SET
  FILE 2: SHOWSET.SET

NO ERRORS WERE FOUND

COMPARE OPERATION COMPLETE
```

Relay Test Results for: LOG OUT OF THE RELAY

OK?
RAN

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Customer Ann Arbor, City of
User Ann Arbor WWTP

Plant: <None> Page: 8
Substation: !4 Date: 2/21/2020
Position: MAIN BREAKER MB-2
Equipment: !18500 - DEFICIENCIES LOCATED

Comments: TIE BREAKER MOVED TO MAIN MB-2 POSITION. CURRENT STATE OF SUB IS DOUBLE-ENDED WITHOUT THE TIE BREAKER.

Plant: <None> Page: 17
Substation: 1 Date: 2/24/2020
Position: MAIN
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: TESTED BREAKER IN MANUAL MODE.

Plant: <None> Page: 18
Substation: 1 Date: 2/24/2020
Position: MAIN (A)
Equipment: 15001 - LOW VOLT PWR CKT BKR TEST(2PG)

Comments: ALL FUNCTIONS PER TEST TOOL SAY PASSED
DATE CODE: 14061.

Plant: <None> Page: 19
Substation: 1 Date: 2/25/2020
Position: MAIN (B)
Equipment: 15001 - LOW VOLT PWR CKT BKR TEST(2PG)

Comments: ALL FUNCTIONS PER TEST TOOL SAY IT PASSED
DATE CODE: 14061.

Plant: <None> Page: 20
Substation: 1 Date: 2/25/2020
Position: MCC RLS A & B TIE
Equipment: 15951 - MOLDED CASE CIRCUIT BREAKER

Comments: UNABLE TO DUCTOR OR CLEAN DUE TO LINE OR LOAD BEING ENERGIZED FROM ALTERNATE SOURCES.

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Plant: <None> Page: 21
Substation: 1 Date: 2/24/2020
Position: MCC-C
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: ALL FUNCTIONS PASS PER TEST TOOL
DATE CODE: 14063.

Plant: <None> Page: 23
Substation: 1 Date: 2/24/2020
Position: MCC-C (01)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Comments: LIGHTING PNL-C OCPD IS 3 DIFFERENT FUSES ALL 80 DUAL ELEMENT.
BAR SCREEN 3 B & C PHASES BARRICADE MISSING.

Plant: <None> Page: 26
Substation: 1 Date: 2/25/2020
Position: MCC-D
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: ALL FUNCTIONS PER TEST TOOL PASSED

Plant: <None> Page: 28
Substation: 1 Date: 2/25/2020
Position: MCC-D (01)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Comments: *DURING IR C-PHASE FUSE CLIP AT THE BOTTOM WAS HOT. TEMP FIX APPLIED WHILE WAITING FOR THE PERMANENT FIX PARTS.

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Plant: <None> Page: 29
Substation: 1 Date: 2/25/2020
Position: MCC-D (02)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Comments: *GRIT BLOWER NO. 2: UNABLE TO TEST DUE TO LOTO / CHANNEL AIR BLOWER.
GRIT / SLURRY PUMP: VARIOUS FUSE IN USE ALL 30A / B TO C PHASE BARRIER BROKEN.

Plant: <None> Page: 32
Substation: 1 Date: 2/24/2020
Position: MCC-RLS-A
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: ALL FUNCTIONS PER TEST TOOL PASSED
DATE CODE: 14061.

Plant: <None> Page: 35
Substation: 1 Date: 2/24/2020
Position: MCC-RLS-A (02)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Comments: SCREW PUMP NO. 5: LOTO APPLIED, UNABLE TO OPERATE.

Plant: <None> Page: 36
Substation: 1 Date: 2/25/2020
Position: MCC-RLS-B
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: ALL FUNCTIONS PER TEST TOOL PASSED
DATE CODE: 14061.

Plant: <None> Page: 37
Substation: 1 Date: 2/25/2020
Position: MCC-RLS-B
Equipment: 30101 - MOTOR CONTROL CENTER INSULATION

Comments: * POWER PACT LJ600

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Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Plant: <None> Page: 40
Substation: 1 Date: 2/25/2020
Position: MCC-RLS-B MAIN
Equipment: 15951 - MOLDED CASE CIRCUIT BREAKER

Comments: IR SET AT 400A. INST SET AT 11.

Plant: <None> Page: 41
Substation: 1 Date: 2/25/2020
Position: SECTION 4 (SPARE)
Equipment: 15001 - LOW VOLT PWR CKT BKR TEST(2PG)

Comments: ALL FUNCTIONS PER TEST TOOL PASSED.
DATE CODE: 14061.

Plant: <None> Page: 42
Substation: 1 Date: 2/24/2020
Position: SPARE (SECTION 1)
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: ALL FUNCTIONS PER TEST TOOL SAY PASSED
DATE CODE: 14063.

Plant: <None> Page: 44
Substation: 1 Date: 2/25/2020
Position: SUB 1
Equipment: 50400 - SWITCHBOARD BUS CONNECTION TEST

Comments: NEUTRAL DOES NOT PASS THROUGH SECTIONS 2 & 3.

Plant: <None> Page: 45
Substation: 1 Date: 2/24/2020
Position: SUB 1 (A)
Equipment: 29000C - LOADBREAK DISCONNECT

Comments: NON FUSED SWITCH
HIPOT VALUE 37 kVDC

Utilities Instrumentation Service, Inc.
Dexter, Michigan
(734) 424-1200
Centerville, Ohio
(937) 439-9660

Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Plant: <None> Page: 46
Substation: 1 Date: 2/25/2020
Position: SUB 1 (B)
Equipment: 29000C - LOADBREAK DISCONNECT

Comments: NON FUSED SWITCH
HIPOT VALUE 37 kVDC

Plant: <None> Page: 54
Substation: 1 Date: 2/24/2020
Position: TIE
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: ALL FUNCTIONS PER TEST TOOL SAY PASSED

Plant: <None> Page: 63
Substation: 13.2 kV Date: 5/8/2020
Position: BUS 1 - BUS 2 ISOLATION BREAKER (52 1B)
Equipment: 16100 - VACUUM CIRCUIT BREAKER

Comments: THE FIRST TIME THIS BREAKER WAS OPERATED (W/ ELECTRIC CONTROLS), UPON REACHING FULL CHARGE, THE BREAKER CLOSED. THE CLOSE SIGNAL HAD NOT YET BEEN SENT. THE BREAKER WAS THEN OPERATED SEVERAL MORE TIMES, BOTH ELECTRICALLY AND MANUALLY, FULL INSPECTED AND TESTED WITHOUT ANY FURTHER PROBLEMS. THE BREAKER APPEARS TO OPERATE AS INTENDED NOW.

Plant: <None> Page: 67
Substation: 13.2 kV Date: 3/4/2020
Position: BUS 2 - BUS 3 TIE BREAKER (52 GT2)
Equipment: 16100 - VACUUM CIRCUIT BREAKER (2)

Comments: ONLY OPERATED ONCE ELECTRICALLY DUE TO CONTROL SYSTEM ISSUES. CONTROL ISSUES CORRECTED BY UIS & CUMMINS TECH.

Plant: <None> Page: 79
Substation: 13.2 kV Date: 3/11/2020
Position: SUB 8 -EBB (52F 18)
Equipment: 16100 - VACUUM CIRCUIT BREAKER

Comments: CAT #V5DB133Y000

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Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Plant: <None> Page: 81
Substation: 13.2 kV Date: 2/26/2020
Position: UNIT SUB 3- WBB (52F 13)
Equipment: 16100 - VACUUM CIRCUIT BREAKER

Comments: CAT #V5DB133Y000

Plant: <None> Page: 83
Substation: 13.2 kV Date: 5/13/2020
Position: VT2 (X,Y & Z)
Equipment: 27200 - VOLTAGE TRANSFORMER TEST

Comments: PRI FUSE RESISTANCE X = 30.04 OHMS Y = 30.23 OHMS Z = 30.01 OHMS

Plant: <None> Page: 84
Substation: 13.2 kV Date: 5/12/2020
Position: VT2 X, Y & Z
Equipment: 27200 - VOLTAGE TRANSFORMER TEST

Comments: PRIMARY FUSE RESISTANCE X = 33.2 OHMS Y = 34.7 OHMS Z = 37.4 OHMS

Plant: <None> Page: 85
Substation: 2 Date: 2/18/2020
Position: MAIN A
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: DATE CODE: 14063. BREAKER PASSED THE AUTOMATIC TRIP CURVE TEST.

