

ONLINE PARTIAL DISCHARGE TESTING SPECIFICATION

1.01 OBJECTIVE

- A. The purpose for this project is to develop data that will assist in assessing the condition of our medium voltage cable systems. Data collected during this project shall be of a nature that will enable data trending to assess degradation over time.
- B. Since it is impractical to remove our medium voltage cable circuits from service for the purpose of performing condition assessment testing, this project and all associated work shall be done while the cables, accessories and all parts of the electrical system remain in service and energized.

1.02 PROJECT SCOPE (The Electrical Testing Firm shall:)

- A. Perform partial discharge testing on each of the cable circuits identified by Attachment 1 (site single-line drawing).
- B. Perform the work while the medium voltage circuits and equipment remain in service and energized. The cable circuits shall not be disconnected or de-energized and the testing shall not expose the cables to voltages that exceed normal operating voltage.
- C. Use a time or frequency domain detection process incorporating radio frequency current transformer (RF CT) sensors. The detection system shall have a PD detection range that at least covers the frequency range of 10kHz to 300MHz. The testing shall be performed in a manner that complies with the requirements of:
 - IEEE Standard 400, IEEE Guide for Field Testing and Evaluation of the Insulation of Shielded Power Cable Systems.
 - IEEE Draft Standard 400.3 IEEE Guide for Partial Discharge Testing of Shielded Power Cable Systems in a Field Environment.
- D. Provide a comprehensive report that identifies numerically and graphically the magnitude of partial discharge detected for each circuit and each cable section tested. The report shall provide commentary regarding the significance of the PD detected and shall also provide conclusions and recommendations for corrective action as appropriate. In addition, the test report shall include the following:
 - Summary of project
 - Description of circuits and cable sections tested
 - Identification of the testing organization
 - Identification of the test equipment used
 - Date work was performed
 - Identification of the person that performed the tests

1.03 QUALITY ASSURANCE

- A. The Electrical Testing Firm shall provide the necessary material, equipment, labor, and technical supervision to perform the inspections and tests described herein.
- B. The Electrical Testing Firm shall be an independent, third party, testing organization which can function as an unbiased testing authority, professionally independent of the manufacturers, suppliers, and installers of equipment or systems evaluated by the testing organization.
- C. The Electrical Testing Firm shall be regularly engaged in the testing of electrical equipment devices, installations, and systems, shall have a minimum of 3 years field experience in Online Partial Discharge testing of MV cables, and shall have completed at least 100 - Online Partial Discharge MV cable testing projects.
- D. The Electrical Testing Firm shall utilize engineers and technicians that are experienced and regularly perform electrical power system testing.
- E. Personnel performing these electrical tests and inspections shall be trained and certified to perform online partial discharge testing on cable systems. These individuals shall be capable of conducting the tests in a safe manner and with complete knowledge of the hazards involved. They must evaluate the test data and make an informed judgment regarding the cable circuits tested.

1.04 SAFETY AND PROCEDURAL REQUIREMENTS

- A. Safety and Precautions
This document does not include specific safety procedures. It is recognized that tests and inspections set forth by this RFQ may be potentially hazardous. Consequently, individuals performing these tests must be capable of conducting these tests in a safe manner and with complete knowledge of the hazards involved. Each person involved in this project must be provided with and use appropriate PPE.
- B. Safety practices that shall be followed include, but are not limited to, the following:
 - Occupational Safety and Health Act
 - *Accident Prevention Manual for Industrial Operations*, National Safety Council
 - Applicable state and local safety operating procedures
 - Owner's safety practices
- C. Perform all testing work in accordance with the applicable codes and standards of the following agencies except as provided otherwise herein:
 1. InterNational Electrical Testing Association – NETA ATS latest Edition: Acceptance Testing Specifications, and/or NETA MTS latest Edition: Maintenance Testing Specifications.
 2. National Fire Protection Association – NFPA
 - a. ANSI/NFPA 70: National Electrical Code
 - b. ANSI/NFPA 70B: Recommended Practice for Electrical Equipment Maintenance
 - c. NFPA 70E: Electrical Safety Requirements for Employee Workplaces

1.05 TEST INSTRUMENTS

- A. All test equipment shall be in good mechanical and electrical condition.
- B. The electrical testing firm shall have a calibration program that assures that all applicable test instruments are maintained within rated accuracy.
- C. The accuracy shall be directly traceable to the National Institute of Standards and Technology (NIST).
- D. Instruments shall be calibrated in accordance with the following frequency schedule:
 - 1. Field instruments: Analog and Digital, 12 months maximum
 - 2. Laboratory instruments: 12 months
 - 3. Leased specialty equipment: 12 months where accuracy is guaranteed by lessor
- E. Dated calibration labels shall be visible on all test equipment or calibration certification shall be included in the project report discussed above.
- F. Records, which show date and results of instruments calibrated or tested, shall be kept up-to-date.
- G. Up-to-date instrument calibration instructions and procedures shall be maintained for each test instrument.
- H. The calibrating standard shall be of higher accuracy than that of the instrument tested.

1.06 DIVISION OF RESPONSIBILITY

- A. The Electrical Testing Firm shall notify the customer immediately upon the discovery of any customer electrical equipment that is defective, dangerous or obviously unreliable.
- B. The Electrical Testing Firm will be supplied with the following for the purposes of completing this project:
 - Accurate single-line schematic and physical layout drawings identifying each cable circuit to be tested
 - Security clearance and access to each point of attachment where PD measurements will be made
 - At least one full-time and qualified site representative to accompany the Electrical Testing Firm personnel to ensure access and security issues are resolved in a timely manner and to ensure identification and adherence to any facility-specific safety and procedural requirements

1.06 QUALIFIED FIRMS

Electrical Reliability Services, Inc.
8760 Orion Place, Suite 110
Columbus, OH 43240
Phone: 888-468-6384

High Voltage Maintenance Corp.
5100 Energy Drive
Dayton, OH 45414
Phone: 866-486-8326