



Standard Guide for Extension of Data from Penetration Firestop System Tests Conducted in Accordance with ASTM E814¹

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^ε¹ NOTE—The title of this guide was corrected editorially in February 2013.

1. Scope

1.1 This guide covers the extension of results obtained from fire tests performed in accordance with Test Method E814 to applications that have not been tested. Test Method E814 evaluates the duration for which test specimens will contain a fire, retain their integrity, or both during a predetermined fire test exposure. Firestops are intended for use in fire-resistive walls and floors that are evaluated in conformance with Test Method E119.

NOTE 1—Data obtained from firestops tested in accordance with Test Methods E119 with positive pressure can also be used.

1.2 This guide is based on principles involving the extension of test data using simple considerations. The acceptance of these principles and their application is based substantially on an analogous worst-case proposition.

1.3 These principles are only applicable to temperature conditions represented by the standard time-temperature curve described in Test Method E814, for systems falling within the scope of Test Method E814. This test method is a fire-test-response standard.

1.4 The types of building constructions which are part of this guide are as follows: floors, walls, partitions, floor/ceiling and roof/ceiling assemblies.

1.5 This guide applies to:

- 1.5.1 a single penetrating item, or
- 1.5.2 multiple penetrating items.

1.6 This guide does not apply to joints systems tested to E119, E1966 and E2307.

1.7 Penetrating items can be one of the following: metallic pipe, non-metallic pipe, metallic tubing, non-metallic tubing, metallic conduit, non-metallic conduit, flexible metal conduit,

cables, cable trays, bus ducts, insulated pipes, insulated tubing, insulated conduit, insulated and non-insulated ducts, and structural members.

Metallic pipe, tubing or conduit	6.7
Insulated pipe, tubing or conduit	6.8
Non-metallic pipe, tubing or conduit	6.9 and 6.10
Flexible metal conduit	6.11.1.4 and 6.11.1.5
Cables	6.11
Cable tray	6.12
Bus duct	6.13
Non-insulated duct	6.14
Insulated duct	6.14.2
Non-structural or service support member	6.15
Mixed penetrations	6.16

1.8 Assemblies can be one of the following; concrete floors or walls, masonry walls, gypsum walls, wood floor/ceiling assemblies, concrete floor/ceiling assemblies, chase wall in floor/ceiling assemblies and fire-rated insulated walls.

Concrete floors or walls	6.1
Masonry walls	6.1
Gypsum board wall assemblies	6.2
Wood floor/ceiling assemblies	6.3
Floor/ceiling assembly with concrete floor	6.4
Chase wall intersecting a floor/ceiling assembly	6.5
Fire-resistance insulated walls	6.6

1.9 The extension of data using numerical calculations based on empirical data or theoretical models is not covered in this guide.

1.10 This guide does not cover the substitution of one proprietary material for another proprietary material, or materials for which fire-test data are not presently available.

1.11 This guide is used to predict or provide a quantitative measure of the fire hazard from a specified set of fire conditions involving specific materials, products, or assemblies. This assessment does not necessarily predict the hazard of actual fires which involve conditions other than those assumed in the analysis.

1.12 This guide is used to measure and describe the response of materials, products, or assemblies to heat and flame under controlled conditions, but does not by itself incorporate all factors required for fire hazard or fire risk assessment of the materials, products or assemblies under actual fire conditions.

¹ This standard guide is under the jurisdiction of ASTM Committee E05 on Fire Standards and is the direct responsibility of Subcommittee E05.11 on Fire Resistance.

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1.13 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.14 *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.*

2. Referenced Documents

2.1 ASTM Standards:²

- C168** Terminology Relating to Thermal Insulation
- E119** Test Methods for Fire Tests of Building Construction and Materials
- E176** Terminology of Fire Standards
- E631** Terminology of Building Constructions
- E814** Test Method for Fire Tests of Penetration Firestop Systems
- E1966** Test Method for Fire-Resistive Joint Systems
- E2032** Guide for Extension of Data From Fire Resistance Tests Conducted in Accordance with ASTM E 119
- E2307** Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus

2.2 Other Standards:

- ACI 216** Fire Resistance of Concrete³

3. Terminology

3.1 Definitions:

3.1.1 For definitions used in this guide, refer to Terminologies in **E176**, **C168** and **E631**.

3.1.2 For definitions of terms specific to this standard, refer to **E814** and **E2032**.

4. Significance and Use

4.1 The methods and procedures set forth in this guide relate to the extension of the fire test results to firestop systems that have not been tested.