Plant: <None> Page: 86
Substation: 2 Date: 2/19/2020
Position: MAIN B
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: DATE CODE: 14063. BREAKER PASSED THE AUTOMATIC TRIP CURVE TEST.

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Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Plant: <None> Page: 87
Substation: 2 Date: 2/18/2020
Position: MCC-E
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: NO OCCS AT TIME OF TEST.
DATE CODE: 14063. BREAKER PASSED THE AUTOMATIC TRIP TEST.

Plant: <None> Page: 88
Substation: 2 Date: 2/18/2020
Position: MCC-E
Equipment: 30101 - MOTOR CONTROL CENTER INSULATION

Comments: *213B9202. SH.46.44.47.21.
MEGGER WITH FEEDERS ATTACHED.

Plant: <None> Page: 89
Substation: 2 Date: 2/18/2020
Position: MCC-E (01)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Comments: CAT #435X719M07. DIAGRAM: 213B9202.
VOLTS: 460.

Plant: <None> Page: 90
Substation: 2 Date: 2/18/2020
Position: MCC-E (02)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Comments: CAT #435X719M07. DIAGRAM: 213B9202. 460 VOLTS.

Plant: <None> Page: 91
Substation: 2 Date: 2/18/2020
Position: MCC-E (03)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Comments: CAT #435X719M07. DIAGRAM: 213B9202. VOLTS: 460.

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Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Plant: <None> Page: 92
Substation: 2 Date: 2/18/2020
Position: MCC-E (04)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Comments: CAT #435X719M08. DIAGRAM: 213B9202. VOLTS: 460.

Plant: <None> Page: 93
Substation: 2 Date: 2/18/2020
Position: MCC-E (05)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Comments: CAT #435X719M08. DIAGRAM: 213B9202. VOLTS: 460.

Plant: <None> Page: 94
Substation: 2 Date: 2/18/2020
Position: MCC-E (06)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Comments: CAT #435X719M08. DIAGRAM: 213B9202. VOLTS: 460.

Plant: <None> Page: 95
Substation: 2 Date: 2/18/2020
Position: MCC-E (07)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Comments: CAT #435X719M09. DIAGRAM: 213B9202. VOLTS: 460.

Plant: <None> Page: 96
Substation: 2 Date: 2/18/2020
Position: MCC-E (08)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Comments: CAT #435X719M09. DIAGRAM: 213B9202. VOLTS: 460.

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Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Plant: <None> Page: 97
Substation: 2 Date: 2/18/2020
Position: MCC-E (09)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST (2) (2)

Comments: CAT #435X719M09. DIAGRAM: 213B9202. VOLTS: 460.

Plant: <None> Page: 98
Substation: 2 Date: 2/19/2020
Position: MCC-F
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: DATE CODE: 14061. BREAKER PASSED THE AUTOMATIC TRIP TEST.
CAT. NO. WOULD INDICATE AN 800A SENSOR PLUG, BUT IT HAS A 400A.

Plant: <None> Page: 99
Substation: 2 Date: 2/19/2020
Position: MCC-F
Equipment: 30101 - MOTOR CONTROL CENTER INSULATION

Comments: MEGGER WITH FEEDERS ATTACHED.

Plant: <None> Page: 100
Substation: 2 Date: 2/19/2020
Position: MCC-F (01)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Comments: CAT #435X719M11. DIAGRAM: 213B9202. VOLTS: 460.

Plant: <None> Page: 101
Substation: 2 Date: 2/19/2020
Position: MCC-F (02)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Comments: CAT #435X719M11. DIAGRAM: 213B9202. VOLTS: 460.

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Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Plant: <None> Page: 102
Substation: 2 Date: 2/19/2020
Position: MCC-F (03)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Comments: CAT #435X719M11. DIAGRAM: 213B9202. VOLTS: 460.
BASIN HOIST: LOTO APPLIED, UNABLE TO OPEN DOOR.

Plant: <None> Page: 103
Substation: 2 Date: 2/19/2020
Position: MCC-F (04)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Comments: CAT #435X719M12. DIAGRAM: 213B9202. VOLTS: 460.

Plant: <None> Page: 104
Substation: 2 Date: 2/19/2020
Position: MCC-F (05)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Comments: CAT #435X719M12. DIAGRAM: 213B9202. VOLTS: 460.

Plant: <None> Page: 105
Substation: 2 Date: 2/19/2020
Position: MCC-F (06)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Comments: CAT #435X719M12. DIAGRAM: 213B9202. VOLTS: 460.

Plant: <None> Page: 106
Substation: 2 Date: 2/19/2020
Position: MCC-F (07)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Comments: CAT #435X719M13. DIAGRAM: 213B9202. VOLTS: 460.

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Job #AACI207024-1

Plant: <None>
Substation: 2
Position: MCC-F (08)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Page: 107
Date: 2/19/2020

Comments: CAT #435X719M13. DIAGRAM: 213B9202. VOLTS: 460.

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Comment Summary
Job #AACI207024-1

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User Ann Arbor WWTP

Plant: <None> Page: 108
Substation: 2 Date: 2/18/2020
Position: N/A
Equipment: 50400 - SWITCHBOARD BUS CONNECTION TEST

Comments: NEUTRAL BUS ENDS IN CAB 1 AND DOES NOT EXTEND INTO THE OTHER SECTIONS.

Plant: <None> Page: 109
Substation: 2 Date: 2/18/2020
Position: SPARE
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: DATE CODE: 14063. BREAKER PASSED THE AUTOMATIC TRIP CURVE TEST.

Plant: <None> Page: 110
Substation: 2 Date: 2/18/2020
Position: SUB 2 LV BUS
Equipment: 50100 - LV SWITCHBOARD INSULATION (2PG)

Comments: NEUTRAL BUS ENDS IN CAB 1 & CAB 4, AND DOES NOT EXTEND THROUGH FEEDER SECTIONS.

Plant: <None> Page: 111
Substation: 2 Date: 2/18/2020
Position: SUB 2 MAIN A
Equipment: 29000C - LOADBREAK DISCONNECT

Comments: NO FUSES AT TIME OF TEST. APPEARS TO BE FACTORY-BUILT FOR NON-FUSE USE.
ALL MEG WITH FEEDER CABLES ATTACHED. HIPOT AT 37 KV.

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Comment Summary
Job #AACI207024-1

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Plant: <None> Page: 113
Substation: 2 Date: 2/19/2020
Position: SUB 2 MAIN B
Equipment: 29000C - LOADBREAK DISCONNECT

Comments: * = NO FUSES AT TIME OF TEST - APPEARS TO BE FACTORY BUILT FOR NON FUSED USE.
ARRESTOR # MD DIST-9L20FXX015XH5.
ARRESTORS 15kVA 100K+. TESTED AT 5kV.

Plant: <None> Page: 114
Substation: 2 Date: 2/18/2020
Position: TIE
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: DATE CODE: 14063. PASSED AUTOMATIC TRIP CURVE TEST.

Plant: <None> Page: 121
Substation: 3 Date: 2/27/2020
Position: ISOLATION BREAKER
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: LOW BATTERY INDICATOR.
DATE CODE: 14214, PASSED THE AUTOMATIC TRIP CURVE TEST.

Plant: <None> Page: 122
Substation: 3 Date: 2/26/2020
Position: MAIN A
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: DATE CODE: 14214, PASSED THE AUTOMATIC TRIP CURVE TEST.

Plant: <None> Page: 123
Substation: 3 Date: 2/26/2020
Position: MAIN A
Equipment: 29000C - LOADBREAK DISCONNECT

Comments: NO FUSES INSTALLED APPEARS TO BE FACTORY BUILT TO BE A NON FUSED UNIT

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Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Plant: <None> Page: 124
Substation: 3 Date: 2/27/2020
Position: MAIN A & B
Equipment: 65500 - LIGHTNING ARRESTER TEST

Comments: X-PHASE ARRESTER IS STARTING TO GO BAD. IT PASSES NETA SPEC ON BOTH A & B SUBS. RECOMMEND REPLACING IN THE NEAR FUTURE.
