

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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IEEE Standard for High-Voltage Testing Techniques

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IEEE Power and Energy Society

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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 4TM, 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.
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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

1. Overview	1
1.1 Scope	1
1.2 Purpose	2
1.3 Application	2
2. Normative references.....	2
3. Definitions	2
4. Safety Awareness	6
5. General requirements for high-voltage tests and measurements	6
5.1 Normal environmental conditions	6
5.2 Arrangement of the test object.....	6
5.3 Grounding requirements for high-voltage tests	8
5.4 Use of properly dimensioned interconnections and electrodes.....	8
5.5 Susceptibility to noise: instrumentation shielding	9
5.6 Classification of measuring systems.....	10
5.7 Procedures for qualification and use of measuring systems	12
6. Tests and measurements with alternating voltage	20
6.1 Terms used to characterize alternating voltage tests and measurements	20
6.2 Source requirements	21
6.3 Measuring system requirements for approved measuring systems.....	23
6.4 Test procedures.....	24
6.5 Type tests, acceptance tests, performance tests, and performance checks for alternating voltage measuring systems.....	31
6.6 Additional information on alternating voltage test and measurement techniques	33
7. Tests and measurements with direct voltage	36
7.1 Terms used to characterize direct voltage tests and measurements	36
7.2 Source requirements	36
7.3 Measuring system requirements for approved measuring systems.....	37
7.4 Test procedures.....	38
7.5 Type tests, acceptance tests, performance tests, and performance checks for direct voltage measuring systems	39
7.6 Additional information on direct voltage test and measurement techniques	42
8. Tests and measurements with impulse voltage.....	45
8.1 Terms used to characterize impulse voltage tests and measurements.....	45
8.2 Source requirements	50
8.3 Measuring system requirements for approved measuring systems.....	52
8.4 Test procedures.....	55
8.5 Type tests, acceptance tests, performance tests, and performance checks for impulse voltage measuring systems.....	57
8.6 Additional information on impulse voltage test and measurement techniques.....	60
8.7 Reference voltage divider	63
9. Test and measurements with impulse current.....	67
9.1 Terms used to characterize impulse currents	67
9.2 Source requirements	69

9.3 Measuring system requirements for approved measuring systems	70
9.4 Test Procedures.....	71
9.5 Type tests, acceptance tests, performance tests, and performance checks for impulse current measuring systems	71
9.6 Additional information on impulse current measurement techniques	74
10. Combined voltage and composite voltage tests.....	79
10.1 Combined voltage tests.....	79
10.2 Composite voltage tests	82
11. Tests in different ambient conditions	82
11.1 Dry tests.....	82
11.2 Wet tests	82
12. Artificial contamination tests.....	84
12.1 Preparation of the test object	85
12.2 General test procedures.....	86
12.3 Power supply requirements for alternating voltage artificial contamination tests	87
12.4 Power supply requirements for direct-voltage artificial contamination tests.....	89
12.5 The solid layer test method.....	89
12.6 The salt fog test method.....	100
13. Atmospheric corrections.....	105
13.1 Atmospheric conditions	105
13.2 Atmospheric correction factors.....	105
13.3 Measurement of atmospheric parameters	113
13.4 Conflicting requirements for testing internal and external insulation.....	115
14. Voltage measurement by means of sphere gaps and rod gaps.....	115
14.1 Terms associated with sphere and rod gap voltage measurements	115
14.2 General information on spark-gaps.....	115
14.3 Use of the sphere gap to measure the peak value of alternating voltage at power frequency	120
14.4 Measurement of peak value of full lightning and switching impulse voltages using sphere gaps.	121
14.5 Reference voltage values in Table 12 and Table 13 for sphere gaps	122
14.6 Standard rod-rod gap for measurement of direct voltage.....	129
14.7 Use of standard air gaps for performance checks of approved measuring systems	131
15. Statistical treatment of test results	132
15.1 Classification of tests.....	132
15.2 Statistical behavior of disruptive discharge	133
15.3 Analysis of test results.....	134
15.4 Application of likelihood methods	136
Annex A (normative) Procedure for calculating of parameters of lightning impulse voltages with superimposed oscillation on the peak	138
A.1 Basis of the procedures.....	138
A.2 Procedure for calculation from digital waveforms.....	139
A.3 Manual procedure for calculation from graphic waveforms	146
Annex B (informative) Experimental step response measurements	147
B.1 Procedure for measuring the experimental step response	147
B.2 Determination of the response parameters from experimental step response oscillograms	148
Annex C (informative) Convolution methods	151
C.1 The convolution method	151

C.2 Procedure for performing the convolution calculation.....	152
C.3 Verify linearity of the measurement system	154
C.4 Use of the parameter differences.....	154
Annex D (informative) Evaluation of measurement uncertainties	155
D.1 General.....	155
D.2 Terms used in evaluation of uncertainty	155
D.3 Combined standard uncertainty	157
D.4 Expanded uncertainty	158
D.5 Coverage factor and effective degrees of freedom	158
D.6 Steps for calculating the expanded uncertainty.....	161
D.7 Examples of uncertainty limit evaluation	161
Annex E (informative) Partial discharge and corona measurements.....	177
E.1 Terms used to characterize partial discharge and corona measurements	177
E.2 Parameters affecting the magnitude and intensity of partial discharge and corona.....	177
E.3 Effects of partial discharge and corona on high-voltage equipment	178
E.4 Partial discharge and corona detection methods.....	178
E.5 Test procedures	179
Annex F (informative) Bibliography	186

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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.