



Standard Practice for Extension of Data From Fire Resistance Tests Conducted in Accordance with ASTM E 119¹

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1. Scope

1.1 This practice covers the extension of fire resistance ratings obtained from fire tests performed in accordance with Test Method E119 to constructions that have not been tested. Test Method E119 evaluates the duration for which test specimens will contain a fire, retain their standard integrity, or both during a predetermined test exposure.

1.2 This practice 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 E119. Test Method E119 is a fire-test-response standard.

1.4 The types of building constructions which are the subject of this practice are categorized as follows: beams; floor and roof assemblies; columns; and walls and partitions. Floor and roof assemblies include such assemblies with ceiling protective membranes.

1.5 The extension of test data using numerical calculations based on empirical data or theoretical models is not covered in this practice.

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

1.7 This practice does not purport to be comprehensive in its treatment of non-proprietary modifications of tested constructions. Engineering evaluation or tests are recommended for assessing modifications not specifically covered in this practice.

1.8 The values stated in SI units are to be regarded as standard. The values given in parentheses after SI units are provided for information only and are not considered standard.

¹ This standard practice 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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1.9 *This standard is used to determine certain fire-test responses of materials, products, or assemblies to heat and flame under controlled conditions by using results obtained from fire-test-response standards. The results obtained from using this standard do not by themselves constitute measures of fire hazard or fire risk.*

1.10 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.11 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

- C168 Terminology Relating to Thermal Insulation
- C553 Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
- C612 Specification for Mineral Fiber Block and Board Thermal Insulation
- E119 Test Methods for Fire Tests of Building Construction and Materials
- E176 Terminology of Fire Standards
- E631 Terminology of Building Constructions
- E1264 Classification for Acoustical Ceiling Products
- E1513 Practice for Application of Sprayed Fire-Resistive Materials (SFRMs)

3. Terminology

3.1 Definitions:

3.1.1 For definitions used in this practice, refer to Terminologies E176, C168, E631, and Test Method E119.

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.

3.1.2 *mineral fiber insulation, n*—insulation composed principally of fibers manufactured from rock, slag, or glass processed from molten state into fibrous form to comprise flexible batts or blankets, rigid or semi-rigid blocks and boards, or loose fill insulations, with or without binder.

3.1.2.1 *Discussion*—Mineral fiber blanket thermal insulations and mineral fiber block and board thermal insulations are classified into various types based upon the maximum use temperature, which can range from 204 °C (400 °F) to 982 °C (1800 °F), and the apparent thermal conductivity (See Specifications C553 and C612).

3.1.3 *unit weight, n*—as applied to concrete, weight per unit volume.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *acoustical ceiling panel, n*—a form of a prefabricated sound absorbing ceiling element used with exposed suspension systems (see Specification E1264).

3.2.2 *acoustical ceiling tile, n*—a form of a prefabricated sound absorbing ceiling element used with concealed or semi-exposed suspension systems, stapling, or adhesive bonding (see Specification E1264).

3.2.3 *beams, n*—all horizontally oriented structural members employed in building construction and known variously as beams, joists, or girders.

3.2.4 *ceiling protective membrane, n*—a ceiling membrane attached to or suspended from the structural members of the floor or ceiling assembly, usually by hanger wire or threaded rods, consisting of a grid suspension system with lay-in ceiling panels or a grid of steel furring channels to which the ceiling membrane is directly attached, intended to provide fire protection, acoustical and or aesthetic enhancements, or both.

3.2.5 *composite, n*—as applied to loadbearing elements, an interaction between structural components which is to be taken into account in the evaluation of load capacity.

3.2.6 *design load, n*—the intended maximum design load condition allowed by design under appropriate nationally recognized structural design criteria.

3.2.7 *directly applied fire resistive coating, n*—materials that are normally sprayed onto substrates to provide fire-resistive protection of the substrates.

3.2.7.1 *Discussion*—These coatings are called sprayed fire-resistive materials in Standard Practice E1513 and related standards.

3.2.8 *equivalent thickness, n*—the calculated solid thickness of concrete or masonry for purposes of determining fire resistance ratings of barrier elements on the basis of heat transmission end-point criteria.

3.2.9 *insulation, n*—a material that is normally added to an assembly to provide resistance to heat flow for purpose of energy conservation.

3.2.9.1 *Discussion*—Insulation materials are also used to improve sound control or improve fire resistance.

3.2.10 *lightweight aggregate concrete, n*—concrete made with aggregates of expanded clay, shale, slag, or slate or sintered fly ash, and weighing 1360 g/m³ to 1840 kg/m³ (85 pcf to 115 pcf).

3.2.11 *material, generic, n*—is one for which a nationally recognized Standard Specification exists.

3.2.12 *material proprietary, n*—is one whose fire performance characteristics are determined in consideration of a formulation or process of production that is proprietary.

3.2.13 *non-composite, n*—as applied to loadbearing elements, structural interaction between contiguous elements is assumed not to exist in the evaluation of load capacity.

3.2.14 *sand-lightweight concrete, n*—concrete made with a combination of expanded clay, shale, slag, or slate or sintered fly ash and natural sand and generally weighing between 1680 kg/m³ and 1920 kg/m³ (105 pcf to 120 pcf).

3.2.15 *specified load, n*—as applied to loadbearing elements, the test load applied to the element in a Test Method E119 test.

3.2.15.1 *Discussion*—In Test Method E119 testing, the specified load is generally the design load (see 3.2.6).

3.2.16 *test specimen, n*—the specific construction assembly that was tested in accordance with Test Method E119.

3.2.17 *transfer, n*—the process of substituting a loadbearing element from one test specimen for the loadbearing element in another test specimen, or utilizing a loadbearing element from one test specimen for use in another test specimen that does not include a loadbearing element.

3.2.18 *ultimate capacity, n*—as applied to loadbearing elements, the actual maximum load carrying capacity of an element based on properties specific to the material constituting the element.

4. Significance and Use

4.1 The methods and procedures set forth in this practice relate to the extension of the fire resistance ratings obtained from particular fire tested specimens to constructions that have not been tested.

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

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

4.4 In Test Method E119, the specimens are subjected to specific laboratory fire test exposure conditions. Substitution of different test conditions or changes in the end use conditions have the ability to change the measured fire-test-response characteristics. Therefore, the extensions of data are valid only for the fire test exposure conditions described in Test Method E119.

5. General Principles

5.1 The same criteria or conditions of acceptance as set out in the Test Method E119 and followed in the establishment of the fire resistance rating of the original test specimen shall be used in the evaluation of the effect of the modification or substitution of components in a test specimen.