GENERAL ELECTRIC 15KV ARRESTER MCOV HD DIST 9L20FXX0.

Plant: <None> Page: 125
Substation: 3 Date: 2/27/2020
Position: MAIN B
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: DATE CODE: 14214.

Plant: <None> Page: 126
Substation: 3 Date: 2/27/2020
Position: MAIN B
Equipment: 29000C - LOADBREAK DISCONNECT

Comments: * = NO FUSES INSTALLED - APPEARS TO BE FACTORY BUILT TO BE A NON FUSED UNIT.
GENERAL ELECTRIC HD DIST - 9220FXX0.
LIGHTNING ARRESTORS 15KV A-36900, B-100K+, C-100K+. A-PHASE GETTING WEAK.

Plant: <None> Page: 127
Substation: 3 Date: 2/26/2020
Position: MCC-WBB-A
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: DATE CODE: 14214. PASSED THE AUTOMATIC TRIP CURVE TEST.

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Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Plant: <None> Page: 128
Substation: 3 Date: 2/20/2020
Position: MCC-WBB-A
Equipment: 30101 - MOTOR CONTROL CENTER INSULATION

Comments: 1) INCLUDES TIE BREAKER TO MCC WBB-B. 2) INCLUDES 2 - GE 469 MOTOR MANAGEMENT RELAYS. 3) IN THE MAIN LUG COMPARTMENT, GROUNDS WERE RUBBING AGAINST THE THREADS OF C-PHASE LUGS & HAD TO REROUTE GROUNDS FROM A-PHASE THAT WERE RUBBING ON A-PHASE BUS. CORRECTED ON 2/26/2020

Plant: <None> Page: 130
Substation: 3 Date: 2/26/2020
Position: MCC-WBB-A (02)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Comments: HOIST LCP - *A-PHASE LUG WAS MISALIGNED & THE BREAKER TAB WAS BARELY UNDER THE LUG. CORRECTED 2/26/2020.

Plant: <None> Page: 132
Substation: 3 Date: 2/27/2020
Position: MCC-WBB-B
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: DATE CODE: 14214, PASSED THE AUTOMATIC TRIP CURVE TEST.

Plant: <None> Page: 133
Substation: 3 Date: 2/27/2020
Position: MCC-WBB-B
Equipment: 30101 - MOTOR CONTROL CENTER INSULATION

Comments: INCLUDES 1 - GE 469 MOTOR MANAGEMENT RELAY

Plant: <None> Page: 134
Substation: 3 Date: 2/27/2020
Position: MCC-WBB-B (01)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Comments: PP-WBB-B A-PHASE TERMINAL NOT TORQUED--CONDUCTOR PULLED FREE. RE-LANDED AND TORQUED.

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Comment Summary
Job #AACI207024-1

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Plant: <None> Page: 138
Substation: 3 Date: 2/26/2020
Position: MCC-WPB-A
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: DATE CODE: 14214, PASSED THE AUTOMATIC TRIP CURVE TEST.

Plant: <None> Page: 143
Substation: 3 Date: 2/26/2020
Position: MCC-WPB-A (MAIN)
Equipment: 15952 - MOLDED CASE CKT BKR SOLID STATE

Comments: MEGGER & DUCTOR ONLY.
MEGGER WITH CABLES & MCC BUS.

Plant: <None> Page: 144
Substation: 3 Date: 2/26/2020
Position: MCC-WPB-A (TIE BREAKER)
Equipment: 15952 - MOLDED CASE CKT BKR SOLID STATE

Comments: UNABLE TO CLEAN, MEGGER, OR DUCTOR, DUE TO LINE OR LOAD BEING ENERGIZED FROM ALTERNATE SOURCES.

Plant: <None> Page: 145
Substation: 3 Date: 2/27/2020
Position: MCC-WPB-B
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: BATTERY INDICATOR LOW.
DATE CODE: 14214, PASSED THE AUTOMATIC TRIP CURVE TEST.

Plant: <None> Page: 146
Substation: 3 Date: 2/27/2020
Position: MCC-WPB-B
Equipment: 30101 - MOTOR CONTROL CENTER INSULATION

Comments: * = SQUARE D POWER PACT LJ600

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Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Plant: <None> Page: 152
Substation: 3 Date: 2/26/2020
Position: SPARE A
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: DATE CODE: 14214, PASSED THE AUTOMATIC TRIP CURVE TEST.

Plant: <None> Page: 153
Substation: 3 Date: 2/27/2020
Position: SPARE B
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: DATE CODE: 14214, PASSED THE AUTOMATIC TRIP CURVE TEST.

Plant: <None> Page: 154
Substation: 3 Date: 2/26/2020
Position: SUB 3 TRANSFORMER 1
Equipment: 56000 - TRANS. DIELECTRIC ABSORPTION

Comments: PRIMARY VOLTAGE RATED CURRENT: 83.3, 85.3, 87.5, 89.1, 97.1 AMPERES.

Plant: <None> Page: 155
Substation: 3 Date: 2/26/2020
Position: SUB 3 TRANSFORMER 1
Equipment: 56200B- TRANSFORMER INSPECTION

Comments: PRIMARY VOLTAGE RATED CURRENT: 88.3, 85.3, 87.5, 89.1, 97.1.
MAIN BONDING JUMPERS IN XFMR AND GEAR AT TIME OF TEST. BONDING JUMPER IN GEAR REMOVED PER CUSTOMER REQUEST.

Plant: <None> Page: 156
Substation: 3 Date: 2/26/2020
Position: SUB 3 TRANSFORMER 1
Equipment: 56300 - TRANSFORMER TURNS RATIO

Comments: PRIMARY VOLTAGE RATING CURRENT: 83.3, 85.3, 87.5, 89.1, 97.1 AMPERES.

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Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Plant: <None> Page: 157
Substation: 3 Date: 2/27/2020
Position: SUB 3 TRANSFORMER 2
Equipment: 56000 - TRANS. DIELECTRIC ABSORPTION

Comments: PRIMARY VOLTAGE RATED CURRENT = 83.3, 85.3, 87.5, 89.7, 92.1.

Plant: <None> Page: 158
Substation: 3 Date: 2/27/2020
Position: SUB 3 TRANSFORMER 2
Equipment: 56200B- TRANSFORMER INSPECTION

Comments: TRANSFORMER LABELED AS SUB TRANSFORMER 3.
TOOK OUT REDUNDANT BONDING JUMPER IN GEAR, PER CUSTOMER REQUEST.
PRIMARY VOLTAGE RATED CURRENT = 83.3, 85.3, 87.5, 89.7, 92.1 AMPERES.

Plant: <None> Page: 159
Substation: 3 Date: 2/27/2020
Position: SUB 3 TRANSFORMER 2
Equipment: 56300 - TRANSFORMER TURNS RATIO

Comments: PRIMARY VOLTAGE RATED CURRENT = 83.3, 85.3, 87.5, 89.7, 92.1 AMPERES.
TRANSFORMERS MARKED AS 3 WHEN THEY SHOULD BE 2.

Plant: <None> Page: 161
Substation: 3 Date: 2/26/2020
Position: SWBD A & B
Equipment: 50400 - SWITCHBOARD BUS CONNECTION TEST

Comments: NEUTRAL IS FROM XFMR TO SECTION 1 (A SIDE) AND XFMR TO SECTION 6 (B SIDE).

Plant: <None> Page: 162
Substation: 3 Date: 2/26/2020
Position: TIE
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: DATE CODE: 14214, PASSED THE AUTOMATIC TRIP CURVE TEST.

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Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Plant: <None> Page: 163
Substation: 3 Date: 2/26/2020
Position: TIE MCC -WBB -A/B
Equipment: 15001 - LOW VOLT PWR CKT BKR TEST(2PG)

Comments: UNABLE TO DLRO OR CLEAN DUE TO LINE OR LOAD ALWAYS BEING ENERGIZED FROM ALTERNATE SOURCES.

Plant: <None> Page: 164
Substation: 4 Date: 2/21/2020
Position: BANK UNV-2B FB-7
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: E.O. BREAKER 120VAC CONTROL.

