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IEEE Guide for Field Testing and Evaluation of the Insulation of Shielded Power Cable Systems Rated 5 kV and Above

IEEE Power & Energy Society

Sponsored by the
Insulated Conductors Committee

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USA

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Introduction

This introduction is not part of IEEE Std 400-2012, IEEE Guide for Field Testing and Evaluation of the Insulation of Shielded Power Cable Systems Rated 5 kV and Above.

This omnibus guide is a revision of the 2001 standard. It provides an overview of available methods for performing electrical tests in the field on shielded power cable systems. It is intended to help the reader select a test that is appropriate for a specific situation of interest. It provides a brief description of all the known sources used to perform field tests with a short discussion of specific tests. The material presented is descriptive and tutorial and does not address the evaluation of test results or the specification of test voltage levels and time of application.

There are several principal changes from the 2001 standard. The document structure is rearranged. Instead of listing and discussing each test method in individual clauses, this edition includes a clause that discusses general considerations for field testing of cable systems followed with another clause in which field testing methods are categorized by their functions and introduced as subclauses. Oscillating wave is renamed damped AC voltage in this edition. Advantages and disadvantages of the test methods are tabulated by category, which makes it easier for comparison between tests with different types of voltage sources. A number of test methods are added in a category named "Dielectric Response" along with dissipation factor and DC leakage current: recovery voltage, polarization/depolarization current, and dielectric spectroscopy. Time Domain Reflectometry and Thermal Infrared Imaging are also added as complementary insulation tests.

Additional details are provided in "point" documents, such as IEEE Std 400.1™, IEEE Guide for Field Testing of Laminated Dielectric, Shielded Power Cable Systems Rated 5 kV and Above with High Direct Current Voltage; IEEE Std 400.2™, IEEE Guide for Field Testing of Shielded Power Cable Systems Using Very Low Frequency (VLF); IEEE Std 400.3™, IEEE Guide for Partial Discharge Testing of Shielded Power Cable Systems in a Field Environment; and IEEE P400.4™[a], Draft Guide for Field-Testing of Shielded Power Cable Systems Rated 5 kV and Above with Damped Alternating Current Voltage (DAC). If there is a conflict between this document and the "point" documents, then the "point" documents should be considered as the definitive reference.

[a]This IEEE standards project was not approved by the IEEE-SA Standards Board at the time this publication went to press. For information about obtaining a draft, contact the IEEE.

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1. Overview

1.1 Scope

This guide lists the various field test methods that are currently available or under development. The guide covers shielded, insulated power cable systems rated 5 kV and above. The guide describes the tests and gives advantages and disadvantages, suggested applications, and typical results. Complete guides covering some of the test methods listed are available in the form of IEEE 400 "point" documents.

1.2 Purpose

The purpose of this guide is to provide an overview of the various test methods available for evaluating the insulation of shielded cable systems in the field, and to assist cable owners in selecting one or more appropriate tests for a specific application.

2. Normative references

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used, so each referenced document is cited in text and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.