4.2 Users of this guide must have knowledge and understanding of the provisions of Test Method **E119** and Test Method **E814** including those pertaining to conditions of acceptance.

4.3 In order to apply some of the principles described in this guide, reference to the original fire test report will be necessary.

4.4 In Test Method **E814**, the specimens are subjected to specific laboratory fire test exposure conditions. Differences between the tested assembly and the as-built assembly impact the fire-test-response characteristics. Substitution of different test conditions also impacts the fire-test-response characteristics.

4.5 The extension of data is valid only for the fire test exposure described in Test Method **E814**.

4.6 This guide shall not be used to extrapolate the fire resistance rating to a higher value.

4.7 Limitations:

4.7.1 The extension of fire resistance data is to be used only for changes to the tested specimen that fall within normal and reasonable limits of accepted construction practices.

4.7.2 Conclusions derived from using this guide are valid only if the identified change is the only change in the construction or properties of the components.

4.7.3 Evaluation of changes to the fire-resistive assembly in which the firestop is installed is governed by the Extension of Data principles in Guide **E2032**.

4.8 The statements in this guide are based on a single change to a system.

NOTE 2—It is possible that multiple changes have a different cumulative effect than that of individual changes evaluated separately. The principles contained herein may provide useful information for the application of sound engineering principles to evaluate the effect of multiple differences between tested and installed firestops.

4.9 Extensions of data using this document shall be done by individuals possessing the following minimum qualifications and attributes:

4.9.1 an understanding of the Test Method **E814** test procedure,

4.9.2 an understanding of the fire behavior of firestop materials,

4.9.3 knowledge of the elements of the construction to be protected, and

4.9.4 an understanding of the probable behavior of the underlying construction and the recommended firestop system protecting it, were they to be subjected to testing in accordance with Test Method **E814**.

4.10 The person performing evaluations based on tested or listed firestops shall be one of the following:

4.10.1 the firestop manufacturer's knowledgeable and qualified technical personnel,

4.10.2 a registered professional engineer, or Fire Protection Engineer, knowledgeable in firestopping systems,

4.10.3 an independent testing agency or a listing agency, or

4.10.4 technical personnel with experience in firestopping.

5. General Principles

5.1 The principles in this section shall apply to all subsequent sections.

5.2 The rating criteria and conditions of acceptance as set out in Test Method **E814** shall be used in the evaluation of the effect of the change to the firestop system.

5.3 Conclusions derived from using this guide indicate only whether or not a change in the application or design of the firestop system "reduces" the fire resistance rating.

5.4 The firestop system is limited to the maximum dimensions of the opening in the assembly that have been fire tested according to **E814** or **E119** under positive furnace pressure as specified in **E814**.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from American Concrete Institute (ACI), P.O. Box 9094, Farmington Hills, MI 48333-9094, <http://www.concrete.org>.

5.5 The firestop product(s) is limited to the product(s) fire tested.

5.6 *Angled Penetrations*—Where the penetrating item is indicated as a metallic pipe, conduit, tube, duct or cable, and the firestop system consists of a fill material (such as sealants, putty, or mortar) and a packing material, the penetrant may pass through the opening in the wall or floor assembly at an angle, provided the annular space is maintained on both sides of the wall or floor assembly. In all other cases, except where otherwise indicated in the system, the penetrating item shall penetrate the wall or floor assembly at a 90° angle.

6. Principles for Firestops

NOTE 3—Information regarding the fire resistance of the wall or floor assemblies can be found in Guide E2032 or ACI 216. See Appendix X3 for additional information.

6.1 Concrete or Masonry Assemblies:

6.1.1 Increase in thickness of the assembly will not decrease the fire resistance of the firestop. Exception: Where it is known or suspected that locating a material further from the fire or on the unexposed side of the assembly will reduce the *F*-rating.