Plant: <None> Page: 165
Substation: 4 Date: 2/21/2020
Position: BANK UV-2A FB-8
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: E.O. BREAKER 120VAC CONTROL.

Plant: <None> Page: 166
Substation: 4 Date: 2/24/2020
Position: DEV 60-1
Equipment: 49000B - VOLTAGE RELAY

Comments: BALANCED 3 PHASE CHECK - 120V 3 PHASE ON TERMINALS 5 & 6 & 7. VOLTAGE ACROSS TERMINAL 3 & 4: AS FOUND 0.94 AS SPECIFIED <1.0V
AS LEFT 0.94 PICKUP TEST = SINGLE PHASE ON TERMINAL 5-7 & 6. T1-T2 = 15V T8-T9 = 15 V T9-T10 = 13V
FOUND IN AUTO. LEFT IN AUTO.

Plant: <None> Page: 167
Substation: 4 Date: 2/24/2020
Position: DEV 60-2
Equipment: 49000B - VOLTAGE RELAY

Comments: BALANCED 3 PHASE CHECK - 120V 3 PHASE ON TERMINALS 5 & 6 & 7. VOLTAGE ACROSS TERMINAL 3 & 4: AS FOUND 1.17 AS SPECIFIED <1.0V
AS LEFT 1.07 PICKUP TEST = SINGLE PHASE ON TERMINAL 5-7 & 6. T1-T2 = 16V T8-T9 = 18 V T9-T10 = 14V
FOUND IN AUTO. LEFT IN AUTO.

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Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Plant: <None> Page: 170
Substation: 4 Date: 2/20/2020
Position: FB-5
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: BUFFER BUSHINGS SHOULD BE REPLACED.

Plant: <None> Page: 172
Substation: 4 Date: 2/20/2020
Position: MAIN BRKR MB-1
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: TOP OF PHASE A AND PHASE B ARC SHOOTS ARE CRACKED.

Plant: <None> Page: 173
Substation: 4 Date: 2/21/2020
Position: MAIN BRKR MB-2
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: BREAKER WAS IN THE TIE POSITION & WAS MOVED TO MAIN BECAUSE THE BREAKER WOULD NOT CLOSE IN THE CUBICLE. THE ISSUE SEEMS TO BE IN THE GEAR. BUFFER BUSHINGS SHOULD BE REPLACED.

Plant: <None> Page: 174
Substation: 4 Date: 2/21/2020
Position: MAIN BRKR MB-2
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST (2)

Comments: REPAIRED MOTOR TOGGLE SWITCH.

Plant: <None> Page: 175
Substation: 4 Date: 2/20/2020
Position: MAIN MB-1
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: THIS WAS A SPARE. THE MAIN THAT WAS IN SERVICE WAS DEFECTIVE. BUFFER BUSHINGS SHOULD BE REPLACED.

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Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Plant: <None> Page: 177
Substation: 4 Date: 2/20/2020
Position: MCC-M (01)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Comments: FPP-C NO FUSE IN A-PHASE.

Plant: <None> Page: 178
Substation: 4 Date: 2/20/2020
Position: MCC-M (02)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Comments: REPLACED BROKEN CLIP ON WET WELL BYPASS GT WEST 5-1-1.

Plant: <None> Page: 179
Substation: 4 Date: 2/20/2020
Position: MCC-M (03)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Comments: WASH WATER DRAINAGE PUMP NO. 1 BUCKET HAS EVIDENCE OF ARCING FAULT AT TIME OF TEST. UNKNOWN TIME OR CAUSE.

Plant: <None> Page: 180
Substation: 4 Date: 2/20/2020
Position: MCC-M FB-1
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: BUFFER BUSHINGS SHOULD BE REPLACED.

Plant: <None> Page: 185
Substation: 4 Date: 2/20/2020
Position: MCC-N FB-11
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: BUFFER BUSHINGS NEED TO BE REPLACED.

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Comment Summary
Job #AACI207024-1

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Plant: <None>
Substation: 4
Position: MCC-P (02)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Page: 188
Date: 2/21/2020

Comments: NO LABEL TRS 15R PHASES A & B: DUCT TAPE ON THE DOOR THAT SAYS PHASE-B CONTACT IS BAD. NO LABEL WILL NOT DLRO ON A OR B.

Plant: <None>
Substation: 4
Position: MCC-P FB-12
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Page: 190
Date: 2/21/2020

Comments: HAD TO USE A SPARE, AS THE BREAKER THAT WAS IN SERVICE FAILED LT TRIP. BUFFER BUSHINGS NEED TO BE REPLACED.

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Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Customer Ann Arbor, City of
User Ann Arbor WWTP

Plant: <None> Page: 191
Substation: 4 Date: 2/20/2020
Position: MCC-Q
Equipment: 30101 - MOTOR CONTROL CENTER INSULATION

Comments: ORDER #84-64321.

Plant: <None> Page: 192
Substation: 4 Date: 2/20/2020
Position: MCC-Q (01)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Comments: 1-2 NO NAME PHASE B: NO B-PHASE CONDUCTOR FROM BUS TO DISC.
2-2 SECONDARY EFF-4 PUMP 4: LOTO APPLIED, UNABLE TO OPERATE.

Plant: <None> Page: 193
Substation: 4 Date: 2/20/2020
Position: MCC-Q (02)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Comments: FPP-A NO B-PHASE FUSE.

Plant: <None> Page: 195
Substation: 4 Date: 2/20/2020
Position: MCC-Q FB-2
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: BUFFER BUSHINGS SHOULD BE REPLACED.

Plant: <None> Page: 197
Substation: 4 Date: 2/21/2020
Position: PT-UV-2A
Equipment: 56300 - TRANSFORMER TURNS RATIO

Comments: POST-ENERGIZED VOLTAGE CHECK: A-B=496, B-C=497, C-A=496, A-G=284.1, B-G=285.5, C-G=284.7.

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Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Plant: <None> Page: 199
Substation: 4 Date: 2/21/2020
Position: PT-UV-2B
Equipment: 56300 - TRANSFORMER TURNS RATIO

Comments: POST ENERGIZED SECONDARY VOLTAGE: A-B=496, B-C=496, C-A=495, A-G=284.3, B-G=285.4, C-G=284.0.

Plant: <None> Page: 200
Substation: 4 Date: 2/20/2020
Position: SUB 4 MAIN A LOADBREAK
Equipment: 65500 - LIGHTNING ARRESTER TEST

Comments: Y-PHASE TO GROUND IS SUBSTANTIALLY LOWER THAN THE OTHER TWO, BUT STILL PASSING.

Plant: <None> Page: 201
Substation: 4 Date: 2/21/2020
Position: SUB 4 MAIN B
Equipment: 29000C - LOADBREAK DISCONNECT

Comments: NO FUSES BUS CONNECTIONS

Plant: <None> Page: 202
Substation: 4 Date: 2/21/2020
Position: SUB 4 MAIN B
Equipment: 65500 - LIGHTNING ARRESTER TEST

Comments: A-PHASE IS MUCH LOWER THAN B & C PHASES, BUT STILL PASSING.

Plant: <None> Page: 206
Substation: 4 Date: 2/20/2020
Position: SUB 4A & SUB 4B
Equipment: 50100 - LV SWITCHBOARD INSULATION

Comments: NAMEPLATE NOT AVAILABLE. MAIN 4B TO TIE: NEEDS XFMR A-B PHASE REMOVED FROM BUS IN REAR CUBICLES, ALL FUSES FROM METERING CUBICLE & CT CUBICLE TO MEGGER THESE BUSES.

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Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Plant: <None> Page: 214
Substation: 5 Date: 2/28/2020
Position: 52-4 BUS A TRANSFORMER
Equipment: 56200B- TRANSFORMER INSPECTION

Comments: DIRTY - RECOMMEND FULL P/M CLEANING
BACK OF GEAR LEFT TO RIGHT FAN #5 NOT WORKING.

Plant: <None> Page: 215
Substation: 5 Date: 2/28/2020
Position: 52-4 BUS A TRANSFORMER
Equipment: 56325 - TRANS TURNS RATIO (NC)

Comments: ONE FAN NOT WORKING ON BACK SIDE OF GEAR (2ND CLOSEST TO PRIMARY CABLES). MACMILLAN P/N MTRF024001. CLASS "B."
MODEL K4125-519/4. 1/20 HP SINGLE PHASE.

