

IEEE Standard for Metal-Oxide Surge Arresters for AC Power Circuits (>1 kV)

IEEE Power and Energy Society

Sponsored by the
Surge Protective Devices Committee

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USA

IEEE Std C62.11™-2012
(Revision of
IEEE Std C62.11-2005)

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Approved 19 October 2012

IEEE-SA Standards Board

Abstract: Metal-oxide surge arresters (MOSAs) designed to repeatedly limit the voltage surges on 48 Hz to 62 Hz power circuits (> 1000 V) by passing surge discharge current and automatically limiting the flow of system power current are addressed in this standard. This standard applies to devices for separate mounting and to devices supplied integrally with other equipment. The tests demonstrate that an arrester is able to survive the rigors of reasonable environmental conditions and system phenomena while protecting equipment and/or the system from damaging overvoltages caused by lightning, switching, and other undesirable surges.

Keywords: discharge current, discharge voltage, duty-cycle voltage rating, IEEE C62.11™, lightning protection, maximum continuous operating voltage, MCOV, metal-oxide surge arrester, MOSA, surge arrester, varistor

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Introduction

This introduction is not part of IEEE Std C62.11-2012, IEEE Standard for Metal-Oxide Surge Arresters for AC Power Circuits (>1 kV).

Metal-oxide surge arresters (MOSAs) described in this standard represent the most predominant surge arrester technology applied on ac power systems above 1 kV. This standard presents minimum criteria for the testing of such surge arresters. Matters of application of this type of surge arrester are covered in IEEE Std C62.22TM.^a Testing and application of older technology silicon carbide surge arresters are covered in IEEE Std C62.1TM and ANSI C62.2, respectively. For testing and application of surge protective devices for use in low-voltage circuits (1 kV and below), other standards in the C62 series are available.

IEEE Std C62.11-2012 contains the following significant changes from IEEE Std C62.11-2005:

- Revision of subclause 8.2 Discharge-voltage characteristics test (formerly 8.3) to: (1) remove references to shunt-gapped arresters, (2) modify method of determining front-of-wave discharge voltage, and (3) add requirements for verifying that published arrester discharge voltages are not exceeded
- Removal of optional 5000 h test from subclause 8.7 Accelerated aging test for polymer-housed arresters with exposure to salt fog
- Revision of subclause 8.8 Contamination test to apply only to multi-unit station or intermediate class arresters
- Revision of subclause 8.10 Radio-influence (RIV) test to limit the test to high voltage arresters above 90 kV rated voltage, and to add requirements for evaluation of RIV over a range of voltages
- Revision of subclause 8.12 High-current short-duration withstand test to change allowed delay between the second high-current impulse and application of recovery voltage from 5 min to 100 ms
- Deletion of subclause 8.13.1 Transmission line discharge test for station and intermediate arresters (replaced by new Switching surge energy capability verification test), and renumbering of remaining sub-clauses under subclause 8.13
- Revision of subclause 8.13.1 (formerly 8.13.2) Low-current long-duration test for distribution arresters to change the 18-discharge application from three groups of six to six groups of three, and to eliminate the subsequent heating of the sample and application of discharges 19 and 20
- Addition of new Switching surge energy capability verification test as subclause 8.14
- Addition of new Single impulse withstand capability test as Clause 15
- Revision of subclause 8.16 Duty-cycle test (formerly 8.14) to remove point-on-wave timing of initiating surges for gapless arresters
- Revision of subclause 8.17 Temporary overvoltage (TOV) test (formerly subclause 8.15) to reduce the number of test samples from five to four, and to require one test per sample instead of five tests per sample at each of the selected time ranges
- Deletion of former subclauses 8.16 Pressure-relief test for station and intermediate arresters, 8.17 Short-circuit test for porcelain-housed distribution arresters, and 8.18 Short-circuit test for polymer-housed distribution arresters
- Addition of short circuit test procedure of IEEE Std C62.11aTM-2008 as new subclause 8.18, to replace deleted former subclauses 8.16, 8.17, and 8.18

^a Information on references can be found in Clause 2.

- Revision of subclause 8.19 Failure mode test for liquid-immersed arresters to modify requirements for sample preparation to align with requirements for other arresters prescribed in new subclause 8.18
- Revision of subclause 8.19 Deadfront arrester failure mode test (formerly subclause 8.20) to add sample preparation requirements and modify procedure requirements to align with requirements for other arresters prescribed in new subclause 8.1
- Removal of Clause 9 Conformance tests
- Addition of new Annex A to provide example of use of the procedure of the discharge voltage test
- Removal of Annex C Accelerated aging tests for polymer-housed arresters
- Addition of new Annex D Rationale for tests prescribed by this standard

Less significant changes include:

