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IEEE Standard for High-Voltage Testing Techniques

IEEE Power and Energy Society

Sponsored by the
Power System Instrumentation and Measurements Committee

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USA

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Power System Instrumentation and Measurements Committee
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Approved 6 March 2013

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Abstract: Standard methods and basic techniques for high-voltage testing applicable to all types of apparatus for alternating voltages, direct voltages, lightning impulse voltages, switching impulse voltages, and impulse currents are established in this standard. Sections that deal with alternating voltage, direct voltage, and impulse testing are combined in this revision to organize the technical content for ease of use. In addition, the concept of measurement uncertainty in evaluation of high-voltage and high-current tests is introduced in this version.

Keywords: atmospheric corrections, high-current testing, high-voltage measurements, high-voltage testing, IEEE 4™, impulse currents, impulse voltages, testing

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Introduction

This introduction is not part of IEEE Std 4-2013, IEEE Standard for High-Voltage Testing Techniques.

The current revision of this standard is the eighth edition of this document as a separate standard. The subject had been addressed in the earliest standardization report of the American Institute of Electrical Engineers (AIEE) in 1889 and had been substantially elaborated upon in the subsequent reports issued from 1902 to 1933. When it was decided, in 1922, to reorganize the AIEE's standards into separate sections, the measurement of test voltages became one of the first subjects to be designated for a separate publication. The first edition was published in 1928.

This standard establishes standard methods and basic techniques for high-voltage testing. The standard is applicable to all types of apparatus for alternating voltages, direct voltages, lightning impulse voltages, switching impulse voltages, and impulse currents.

The following standards have been used to prepare this document:

IEC 60052, Recommendations for voltage measurement by means of standard air gaps.

IEC 60060-1, High-voltage test techniques—Part 1: General definitions and test requirements.

IEC 60060-2, High-voltage test techniques—Part 2: Measuring systems.

IEC 60060-3, High-voltage test techniques—Part 3: Definitions and requirements for on-site testing.

IEC 60270, Partial discharge measurements.

IEC 60507, Artificial pollution tests on high-voltage insulators to be used on a.c. systems.

IEC 61083-1, Instruments and software used for measurement in high-voltage impulse tests—Part 1: Requirements for instruments.

IEC 61083-2, Digital recorders for measurements in high-voltage impulse tests—Part 2: Evaluation of software used for the determination of parameters of impulse waveforms.

IEC 61245, Artificial pollution tests on high-voltage insulators to be used on d.c. systems.

IEC 62475, High-current test techniques: Definitions and requirements for test currents and measuring systems.

ISO/IEC Guide 98-3, Uncertainty of measurement—Part 3: Guide to the expression of uncertainty in measurements (GUM).

For ease of use, this revision organizes the technical content in such a way as to combine sections that deal with alternating voltage, direct voltage, and impulse voltage testing. In addition, this version introduces the concept of measurement uncertainty in evaluation of high-voltage and high-current tests.

Contents

IEEE Standard for High-Voltage Testing Techniques

1. Overview

1.1 Scope

This standard is applicable to:

- Dielectric tests with direct voltages
- Dielectric tests with alternating voltages
- Dielectric tests with impulse voltages
- Tests with impulse currents
- Tests with combinations of the above
- Capacitance and dielectric loss measurements

This standard is applicable only to tests on equipment with a rated voltage above 1000 V.

Procedures are given for applying correction factors to convert test data to standard atmospheric conditions.

This standard also specifies procedures for testing equipment when external insulation of the test object is to be subjected to dry, wet, or contaminated conditions.