Plant: <None> Page: 221
Substation: 5 Date: 2/27/2020
Position: F2H 800A SPARE
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: INST TRIP TESTED AT 4.

Plant: <None> Page: 222
Substation: 5 Date: 2/28/2020
Position: F3D MCC-53
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: INST & ST TESTED AT 3.

Plant: <None> Page: 223
Substation: 5 Date: 2/28/2020
Position: F3D MCC-53
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST (2)

Comments: POLE 1 = 12, POLE 2 = 18, POLE 3 = 14 - RIGHT SIDE DLRO.
DLRO ABOVE IS LEFT/RIGHT. INST VERIFIED AT 2.

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Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Plant: <None> Page: 224
Substation: 5 Date: 3/5/2020
Position: F4A MCC-54 BUS A
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: SHORT TIME & INST TESTED AT 3.

Plant: <None> Page: 225
Substation: 5 Date: 3/5/2020
Position: F4B MCC-55 BUS A
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: SHORT TIME & INST TESTED AT 3.

Plant: <None> Page: 226
Substation: 5 Date: 3/5/2020
Position: F4D MCC-56 BUS A
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: SHORT TIME & INST TESTED AT 3.

Plant: <None> Page: 227
Substation: 5 Date: 2/27/2020
Position: F5A 800A SPARE
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: INST & STPU TESTED AT 2.

Plant: <None> Page: 228
Substation: 5 Date: 2/27/2020
Position: F5H 800A SPARE
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: INST & STPU TESTED AT 2.

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Comment Summary
Job #AACI207024-1

Plant: <None> Page: 229
Substation: 5 Date: 3/13/2020
Position: F6A MCC-54 BUS B
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: CAT # MDSC083WEA-065GN-MNNNN-NNNAX.
SHORT TIME & INST TESTED AT 3.

Plant: <None> Page: 230
Substation: 5 Date: 3/13/2020
Position: F6B MCC-55 BUS B
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: CAT # MDSC083WEA-065GN-MNNNN-NNNAX.
SHORT TIME & INST TESTED AT 3.

Plant: <None> Page: 231
Substation: 5 Date: 3/6/2020
Position: F6C CFG-2
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: TRIP UNIT BATTERY DEAD.
SHORT & INST TESTED AT 3.

Plant: <None> Page: 232
Substation: 5 Date: 3/13/2020
Position: F6D MCC-56 BUS B
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: CAT # MDSC083WEA-065GN-MNNNN-NNNAX.
SHORT TIME & INST TESTED AT 3.

Plant: <None> Page: 233
Substation: 5 Date: 3/6/2020
Position: F7A MCC-51 BUS B
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST (2)

Comments: TESTED SHORT & INST AT 3.

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Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Plant: <None> Page: 234
Substation: 5 Date: 3/6/2020
Position: F7B MCC-52 BUS B
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: SHORT & INST TESTED AT 3.

Plant: <None> Page: 235
Substation: 5 Date: 3/6/2020
Position: F7C CFG-3
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: SHORT & INST TESTED AT 3.

Plant: <None> Page: 236
Substation: 5 Date: 3/6/2020
Position: F7D MCC-53 BUS B
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: SHORT & INST TESTED AT 3.

Plant: <None> Page: 237
Substation: 5 Date: 2/27/2020
Position: F8B 800A SPARE
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: INST & STPU TESTED AT 2.

Plant: <None> Page: 238
Substation: 5 Date: 2/28/2020
Position: FEEDER F3A
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: ST TESTED AT 3, INST VERIFIED AT 3.

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Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Plant: <None> Page: 239
Substation: 5 Date: 2/28/2020
Position: FEEDER F3B
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: INST & ST TESTED AT 3.

Plant: <None> Page: 240
Substation: 5 Date: 2/28/2020
Position: FEEDER F4C
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: ST & INST TESTED AT 3.

Plant: <None> Page: 245
Substation: 5 Date: 2/28/2020
Position: MCC-51A (MAIN)
Equipment: 15952 - MOLDED CASE CKT BKR SOLID STATE

Comments: STYLE # 4203B99G06.
TRIP UNIT CAT # 8MES800T. TRIP UNIT TYPE: MES3800LS.

Plant: <None> Page: 248
Substation: 5 Date: 3/6/2020
Position: MCC-51B (MAIN)
Equipment: 15952 - MOLDED CASE CKT BKR SOLID STATE

Comments: TRIP UNIT CAT # MES3800LS.

Plant: <None> Page: 252
Substation: 5 Date: 2/28/2020
Position: MCC-52A (MAIN)
Equipment: 15952 - MOLDED CASE CKT BKR SOLID STATE

Comments: STYLE # 4203B99G06. TRIP UNIT CAT # 8MES800T. TRIP UNIT TYPE: MES3800LS.

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Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Plant: <None> Page: 256
Substation: 5 Date: 3/6/2020
Position: MCC-52B (MAIN)
Equipment: 15952 - MOLDED CASE CKT BKR SOLID STATE

Comments: TRIP UNIT CAT # MES3800LS.

Plant: <None> Page: 257
Substation: 5 Date: 2/28/2020
Position: MCC-53A
Equipment: 30101 - MOTOR CONTROL CENTER INSULATION

Comments: TIE IN SEPARATE SECTION NOT COUNTED ON THIS FORM.

Plant: <None> Page: 259
Substation: 5 Date: 2/28/2020
Position: MCC-53A (02)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Comments: NO NAME RETERMINATED B-PHASE DUE TO STRANDS NOT UNDER LUG.

Plant: <None> Page: 261
Substation: 5 Date: 2/28/2020
Position: MCC-53A (MAIN)
Equipment: 15952 - MOLDED CASE CKT BKR SOLID STATE

Comments: STYLE # 6633C81G06. TRIP UNIT CAT # 6LES600T. TRIP UNIT TYPE: LES3600LS.

Plant: <None> Page: 269
Substation: 5 Date: 3/5/2020
Position: MCC-54A (MAIN)
Equipment: 15952 - MOLDED CASE CKT BKR SOLID STATE

Comments: TRIP UNIT CAT # MES3800LS.

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Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Plant: <None> Page: 273
Substation: 5 Date: 3/13/2020
Position: MCC-54B (MAIN)
Equipment: 15952 - MOLDED CASE CKT BKR SOLID STATE

Comments: TRIP UNIT CAT # MES3800LS

Plant: <None> Page: 277
Substation: 5 Date: 3/5/2020
Position: MCC-55A (MAIN)
Equipment: 15952 - MOLDED CASE CKT BKR SOLID STATE

Comments: TRIP UNIT CAT # LES3600LS.

Plant: <None> Page: 281
Substation: 5 Date: 3/13/2020
Position: MCC-55B MAIN
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: TRIP UNIT CAT # LES3600LS.

Plant: <None> Page: 284
Substation: 5 Date: 3/5/2020
Position: MCC-56A (MAIN)
Equipment: 15952 - MOLDED CASE CKT BKR SOLID STATE

Comments: TRIP UNIT CAT # LES3600LS.

Plant: <None> Page: 288
Substation: 5 Date: 3/13/2020
Position: MCC-56B (MAIN)
Equipment: 15952 - MOLDED CASE CKT BKR SOLID STATE

Comments: TRIP UNIT CAT # LES3600LS.

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Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Plant: <None> Page: 289
Substation: 5 Date: 2/28/2020
Position: SUB 5 BUS A
Equipment: 50100 - LV SWITCHBOARD INSULATION

Comments: NEUTRAL BUS DOES NOT RUN THROUGHOUT THE SWITCHGEAR.

Plant: <None> Page: 291
Substation: 5 Date: 3/6/2020
Position: SUB 5 BUS B
Equipment: 50100 - LV SWITCHBOARD INSULATION

Comments: INSTALLED DEVICE COUNT IS FOR BOTH BUS A & B.

Plant: <None> Page: 293
Substation: 5 Date: 2/27/2020
Position: TIE T5B
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Comments: DLRO READINGS (IN MILLIOHMS). LEFT: A = 0.012, B = 0.023, C = 0.019 - INST TRIP. TESTED AT 2. RIGHT: A = 0.029, B = 0.030, C = 0.025.

