



Standard Test Methods for Fire Tests of Building Construction and Materials¹

This standard is issued under the fixed designation E119; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the U.S. Department of Defense.

INTRODUCTION

The performance of walls, columns, floors, and other building members under fire-exposure conditions is an item of major importance in securing constructions that are safe, and that are not a menace to neighboring structures or to the public. Recognition of this is registered in the codes of many authorities, municipal and other. It is important to secure balance of the many units in a single building, and of buildings of like character and use in a community; and also to promote uniformity in requirements of various authorities throughout the country. To do this it is necessary that the fire-resistive properties of materials and assemblies be measured and specified according to a common standard expressed in terms that are applicable alike to a wide variety of materials, situations, and conditions of exposure.

Such a standard is found in the test methods that follow. They prescribe a standard exposing fire of controlled extent and severity. Performance is defined as the period of resistance to standard exposure elapsing before the first critical point in behavior is observed. Results are reported in units in which field exposures can be judged and expressed.

The test methods may be cited as the “Standard Fire Tests,” and the performance or exposure shall be expressed as “2-h,” “6-h,” “1/2-h,” etc.

When a factor of safety exceeding that inherent in the test conditions is desired, a proportional increase should be made in the specified time-classification period.

1. Scope*

1.1 The test methods described in this fire-test-response standard are applicable to assemblies of masonry units and to composite assemblies of structural materials for buildings, including loadbearing and other walls and partitions, columns, girders, beams, slabs, and composite slab and beam assemblies for floors and roofs. They are also applicable to other assem-

blies and structural units that constitute permanent integral parts of a finished building.

1.2 It is the intent that classifications shall register comparative performance to specific fire-test conditions during the period of exposure and shall not be construed as having determined suitability under other conditions or for use after fire exposure.

1.3 *This standard 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.*

1.4 These test methods prescribe a standard fire exposure for comparing the test results of building construction assemblies. The results of these tests are one factor in assessing

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These test methods, of which the present standard represents a revision, were prepared by Sectional Committee on Fire Tests of Materials and Construction, under the joint sponsorship of the National Bureau of Standards, the ANSI Fire Protection Group, and ASTM, functioning under the procedure of the American National Standards Institute.

predicted fire performance of building construction and assemblies. Application of these test results to predict the performance of actual building construction requires the evaluation of test conditions.

1.5 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.6 *Fire testing is inherently hazardous. Adequate safeguards for personnel and property shall be employed in conducting these tests.*

1.7 *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.*

1.8 The text of this standard references notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

1.9 *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

C569 Test Method for Indentation Hardness of Preformed Thermal Insulations (Withdrawn 1988)³

D6513 Practice for Calculating the Superimposed Load on Wood-frame Walls for Standard Fire-Resistance Tests

E176 Terminology of Fire Standards

E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

E814 Test Method for Fire Tests of Penetration Firestop Systems

E2226 Practice for Application of Hose Stream

E2032 Practice for Extension of Data From Fire Resistance Tests Conducted in Accordance with ASTM E 119

3. Terminology

3.1 *Definitions*—For definitions of terms found in this test method, refer to Terminology **E176**.

4. Significance and Use

4.1 These test methods are intended to evaluate the duration for which the types of building elements noted in **1.1** contain a

fire, retain their structural integrity, or exhibit both properties during a predetermined test exposure.

4.2 The test exposes a test specimen to a standard fire controlled to achieve specified temperatures throughout a specified time period. When required, the fire exposure is followed by the application of a specified standard fire hose stream applied in accordance with Practice **E2226**. The test provides a relative measure of the fire-test-response of comparable building elements under these fire exposure conditions. The exposure is not representative of all fire conditions because conditions vary with changes in the amount, nature and distribution of fire loading, ventilation, compartment size and configuration, and heat sink characteristics of the compartment. Variation from the test conditions or test specimen construction, such as size, materials, method of assembly, also affects the fire-test-response. For these reasons, evaluation of the variation is required for application to construction in the field.

4.3 The test standard provides for the following:

4.3.1 For walls, partitions, and floor or roof test specimens:

4.3.1.1 Measurement of the transmission of heat.

4.3.1.2 Measurement of the transmission of hot gases through the test specimen.

4.3.1.3 For loadbearing elements, measurement of the load carrying ability of the test specimen during the test exposure.

4.3.2 For individual loadbearing members such as beams and columns:

4.3.2.1 Measurement of the load carrying ability under the test exposure with consideration for the end support conditions (that is, restrained or not restrained).

4.4 The test standard does not provide the following:

4.4.1 Information as to performance of test specimens constructed with components or lengths other than those tested.

4.4.2 Evaluation of the degree by which the test specimen contributes to the fire hazard by generation of smoke, toxic gases, or other products of combustion.

4.4.3 Measurement of the degree of control or limitation of the passage of smoke or products of combustion through the test specimen.

4.4.4 Simulation of the fire behavior of joints between building elements such as floor-wall or wall-wall, etc., connections.

4.4.5 Measurement of flame spread over the surface of test specimens.

4.4.6 The effect on fire-resistance of conventional openings in the test specimen, that is, electrical receptacle outlets, plumbing pipe, etc., unless specifically provided for in the construction tested. Also see Test Method **E814** for testing of fire stops.

5. Test Specimen

5.1 The test specimen shall be representative of the construction that the test is intended to assess, as to materials, workmanship, and details such as dimensions of parts, and shall be built under conditions representative of those applied in building construction and operation. The physical properties

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 The last approved version of this historical standard is referenced on www.astm.org.