Electrical Utility Field Testing for Medium-Voltage Cables

This document outlines the various methods for field testing medium-voltage cable either during or after installation.

Visual Inspection: Visual inspection is recommended for all incoming material as cable could be damaged during shipment and delivery. If the reel wrap is punctured, or damage is noted once reel wrap is removed, it is important to evaluate the extent of the damage. There is a possibility that a simple jacket repair (See Utility Technical Bulletin UTB-020 – Medium-Voltage Power Cable Jacket Repair) may resolve any issues found. More extreme problems should be resolved between the cable manufacturer, the shipment company, and the customer, as replacement material may be required.

Insulation Resistance (Megger) Testing:
The Insulation Resistance Test is not recommended for medium-voltage cables. The limitation for this test is in its interpretation of the test measurements. The significance of the data is very dependent on the environment in which the test measurements are taken. If a user chooses to conduct this test, the cable ends will need to be cut-back and prepped to remove the conductive graphite paint applied to the ends by the manufacturing plant.

DC Cable Testing:
DC Cable Testing is still included in the industry cable standards as tests that are carried out during the cable installation phase, and then at reduced voltages during the first 5 years of the service life of the cable. The dc cable test is primarily utilized to determine if gross problems exist on new cable systems (damage or improperly installed accessories). DC cable testing is also outlined in Section 6 of our Cable Installation Manual[1] (see pages 80-84) available on the web at: *General Cable - Cable Installation Manual for Power and Control Cables*

The dc or VLF (Very Low Frequency – typically 0.1 Hz) voltage tests are typically “withstand” tests that are suitable for identifying gross defects. A prescribed elevated voltage is applied to the cable, and if it does not fail after a specified amount of time, the tested cable circuit is considered good. In conjunction with a dc test, the test voltage may be applied slowly in incremental steps up to the maximum voltage specified providing more detailed information on current leakage through the cable and terminations, which may indicate a potential installation problem or defect.

Other Tests:
There are more technically advanced (and expensive) tests available such as field partial discharge (PD) testing utilizing 60 Hz ac voltage or VLF dissipation factor testing utilizing ac or VLF voltage. Neither the dc test nor the VLF dissipation factor test can locate potential problems unless the cable actually fails during the testing. Partial discharge testing can pinpoint potential problems (defects that are emitting partial discharges) along the cable run before the cable actually fails. For partial discharge or VLF dissipation factor testing, cable testing experts need to be brought in to conduct this specialized testing and interpretation of the results.

These tests are outlined in the following IEEE Standards:

IEEE 400, the IEEE Guide for Field Testing and Evaluation of the Insulation of Shielded Power Cable Systems (this is the omnibus guide for other more specific guides such as these listed below.)

IEEE 400.1, the IEEE Guide for Field Testing of Laminated Dielectric, Shielded Power Cable Systems Rated 5 kV and Above With High Direct Current Voltage

IEEE 400.2, the IEEE Guide for Field Testing of Shielded Power Cable Systems Using Very Low Frequency (VLF) IEEE 400.3, the IEEE Guide for Partial Discharge Testing of Power Cable Systems in a Field Environment

IEEE 400.4, the IEEE Guide for Field Testing of Shielded Power Cable Systems Rated 5 kV and Above with Damped Alternating Current (DAC) Voltage

[1] General Cable - Cable Installation Manual for Power and Control Cables – 9th Edition – GC Publication Form No. INS-0095-0911

tel: (800) 237-2726
info@generalcable.com