Plant: <None> Page: 326
Substation: 6 Date: 3/9/2020
Position: SUB 6 TRANSFORMER 1
Equipment: 56000 - TRANS. DIELECTRIC ABSORPTION

Comments: LIGHTNING ARRESTOR MEGGER: A = 3180, B = 6720, C = 6100.

Plant: <None> Page: 329
Substation: 6 Date: 3/9/2020
Position: SUB 6 TRANSFORMER 1 & 2
Equipment: 34001 - CAPACITOR BANK TEST

Comments: * = CAPACITANCE MEASUREMENTS ARE IN NANO FARRADS
100KV BILL MEG AT 2500VD

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Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Customer Ann Arbor, City of
User Ann Arbor WWTP

Plant: <None> Page: 340
Substation: 7 Date: 3/2/2020
Position: MCC-ADM-1
Equipment: 30101 - MOTOR CONTROL CENTER INSULATION

Comments: F. O. # 30951271 -147
3 PHASE 3 WIRE 60 HZ

Plant: <None> Page: 346
Substation: 7 Date: 3/2/2020
Position: MCC-CEB-A & B
Equipment: 30101 - MOTOR CONTROL CENTER INSULATION

Comments: * NO NEUTRAL PRESENT

Plant: <None> Page: 347
Substation: 7 Date: 3/2/2020
Position: MCC-CEB-A (01)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Comments: 125VDC BATTERY CHARGER C-PHASE NOT IN USE. A & B FEED THE CHARGER.

Plant: <None> Page: 355
Substation: 7 Date: 3/2/2020
Position: PT-UA-1A
Equipment: 56325 - TRANS TURNS RATIO (NC)

Comments: PART NO. 158684.
ZIG0ZAG WYE SECONDARY.

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Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Plant: <None> Page: 359
Substation: 7 Date: 3/2/2020
Position: SUB 7
Equipment: 50400 - SWITCHBOARD BUS CONNECTION TEST

Comments: LUGS IN FAR RIGHT CABINET ON BACK SIDE ARE STARTING TO LEAK NO-OX FROM INSIDE LUGS BEHIND THE PLUGS. LUGS ARE SPARES FOR A-SIDE EQUIPPED SPACE.

Plant: <None> Page: 360
Substation: 7 Date: 3/2/2020
Position: SUB 7 TRANSFORMER 1
Equipment: 56000 - TRANS. DIELECTRIC ABSORPTION

Comments: PRIMARY VOLTAGE RATED CURRENT: 62.5 - 64.0 - 65.6 - 67.3 - 69.1 AMPERES.

Plant: <None> Page: 361
Substation: 7 Date: 3/2/2020
Position: SUB 7 TRANSFORMER 1
Equipment: 56200B- TRANSFORMER INSPECTION

Comments: PRIMARY VOLTAGE RATED CURRENT: 62.5 - 64.0 - 65.6 - 67.3 - 69.1 AMPERES.

Plant: <None> Page: 362
Substation: 7 Date: 3/2/2020
Position: SUB 7 TRANSFORMER 1
Equipment: 56300 - TRANSFORMER TURNS RATIO

Comments: PRIMARY VOLTAGE RATED CURRENT: 62.5 - 64.0 - 65.6 - 67.3 - 69.1 AMPERES.

Plant: <None> Page: 364
Substation: 7 Date: 3/2/2020
Position: SUB 7 TRANSFORMER 1
Equipment: 80111 - CAPACITOR TEST FORM

Comments: MEGGER: X = 138.1 MEGOHMS, Y = 138.1 MEGOHMS, Z = 139.8 MEGOHMS.
CAPACITOR S/N (2) 500877223-40-0001, (3) 500877223-40-0005.

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Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Plant: <None> Page: 365
Substation: 7 Date: 3/3/2020
Position: SUB 7 TRANSFORMER 2
Equipment: 56000 - TRANS. DIELECTRIC ABSORPTION

Comments: PRIMARY VOLTAGE RATED CURRENT: 62.5 - 64.0 - 65.6 - 67.3 - 69.1 AMPERES.

Plant: <None> Page: 366
Substation: 7 Date: 3/3/2020
Position: SUB 7 TRANSFORMER 2
Equipment: 56200B- TRANSFORMER INSPECTION

Comments: PRIMARY VOLTAGE RATED CURRENT: 62.5 - 64.0 - 65.6 - 67.3 - 69.1 AMPERES.

Plant: <None> Page: 367
Substation: 7 Date: 3/3/2020
Position: SUB 7 TRANSFORMER 2
Equipment: 56300 - TRANSFORMER TURNS RATIO

Comments: PRIMARY VOLTAGE RATED CURRENT: 62.5 - 64.0 - 65.6 - 67.3 - 69.1 AMPERES.

Plant: <None> Page: 369
Substation: 7 Date: 3/3/2020
Position: SUB 7 TRANSFORMER 2
Equipment: 80111 - CAPACITOR TEST FORM

Comments: MEGGER: X = 139 MEGOHMS, Y = 139 MEGOHMS, Z = 137 MEGOHMS.
CAP SERIAL NUMBERS: (2) 50087723-40-0007, (3) 500877223-40-0008.

Plant: <None> Page: 375
Substation: 8 Date: 3/11/2020
Position: 8A-XFMR 1
Equipment: 56200B- TRANSFORMER INSPECTION

Comments: LOOSE CORE SUPPORTS ON BOTH THE OUTSIDE COILS OF XFMR. CORRECTED ON 3/11/20.

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Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Plant: <None> Page: 382
Substation: 8 Date: 3/12/2020
Position: BLOWER 2
Equipment: 16100 - VACUUM CIRCUIT BREAKER

Comments: MANUALLY OPERATED. NO CHARGING STATION.
ELECTRICALLY OPERATED IN CUBICLE.

Plant: <None> Page: 384
Substation: 8 Date: 3/12/2020
Position: CPT-A / CPT-B
Equipment: 27451 - CONTROL POWER TRANS TEST (NC)

Comments: SECONDARY VOLTAGE = 120/240

Plant: <None> Page: 387
Substation: 8 Date: 3/11/2020
Position: MAIN A
Equipment: 29000C - LOADBREAK DISCONNECT

Comments: HIPOT CLOSED, POLE 1 = 1500, POLE 2 = 1100, POLE 3 = 1000.
HIGH VOLTAGE LEAD TO THE XFMR WAS RESTING ON THE MICARTA CROSS SUPPORT. REROUTED CABLE SO IT WAS NOT TOUCHING. 3/11/2020.

Plant: <None> Page: 388
Substation: 8 Date: 3/11/2020
Position: MAIN A
Equipment: 65500 - LIGHTNING ARRESTER TEST

Comments: GROUND CONNECTION RESISTANCE : A X=0.2 OHMS Y=0.2 OHMS Z=0.2 OHMS
B X=0.2 OHMS Y=0.2 OHMS Z=0.2 OHMS

Plant: <None> Page: 389
Substation: 8 Date: 3/12/2020
Position: MAIN B
Equipment: 16100 - VACUUM CIRCUIT BREAKER

Comments: MANUALLY OPERATED. NO CHARGING STATION.
ELECTRICALLY OPERATED IN CUBICLE.

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(937) 439-9660

Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Plant: <None> Page: 390
Substation: 8 Date: 3/12/2020
Position: MAIN B
Equipment: 29000C - LOADBREAK DISCONNECT

Comments: HIPOT CLOSED: POLE 1 = 140, POLE 2 = 96, POLE 3 = 140.

Plant: <None> Page: 392
Substation: 8 Date: 3/11/2020
Position: PAB-E1
Equipment: 29000C - LOADBREAK DISCONNECT

Comments: UNABLE TO HIPOT DUE TO CABLES ON LINE AND SELF GROUNDING SWITCH ON LOAD. HOURS = 139987.

Plant: <None> Page: 393
Substation: 8 Date: 3/11/2020
Position: PAB-E1
Equipment: 31300 - MEDIUM VOLTGE VACUUM MOTOR START

Comments: POLE TO POLE TAKEN IS OPEN POSITION DUE TO LOAD. UNABLE TO MEG LOAD TO FRAME DUE TO LOAD. DLRO # INCLUDE FACTORY WIRING FROM LINE TO LOAD.

