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(Revision of  
IEEE Std 634-1978)

IEEE Standards

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# IEEE Standard Cable-Penetration Fire Stop Qualification Test

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**IEEE Power Engineering Society**

Sponsored by the  
Insulated Conductors Committee



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# IEEE Standard Cable-Penetration Fire Stop Qualification Test

Sponsor

**Insulated Conductors Committee  
of the  
IEEE Power Engineering Society**

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**American National Standards Institute**

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**Abstract:** This standard is applicable to fire stops of various materials and construction. Cable-penetration fire stops are intended for use in fire-resistive barriers. Tests conducted in conformance with this standard will record the performance of fire stops during the test exposure. The resistance of a fire stop to an external force imposed by a hose stream or water spray will also be considered in this standard. The intent of this standard is to develop data to assist in determining the suitability of a fire stop for use where fire resistance is required.

**Keywords:** cable-penetration, fire-resistant, fire-resistive barrier, fire stop, fire test, fire test facilities, fire test procedure, F-rating, penetration seal, thermocouple, time-temperature curve, T-rating

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# Introduction

This introduction is not part of IEEE Std 634-2004, IEEE Standard Cable-Penetration Fire Stop Qualification Test.

Confining a fire to the area of origin is desirable for a number of reasons, including protecting a structure's personnel and/or occupants, preventing excessive damage to a structure's equipment and/or contents, and minimizing the consequential loss as a result of the fire. Fire resistant barriers (e.g., wall, floor, and ceiling partitions) generally provide the primary means of fire containment. However, the effectiveness of a fire resistant barrier may be compromised by the quantity, type, and size of openings or penetrations through the barrier. In the construction of all types of buildings, openings exist through barriers to allow the passage of mechanical and electrical equipment. Such openings must be closed or sealed in order for the fire resistance rating of the barrier to be maintained. The fire resistance rating of a barrier is generally determined by testing in accordance with other industry standards (e.g., ASTM E119<sup>a</sup>, NFPA 251). The fire resistance rating of cable-penetration fire stops is intended to be determined using this standard.

IEEE Std 634 was initially developed to provide qualification test procedures for type testing cable-penetration fire stops when mounted in fire rated barriers. Originally approved by the IEEE Standards Board on December 15, 1977, IEEE Std 634 remained unchanged until it was withdrawn in April of 1990. Subsequently, a Cable-Penetration Fire Stop Qualification working group was formed to revive the standard. The principle changes from the previous version of this standard include general test methodology, acceptance criteria, and rating classification. The updated standard incorporates modernized fire testing protocols, such as furnace pressure requirements, variable temperature acceptance criteria based on actual cable properties, and separate rating classifications for cable-penetration fire stops which limit flame propagation alone or in addition to limiting unexposed side temperature rise (e.g., F-ratings and T-ratings).

This standard is intended to provide a controlled method by which cable-penetration fire stops can be tested to determine their fire resistance capability. However, this standard does not address the following conditions related to cable-penetration fire stops.

*Pressure seals:* Some cable-penetration fire stops may also be required to function as a pressure seal to maintain an existing differential pressure between areas separated by the barrier in which it is installed. This standard does not address the ability of a cable-penetration fire stop to serve as a pressure resistant seal, even though a correlation could be made to a minor pressure rating based on the specific furnace pressure condition under which this test is performed.

*Ampacity derating due to cable-penetration fire stops:* It is recognized that the thermal insulating characteristics of a cable-penetration fire stop may have an effect on the ampacity of the cables passing through the penetration. Design of the cable-penetration fire stop should address this effect. However, ampacity considerations are not part of this qualification test and, consequently, are not within the scope of this standard.

*Electrical penetration assemblies in containment structures:* Electrical penetration assemblies in containment structures are not covered in this standard. For guidance in this area, refer to IEEE Std 31<sup>TM</sup>.

*Seismic, radiation, aging, and loss-of-coolant accident (LOCA):* Although it is recognized that seismic, radiation, aging, and LOCA conditions may be required to be considered and evaluated for nuclear power plants, these effects are not within the scope of this standard. For guidance in these areas, refer to ANSI/IEEE Std 344<sup>TM</sup> and IEEE Std 323<sup>TM</sup>.

<sup>a</sup>Information on references can be found in Clause 2.

*Test limitations and cautions:* This test is performed with a specific standard fire. This fire may or may not be as severe as fires actually experienced and hence may not predict the performance of the cable penetration fire stop in actual service. It is the judgment of those experienced in the field that relative performance is accurately portrayed, and the relative values may be used as a basis for engineering judgment in a particular design situation.

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# IEEE Standard Cable-Penetration Fire Stop Qualification Test

## 1. Overview

This standard provides two methods for qualifying the performance of cable-penetration fire stops (also referred to as “fire stops”) when they are installed in rated fire-resistive barriers. The two methods are the general acceptance qualification (Type I) and a cable-specific qualification (Type II). The cables used for Type II tests shall be tested to determine their flash-ignition and self-ignition temperatures before their inclusion in a fire-stop qualification test. Annex A provides a series of figures that may be used as guidance when developing a test assembly for Type I qualification. Annex B contains the bibliography associated with this standard.

### 1.1 Scope

This standard is applicable to fire stops of various materials and construction. Cable-penetration fire stops are intended for use in fire-resistive barriers. Tests conducted in conformance with this standard will record the performance of fire stops during the test exposure. However, this test shall not be used to determine the suitability of a fire stop for use after it is exposed to a fire. This standard also considers the resistance of a fire stop to an external force imposed by a hose stream or water spray. This standard shall not be used to determine the performance of a fire stop during actual fire conditions when subjected to additional forces, such as failure of cable support systems and falling debris. The intent of this standard is to develop data to assist in determining the suitability of a fire stop for use where fire resistance is required. This standard should be used to measure and describe the response of the fire stop material under a set of controlled conditions but should not be used to describe or appraise the fire hazard or fire risk of that fire stop under the actual fire conditions. However, the results of this test may be used as an element of a fire hazard assessment or a fire-risk assessment that takes into account all of the factors that are pertinent to a particular end use. This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

### 1.2 Purpose

The purpose of this standard is to establish type tests to assure that cable-penetration fire stops meet the required fire rating.