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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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(Revision of
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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 C62.22™.[a] Testing and application of older technology silicon carbide surge arresters are covered in IEEE Std C62.1™ 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 of 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 C62.11a™-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

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

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.