Plant: <None> Page: 394
Substation: 8 Date: 3/11/2020
Position: PAB-E1 BLOWER NO.1
Equipment: 45000G2 - OVERCURRENT RELAY W/GRND

Comments: FOUND 50/51-1 TARGET LED NOT SET TO SEAL IN. CORRECTED 3-11-2020.

Plant: <None> Page: 395
Substation: 8 Date: 3/12/2020
Position: PAB-E2
Equipment: 29000C - LOADBREAK DISCONNECT

Comments: UNABLE TO MEGGER LOAD TO FRAME DUE TO SELF-GROUNDING ON LOAD SIDE.

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Comment Summary
Job #AACI207024-1

NETA ACCREDITED COMPANY

Plant: <None> Page: 396
Substation: 8 Date: 3/11/2020
Position: PAB-E2
Equipment: 31300 - MEDIUM VOLTGE VACUUM MOTOR START

Comments: P TO P LINE SIDE ONLY ON MEGGER TEST DUE TO LOAD. LOAD TO FRAME UNABLE TO MEGGER DUE TO LOAD. UNABLE TO HIPOT DUE TO LOAD. DLRO # INCLUDE FACTORY WIRED JUMPERS LINE TO BUS. HIPOT INCLUDES BOTTOM OF FUSE CLIPS TO LINE SIDE OF MOTOR STARTER.

Plant: <None> Page: 398
Substation: 8 Date: 3/11/2020
Position: PAB-E3
Equipment: 29000C - LOADBREAK DISCONNECT

Comments: UNABLE TO HIPOT DUE TO CABLES ON LINE SIDE AND SELF GROUNDING ON LOAD SIDE. HOURS = 122388.

Plant: <None> Page: 399
Substation: 8 Date: 3/11/2020
Position: PAB-E3
Equipment: 31300 - MEDIUM VOLTGE VACUUM MOTOR START

Comments: POLE TO POLE & POLE TO FRAME LINE SIDE ONLY. LOAD SIDE CONNECTED TO LOAD. DLRO # INCLUDE MANUFACTURERES WIRING FROM STARTER TRUCK TO LOAD TERMINATION POINT.

Plant: <None> Page: 402
Substation: 8 Date: 3/10/2020
Position: SPARE A
Equipment: 45000G2 - OVERCURRENT RELAY W/GRND

Comments: RELAY PROGRAMMED AND TESTED AT SAME PARAMATERS AS SUB 6 FEEDER POSITIONS.

Plant: <None> Page: 404
Substation: 8 Date: 3/9/2020
Position: SPARE B
Equipment: 45000G2 - OVERCURRENT RELAY W/GRND

Comments: RELAY PROGRAMMED AND TESTED AT SAME PARAMATERS AS SUB 6 FEEDER POSITIONS.

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Job #AACI207024-1

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Plant: <None> Page: 411
Substation: 8 Date: 3/11/2020
Position: SUB 8-4160 MAIN
Equipment: 65500 - LIGHTNING ARRESTER TEST

Comments: GROUND CONNECTION RESISTANCE : A X=0.1 OHMS Y=0.1 OHMS Z=0.1 OHMS
B X=0.2 OHMS Y=0.2 OHMS Z=0.2 OHMS

Plant: <None> Page: 413
Substation: 8 Date: 3/12/2020
Position: VT B-2
Equipment: 27200 - VOLTAGE TRANSFORMER TEST

Comments: *= CATALOG NO. PTG3-2-60-422-FFGC
SECONDARY VOLTAGE = 120/240

Plant: <None> Page: 417
Substation: GEN Date: 3/4/2020
Position: BUS #3
Equipment: 50050 - MV SWITCHBOARD HIPOT

Comments: HIPOT WITH CABLES REMOVED & ALL 3 BREAKERS CLOSED.

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Deficiency Summary
Job #AACI207024-1

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Customer Ann Arbor, City of
User Ann Arbor WWTP

Plant: <None> Page: 1
Substation: !1 Date: 2/24/2020
Position: MAIN A & B METERS
Equipment: !18500 - DEFICIENCIES LOCATED

Deficiencies: CT CIRCUIT SHORTING SCREWS ARE STILL IN PLACE, NOT REQUIRING CURRENT TO FLOW THROUGH METERS, CAUSING CURRENT AND POWER SHOWN ON METERS TO BE INACCURATE. VERIFY CT CIRCUIT IS COMPLETE TO METER AND REMOVE SHORTING SCREWS.

Plant: <None> Page: 2
Substation: !13.2 kV Date: 5/8/2020
Position: 52T & 52 1B
Equipment: !18500 - DEFICIENCIES LOCATED

Deficiencies: TRIP/CLOSE BREAKER CONTROL HANDLES AT DIGITAL MASTER CONTROL PANEL DISPLAYS A GREEN LIGHT INDICATING THE BREAKER IS OPEN. THIS LIGHT IS STILL LIT AFTER REMOVING BREAKER FROM ITS CUBICLE. IN THIS INSTANCE, ALL LIGHTS SHOULD GO OUT.

Plant: <None> Page: 3
Substation: !13.2 kV Date: 5/12/2020
Position: BUS 1 DIFF. RELAY
Equipment: !18500 - DEFICIENCIES LOCATED

Deficiencies: FOUND 87A INPUT TO BE APPROX. 25% OUT OF SPEC. REPAIRS COMPLETED ON 5/12/2020.

Plant: <None> Page: 4
Substation: !13.2 kV Date: 5/13/2020
Position: BUS 2
Equipment: !18500 - DEFICIENCIES LOCATED

Deficiencies: A PHASE BUS MAY HAVE A LOOSE CONNECTION BETWEEN SECTION 11 AND SECTION 15. DLRO TEST VALUES INDICATE THE A PHASE BUS HAS A MUCH HIGHER RESISTANCE THAN THE OTHER TWO PHASES.

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Deficiency Summary
Job #AACI207024-1

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Plant: <None> Page: 5
Substation: !2 Date: 2/18/2020
Position: MAIN A LINE METER
Equipment: !18500 - DEFICIENCIES LOCATED

Deficiencies: PANEL METER, SQUARE D POWERLOGIC PM 800 NOT WORKING. ERROR "OS MISSING" SHOWN ON SCREEN.

Plant: <None> Page: 6
Substation: !4 Date: 2/21/2020
Position: LIGHTING PANEL N
Equipment: !18500 - DEFICIENCIES LOCATED

Deficiencies: THE BREAKER INSIDE THE BUCKET WILL NOT SHUT OFF. BREAKER WILL NOT OPEN IF CALLED UPON TO DO SO DURING A FAULT. PANEL BEING FED BY THIS POSITION DOES HAVE A MAIN BREAKER. REPLACE BREAKER.

Plant: <None> Page: 7
Substation: !4 Date: 2/20/2020
Position: MAIN BREAKER MB-1
Equipment: !18500 - DEFICIENCIES LOCATED

Deficiencies: BREAKER DOES NOT TRIP. DEFECTIVE ACTUATOR. WORN BUFFER BUSHINGS. REPLACE TRIP ACTUATOR AND BUFFER BUSHINGS.

Plant: <None> Page: 8
Substation: !4 Date: 2/21/2020
Position: MAIN BREAKER MB-2
Equipment: !18500 - DEFICIENCIES LOCATED

Deficiencies: BREAKER WILL NOT TRIP. ACTUATOR IS DEFECTIVE. SUB 4 HAS TO BE SINGLE-ENDED UNTIL A MAIN IS REPAIRED. REPLACE ACTUATOR, OR RETROFIT WITH AC-PRO. REPLACE BUFFER BUSHINGS.

Plant: <None> Page: 9
Substation: !4 Date: 2/21/2020
Position: MCC-N
Equipment: !18500 - DEFICIENCIES LOCATED

Deficiencies: BROKEN DISCONNECT HANDLE. THE EQUIPMENT COULD BE ON, BUT LOOKING AT THE DISCONNECT HANDLE, IT COULD APPEAR TO BE OFF. REPLACE DISCONNECT HANDLE.

