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IEEE Standard Design Tests for High-Voltage (>1000 V) Fuses and Accessories

IEEE Power and Energy Society

Sponsored by the
Switchgear Committee

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USA

IEEE Std C37.41™-2016
(Revision of
IEEE Std C37.41-2008)

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Abstract: Required procedures for performing design tests for high-voltage fuses, as well as for fuse disconnecting switches, are specified. These design tests, as appropriate to a particular device, include the following test types: dielectric, interrupting, radio-influence, temperature-rise, time-current, manual-operation, liquid-tightness, thermal-cycle, bolt-torque, withstand tests for motor circuit fuses, expulsion fuses using polymeric insulators, load-break, and short-time current.

Keywords: fuse accessories, fuse design tests, fuse disconnecting switches, fuse-enclosure package (FEP), high-voltage fuses, IEEE 37.41™

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Introduction

This introduction is not part of IEEE Std C37.41™-2016, IEEE Standard Design Tests for High-Voltage (> 1000 V) Fuses and Accessories.

IEEE Std C37.41-2016 is a revision of IEEE Std C37.41-2008, done in order to bring it up to date and into agreement with current requirements for high-voltage fuses and switches. The structure of the document has changed significantly. An attempt has been made to better separate testing requirements between expulsion fuses and current-limiting fuses. Fuse types that have restricted application, in terms of performance requirements or geographical applicability, have been separated from those that have essentially universal applicability, and placed in a normative Annex. Test requirements for distribution class high-voltage (> 1000 V) enclosed single-pole air switches have been moved to IEEE Std C37.45™. Several changes to the expulsion and current-limiting fuse-testing requirements have been made to align more closely with the latest International Electrotechnical Commission (IEC) test requirements. The Revision of Fuse Standards Working Group of the IEEE Subcommittee on High-Voltage Fuses prepared the standard. Liaison was maintained with the IEC during the development of the revisions in order to incorporate the latest activities at the time of publication.

This standard is one of a series of complementary standards covering various types of high-voltage fuses and switches and covers basic testing requirements, while IEEE Std C37.42™-2016 contains the specification requirements for those devices. IEEE Std C37.45-2016 contains all of the testing requirements and specifications for high-voltage distribution class enclosed single-pole air switches. IEEE Std C37.41-2016 and IEEE Std C37.42-2016 together, and IEEE Std C37.45-2016 alone, provide all of the testing requirements for a device. In addition, IEEE Std C37.48™-2005 provides application, operation, and maintenance guidance for all the devices, and it is supplemented by IEEE Std C37.48.1™-2011 which is an application, operation, and coordination guide for current-limiting fuses.

At the time this standard was approved, this series comprised the following standards:

IEEE Std C37.41-2016, IEEE Standard Design Tests for High-Voltage (>1000 V) Fuses and Accessories.

IEEE Std C37.42-2016, IEEE Standard Specifications for High-Voltage (>1000 V) Fuses and Accessories.

IEEE Std C37.45-2016, IEEE Standard Design Tests and Specifications for High-Voltage (>1000 V) Distribution Class Enclosed Single-Pole Air Switches.

IEEE Std C37.48-2005, IEEE Guide for Application, Operation, and Maintenance of High-Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches, and Accessories.

IEEE Std C37.48.1-2011, IEEE Guide for the Application, Operation, and Coordination of High-Voltage (>1000 V) Current-Limiting Fuses.

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IEEE Standard Design Tests for High-Voltage (> 1000 V) Fuses and Accessories

1. Overview

1.1 Scope

This standard specifies design test requirements for high-voltage (above 1000 V) fuses and accessories for use on ac electrical distribution systems. Devices with rated maximum voltages to 170 kV are covered. The devices to which this standard applies are as follows:

a) Expulsion fuses (including fuse cutouts)

b) Current-limiting fuses

c) Items a) and b) used in fuse-enclosure packages

d) Fuse supports of the type intended for use with fuses and fuse disconnecting switches

e) Disconnecting devices (fuse disconnecting switches, disconnecting switches, and disconnecting cutouts) created by the use of a removable fuse unit or switch blade in a fuse support

f) Expulsion, current-limiting, and combination types of external capacitor fuses used with a capacitor unit, a group of units, or capacitor banks

g) Backup current-limiting fuses (“motor-starter fuses”) used in conjunction with high-voltage motor starters

h) Fuse links when used exclusively with expulsion fuses and fuse disconnecting switches

i) Items a) through f) having integral load-break means

This standard may also be used as a basis for testing other devices that are similar to the devices listed in the scope. In addition, the parts relating to expulsion fuses may, where applicable, be used for non-expulsion fuses in which the interruption process waits for a natural current zero to clear the circuit. The manufacturer and the user should agree on any specifications or tests performed for such devices.

1.2 Purpose

This standard specifies the minimum testing requirements for fuses and related devices. Such standardization is needed to ensure uniform minimum product testing for devices within the document scope. Test areas covered are based on historical experience.