- Change of title of Clause 1 from Scope to Overview, add 1.1 Scope and 1.2 Purpose
- Removal of definitions for terms not used in the standard.
- Renumbering of tests beyond subclause 8.13 to accommodate addition of new tests and deletion of old tests, and renumbering of clauses beyond Clause 8 to accommodate removal of previous Clause 9
- Replacement of all instances of “valve element” with “varistor;” added definition for varistor
- Minor editorial changes to correct grammatical and typographical errors

Contents

1. Overview	1
1.1 Scope	1
1.2 Purpose	1
2. Normative references.....	2
3. Definitions	3
4. Service conditions	8
4.1 Usual service conditions	8
4.2 Unusual service conditions	9
5. Standard voltage ratings: duty-cycle voltage and maximum continuous operating voltage (MCOV)	10
6. Performance characteristics and tests	10
7. Test requirements	12
7.1 Complete arrester test samples	12
7.2 Prorated section	12
7.3 Test measurements	16
7.4 Impulse test-wave tolerances	16
7.5 Power-frequency test voltages	16
8. Design tests.....	16
8.1 Arrester insulation withstand test	16
8.2 Discharge-voltage characteristics test.....	19
8.3 Power-frequency sparkover test for arresters equipped with gaps.....	22
8.4 Impulse protective level voltage-time characteristic test for arresters equipped with gaps	22
8.5 Accelerated aging test of varistors.....	26
8.6 Accelerated aging test of polymer-housed distribution arresters with exposure to light and electrical stress	26
8.7 Accelerated aging test of polymer-housed arresters with exposure to salt fog	29
8.8 Contamination test.....	30
8.9 Distribution arrester seal integrity design test	32
8.10 Radio-influence voltage (RIV) test.....	33
8.11 Partial discharge (PD) test	34
8.12 High-current short-duration withstand test	35
8.13 Low-current long-duration withstand test.....	36
8.14 Switching surge energy rating test.....	37
8.15 Single-impulse withstand rating test.....	39
8.16 Duty-cycle test.....	40
8.17 Temporary overvoltage (TOV) test	41
8.18 Short Circuit Test.....	43
8.19 Failure mode test for liquid-immersed arresters	54
8.20 Deadfront arrester failure mode test	56
8.21 Distribution arrester disconnecter test	57
8.22 Maximum design cantilever load (MDCL) and moisture ingress test for polymer-housed arresters.....	59
8.23 Ultimate mechanical strength-static (UMS-static) test for porcelain-housed arresters.....	65
8.24 Seismic capability verification.....	65

9. Construction	65
9.1 Identification data	65
9.2 Standard mountings	66
9.3 Iron and steel parts	66
9.4 Terminal connections	66
9.5 Housing leakage distance	67
10. Protective characteristics	67
11. Certification test procedures for arresters applied to unit substations	67
11.1 General	67
11.2 Tests	67
11.3 Evaluation procedure	68
11.4 Certification	68
11.5 Production monitoring and product retest requirements	69
12. Routine tests	69
12.1 Current sharing test	69
12.2 Discharge-voltage test	70
12.3 Partial Discharge (PD) test	70
12.4 Seal test	71
12.5 Power-frequency test	71
12.6 Power-frequency sparkover	71
Annex A (informative) Example use of procedure of 8.2 Discharge voltage characteristics test	72
Annex B (informative) Basis for accelerated aging procedure	77
Annex C (informative) Surge arrester classification and performance requirements	79
Annex D (informative) Rationale for tests prescribed by IEEE Std C62.11-2012	80
Annex E (informative) Bibliography	107

9.1 Identification data	65
9.2 Standard mountings	66
9.3 Iron and steel parts	66
9.4 Terminal connections	66
9.5 Housing leakage distance	67
10. Protective characteristics	67
11. Certification test procedures for arresters applied to unit substations	67
11.1 General	67
11.2 Tests	67
11.3 Evaluation procedure	68
11.4 Certification	68
11.5 Production monitoring and product retest requirements	69
12. Routine tests	69
12.1 Current sharing test	69
12.2 Discharge-voltage test	70
12.3 Partial Discharge (PD) test	70
12.4 Seal test	71
12.5 Power-frequency test	71
12.6 Power-frequency sparkover	71
Annex A (informative) Example use of procedure of 8.2 Discharge voltage characteristics test	72
Annex B (informative) Basis for accelerated aging procedure	77
Annex C (informative) Surge arrester classification and performance requirements	79
Annex D (informative) Rationale for tests prescribed by IEEE Std C62.11-2012	80
Annex E (informative) Bibliography	107

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1. Overview

1.1 Scope

This standard applies to metal-oxide surge arresters (MOSAs) designed to repeatedly limit the voltage surges on 48 Hz to 62 Hz power circuits (> 1000 V) by passing surge discharge current and automatically limiting the flow of system power current. This standard applies to devices for separate mounting and to devices supplied integrally with other equipment.

1.2 Purpose

To define tests that demonstrate that an arrester can survive the rigors of reasonable environmental conditions and system phenomena while protecting equipment and/or the system from damaging overvoltages caused by lightning, switching, and other system disturbances.