6.1.2 Firestop systems tested in concrete floor assemblies can be used in concrete or masonry wall assemblies providing that they are installed symmetrically on both sides of the wall.

6.1.2.1 Firestop systems need not be installed on both sides of the wall assembly if they are symmetrical and equidistant from both surfaces.

6.1.3 Firestop systems fire tested in wall assemblies cannot be installed in floor assemblies unless fire tested according to Test Method E814 as a floor assembly.

6.1.4 Firestop systems can be used in concrete or masonry assemblies of equal or lower fire resistance as long as the Firestop system tested design is not modified in relation to firestop thickness, bonding and support, and is not modified in relation to the assembly thickness.

6.2 Gypsum Board Wall Assemblies:

6.2.1 Increase in the depth of studs or thickness or number of layers of gypsum board will not decrease the fire resistance of the firestop. Exception 1: Where the firestop materials are at different positions within the assembly relative to the heat source.

Exception 2: In assemblies where the active components on both sides of the assembly contribute to the test performance.

NOTE 4—Where it is known or suspected that locating a material further from the fire or on the unexposed side of the assembly will reduce the resistance to the test.

Exception 3: Where it is known that locating a material on the non-fire side of the assembly further from the fire will reduce the performance of the firestop.

6.2.2 Firestop systems cannot be used in assemblies of lower resistance ratings without fire testing.

Exception: A firestop system that is tested and listed for a symmetrical gypsum wall assembly that includes multiple layers of gypsum board per side, can be used to maintain the fire resistance rating of a gypsum wall assembly that includes fewer layers of gypsum board per side, as long as the sealant depth in the listed system, does not exceed the thickness of that reduced number of layers of gypsum board.

6.2.3 Symmetrical Installations:

6.2.3.1 The results of the fire resistance test are deemed to be applicable to a similar type of untested system providing the following are true.

(1) The maximum dimension of the opening is not increased.

(2) The total area of the opening is not increased.

(3) Neither the firestop product(s) or damming material is changed.

(4) The thickness of neither the firestop product(s) or damming material is decreased.

6.2.3.2 Refer to 6.1 for restrictions related to changes in the supporting construction.

6.3 Wood Deck Floor/Ceiling Assemblies:

6.3.1 The following changes, individually or in combination, would not reduce the *F*-rating, provided that: (1) the firestop is in the same position relative to the heat source, and (2) the firestop is at least in contact with the same material as tested;

6.3.1.1 Increase in the depth of joists or trusses,

6.3.1.2 Increase in thickness or number of layers of gypsum board,

6.3.1.3 Increase in the overall assembly thickness due to additional floor coverings or ceiling finishes.

Exception 1: In assemblies where there are firestop materials not part of the exposed side that is part of the tested or listed firestop configuration.

Exception 2: Where it is known or suspected that locating a material further from the fire or on the unexposed side of the assembly will reduce the resistance to the test.

6.3.2 Firestop systems cannot be used in assemblies of lower resistance ratings without fire testing. Exception: A firestop system that is tested and listed for a floor/ceiling assembly that includes multiple layers of gypsum board, can be used to maintain the fire resistance rating of a floor/ceiling assembly that includes fewer layers of gypsum board, as long as the sealant depth in the listed system, does not exceed the thickness of that reduced number of layers of gypsum board.

6.4 Floor/Ceiling Assembly with Concrete Floor:

NOTE 5—This section does not apply to floor/ceiling assemblies protected with direct applied fireproofing.

6.4.1 The following changes, individually or in combination, would not reduce the *F*-rating, provided that: (1) the firestop is in the same position relative to the heat source, and (2) the firestop is at least in contact with the same material as tested;

6.4.1.1 Increase in the depth of joists or trusses,

6.4.1.2 Increase in thickness or number of layers of gypsum board,

6.4.1.3 Increase in the overall assembly thickness due to additional floor coverings or ceiling finishes. Exception: In assemblies where there are firestop materials not part of the exposed side that is part of the tested or listed firestop configuration.

Exception: Where it is known or suspected that locating a material further from the fire or on the unexposed side of the assembly will reduce the resistance to the test.