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Deficiency Summary
Job #AACI207024-1

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Plant: <None> Page: 10
Substation: !4 Date: 3/5/2020
Position: MCC-N & MCC-M
Equipment: !18500 - DEFICIENCIES LOCATED

Deficiencies: MCC-N & MCC-M ATSs HAVE EMERGENCY FEEDS TIED TO EACH OTHER. IF ATSs ARE INTENDED TO OPERATE, ANOTHER EMERGENCY SOURCE WILL NEED TO BE CONNECTED.

Plant: <None> Page: 11
Substation: !4 Date: 2/20/2020
Position: MCC-Q (SEC. 5) LP-Q
Equipment: !18500 - DEFICIENCIES LOCATED

Deficiencies: PLASTIC ON/OFF HANDLE IS BROKEN. THE HANDLE WAS REMOVED. PARTS ARE BEING OBTAINED BY UIS. POSITION IS OPERABLE WITHOUT HANDLE, HOWEVER, USE CAUTION! LIVE PARTS ARE EXPOSED DURING OPERATION WITH DOOR OPEN.

Plant: <None> Page: 12
Substation: !4 Date: 3/5/2020
Position: SUB 4
Equipment: !18500 - DEFICIENCIES LOCATED

Deficiencies: CONTROLS ARE NOT WORKING WITH CONTROL POWER FED FROM A-SIDE. FURTHER INVESTIGATION IS REQUIRED. A TEMPORARY SOLUTION IS TO SWITCH CONTROL POWER TO B-SIDE AND LEAVE IN MANUAL.

Plant: <None> Page: 13
Substation: !4 Date: 2/21/2020
Position: SUB 4 PANEL METERS
Equipment: !18500 - DEFICIENCIES LOCATED

Deficiencies: DIGITAL PANEL METERS ON BOTH SIDES OF SWITCHBOARD ARE MALFUNCTIONING. REPLACE BOTH PANEL METERS.

Plant: <None> Page: 14
Substation: !5 Date: 3/2/2020
Position: F2H 800A SPARE
Equipment: !18500 - DEFICIENCIES LOCATED

Deficiencies: TRIP UNIT FAILS TO PASS MORE THAN 0.5 AMPS WITH SI TEST. REPLACE TRIP UNIT & RETEST.

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Deficiency Summary
Job #AACI207024-1

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Plant: <None> Page: 15
Substation: !8 Date: 3/12/2020
Position: MAIN A RELAY
Equipment: !18500 - DEFICIENCIES LOCATED

Deficiencies: RELAY SETTINGS DIFFER FROM MAIN B & ORIGINAL SPECS.

Plant: <None> Page: 16
Substation: !8 Date: 3/12/2020
Position: PAB-E3
Equipment: !18500 - DEFICIENCIES LOCATED

Deficiencies: INTERLOCK AUX CONTACT MAY PREVENT CONTROL POWER WORKING AFTER LOADBREAK SWITCHING.

Plant: <None> Page: 29
Substation: 1 Date: 2/25/2020
Position: MCC-D (02)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Deficiencies: **DLRO WOULD NOT SETTLE ON A NUMBER. OPERATED SWITCH MULTIPLE TIMES & STILL WOULD NOT SETTLE. BAD B-PHASE CONTACT. BUCKET NOT IN USE.

Plant: <None> Page: 31
Substation: 1 Date: 2/25/2020
Position: MCC-D (04)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Deficiencies: ROTOR F-6-3 DOOR INTERLOCK WILL NOT ALLOW DISCONNECT TO OPERATE WITH DOOR CLOSED.

Plant: <None> Page: 62
Substation: 13.2 kV Date: 5/12/2020
Position: BUS #1 & #2
Equipment: 50400 - SWITCHBOARD BUS CONNECTION TEST

Deficiencies: A PHASE MAY HAVE A LOOSE CONNECTION BETWEEN SECTION 11 AND SECTION 15. FURTHER INVESTIGATION REQUIRED IN NEAR FUTURE.

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Deficiency Summary
Job #AACI207024-1

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Plant: <None> Page: 135
Substation: 3 Date: 2/27/2020
Position: MCC-WBB-B (02)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Deficiencies: *SPARE BUCKET WAS MOVED TO MCC-WPB-B (ATS-WPB). THE DEFECTIVE BUCKET FROM MCC-WPB-B WAS MOVED TO FILL THE SPARE SPACE IN THIS MCC. ALL LUGS WERE NEVER TIGHTENED ONTO THE WIRE, CAUSING MAJOR OVERHEATING / MELTING ON B-PHASE & EVIDENCE OF (OVER-->)

Plant: <None> Page: 147
Substation: 3 Date: 2/27/2020
Position: MCC-WPB-B (01)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Deficiencies: *ATS-WPB LUGS NEVER TIGHTENED. DAMAGE TO OCPD B-PHASE. RECOMMEND REPLACEMENT. 60A POWERPACT HJ060 SINGLE BUCKET. UIS LOCATED AN HJ060 SPARE IN MCC-WBB-B. WE REMOVED THE DEFECTIVE BUCKET & REPLACED IT WITH THE SPARE THAT WAS LOCATED. (OVER-->

Plant: <None> Page: 172
Substation: 4 Date: 2/20/2020
Position: MAIN BRKR MB-1
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Deficiencies: BREAKER DOES NOT TRIP. DEFECTIVE ACTUATOR.

Plant: <None> Page: 174
Substation: 4 Date: 2/21/2020
Position: MAIN BRKR MB-2
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST (2)

Deficiencies: ACTUATOR IS DEFECTIVE. BREAKER WILL NOT TRIP.

Plant: <None> Page: 183
Substation: 4 Date: 2/21/2020
Position: MCC-N (02)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Deficiencies: *GOULD ITE MOLDED CASE SWITCH. TYPE: ETS 225A. CAT #FJ3-S225. BREAKER WILL NOT SHUT OFF.

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Deficiency Summary
Job #AACI207024-1

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Plant: <None> Page: 184
Substation: 4 Date: 2/21/2020
Position: MCC-N (03)
Equipment: 15600 - FUSE DISCONNECT INSP. TEST

Deficiencies: CP-70: BROKEN DISCONNECT HANDLE. B-PHASE NO WIRE.

Plant: <None> Page: 219
Substation: 5 Date: 3/6/2020
Position: 52-7B TRANSFORMER
Equipment: 56200B- TRANSFORMER INSPECTION

Deficiencies: (LEFT TO RIGHT) FRONTSIDE FAN #4 NOT WORKING & ON BACK SIDE FAR LEFT FAN NOT WORKING.

Plant: <None> Page: 221
Substation: 5 Date: 2/27/2020
Position: F2H 800A SPARE
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Deficiencies: BREAKER FAILS TO PASS MORE THAN 0.5 AMPS ON SI TEST. REPLACE TRIP UNIT.

Plant: <None> Page: 238
Substation: 5 Date: 2/28/2020
Position: FEEDER F3A
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Deficiencies: BATTERY NEEDS TO BE REPLACED.

Plant: <None> Page: 239
Substation: 5 Date: 2/28/2020
Position: FEEDER F3B
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Deficiencies: BATTERY NEEDS TO BE REPLACED.

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Deficiency Summary
Job #AACI207024-1

Plant: <None> Page: 240
Substation: 5 Date: 2/28/2020
Position: FEEDER F4C
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Deficiencies: TRIP UNIT BATTERY NEEDS REPLACEMENT.

Plant: <None> Page: 293
Substation: 5 Date: 2/27/2020
Position: TIE T5B
Equipment: 15000 - LOW VOLT. PWR. CKT. BKR. TEST

Deficiencies: CONTROL SWITCH DOES NOT OPERATE BREAKER. FURTHER INVESTIGATION IS REQUIRED.

Plant: <None> Page: 381
Substation: 8 Date: 3/11/2020
Position: BLOWER 1
Equipment: 16100 - VACUUM CIRCUIT BREAKER

Deficiencies: OPERATED 5 TIMES. COUNTER NOT FUNCTIONAL.

Plant: <None> Page: 398
Substation: 8 Date: 3/11/2020
Position: PAB-E3
Equipment: 29000C - LOADBREAK DISCONNECT

Deficiencies: INTERLOCK AUX CONTACT DOES NOT ALLOW CONTROL POWER TO PASS IF LOADBREAK IS OPENED AND RECLOSED.

CITY OF ANN ARBOR WRRF

August 25, 2026

Electrical Preventative Maintenance

RFP# 26-43

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