Designation: E84 – 26a

An American National Standard

Standard Test Method for Surface Burning Characteristics of Building Materials[1]

This standard is issued under the fixed designation E84; 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.

1. Scope*

1.1 This fire-test-response standard for the comparative surface burning behavior of building materials is applicable to exposed surfaces such as walls and ceilings. The test is conducted with the specimen in the ceiling position with the surface to be evaluated exposed face down to the ignition source. The material, product, or assembly shall be capable of being mounted in the test position during the test. Thus, the specimen shall either be self-supporting by its own structural quality, held in place by added supports along the test surface, or secured from the back side.

1.2 Test Method E84 is a 10-min fire-test response method. The following standards address testing of materials in accordance with test methods that are applications or variations of the test method or apparatus used for Test Method E84:

1.2.1 Materials required by the user to meet an extended 30-min duration tunnel test shall be tested in accordance with Test Method E2768.

1.2.2 Wires and cables for use in air-handling spaces shall be tested in accordance with NFPA 262.

1.2.3 Pneumatic tubing for control systems shall be tested in accordance with UL 1820.

1.2.4 Combustible sprinkler piping shall be tested in accordance with UL 1887.

1.2.5 Optical fiber and communications raceways for use in air handling spaces shall be tested in accordance with UL 2024.

NOTE 1—Annex A13 includes additional information describing a standard other than those listed in this section that also utilizes a modification of the apparatus used for Test Method E84.

1.3 The purpose of this test method is to determine the relative burning behavior of the material by observing the flame spread along the specimen. Flame spread and smoke developed index are reported. However, there is not necessarily a relationship between these two measurements.

1.4 The use of supporting materials on the underside of the test specimen has the ability to lower the flame spread index from those which might be obtained if the specimen could be tested without such support. These test results do not necessarily relate to indices obtained by testing materials without such support.

1.5 Testing of materials that melt, drip, or delaminate to such a degree that the continuity of the flame front is destroyed, results in low flame spread indices that do not relate directly to indices obtained by testing materials that remain in place.

1.6 *Units*—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.

1.7 The text of this standard references notes and footnotes that provide explanatory information. These notes and footnotes, excluding those in tables and figures, shall not be considered as requirements of the standard.

1.8 *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.*

1.9 *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.*

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

1.11 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the*

[1] This test method is under the jurisdiction of ASTM Committee E05 on Fire Standards and is the direct responsibility of Subcommittee E05.22 on Surface Burning.

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***A Summary of Changes section appears at the end of this standard**

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]

A390 Specification for Zinc-Coated (Galvanized) Steel Poultry Fence Fabric (Hexagonal and Straight Line)

C1186 Specification for Flat Fiber-Cement Sheets

C1288 Specification for Fiber-Cement Interior Substrate Sheets

C1396/C1396M Specification for Gypsum Board

D4442 Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials

D4444 Test Method for Laboratory Standardization and Calibration of Hand-Held Moisture Meters

E69 Test Method for Combustible Properties of Treated Wood by the Fire-Tube Apparatus

E160 Test Method for Combustible Properties of Treated Wood by the Crib Test (Withdrawn 1993)[3]

E162 Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source

E176 Terminology of Fire Standards

E286 Test Method for Surface Flammability of Building Materials Using an 8-ft (2.44-m) Tunnel Furnace (Withdrawn 1991)[3]

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

E2231 Practice for Specimen Preparation and Mounting of Pipe and Duct Insulation Materials to Assess Surface Burning Characteristics

E2404 Practice for Specimen Preparation and Mounting of Textile, Paper or Polymeric (Including Vinyl) and Wood Wall or Ceiling Coverings, Facings and Veneers, to Assess Surface Burning Characteristics

E2573 Practice for Specimen Preparation and Mounting of Site-Fabricated Stretch Systems to Assess Surface Burning Characteristics

E2579 Practice for Specimen Preparation and Mounting of Wood Products to Assess Surface Burning Characteristics

E2599 Practice for Specimen Preparation and Mounting of Reflective Insulation, Radiant Barrier and Vinyl Stretch Ceiling Materials for Building Applications to Assess Surface Burning Characteristics

E2688 Practice for Specimen Preparation and Mounting of Tapes to Assess Surface Burning Characteristics

E2690 Practice for Specimen Preparation and Mounting of Caulks and Sealants to Assess Surface Burning Characteristics

E2768 Test Method for Extended Duration Surface Burning Characteristics of Building Materials (30 min Tunnel Test)

E2988 Practice for Specimen Preparation and Mounting of Flexible Fibrous Glass Insulation for Metal Buildings to Assess Surface Burning Characteristics

E3202 Practice for Specimen Preparation and Mounting of Plastic Composites for Use as Deck Boards, Stair Treads, Guards or Handrails to Assess Surface Burning Characteristics

E3287 Practice for Specimen Preparation of Fenestration Profiles Intended to Support Non-Combustible In-Fill Materials to Assess Surface Burning Characteristics

2.2 *NFPA Standards:*[4]

NFPA 90A Standard for the Installation of Air-Conditioning and Ventilating Systems (2021)

NFPA 262 Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces (2019)

2.3 *UL Standards:*[5]

UL 723 Standard for Test for Surface Burning Characteristics of Building Materials (2023)

UL 1820 Standard for Safety for Fire Test of Pneumatic Tubing for Flame and Smoke Characteristics (2021)

UL 1887 Standard for Fire Test of Plastic Sprinkler Pipe for Visible Flame and Smoke Characteristics (2021)

UL 2024 Standard for Safety for Optical Fiber and Communication Cable Raceway (2021)

UL 2846 Standard for Fire Test of Plastic Water Distribution Plumbing Pipe for Visible Flame and Smoke Characteristics (2021)

2.4 *ICC Codes:*[6]

IMC International Mechanical Code (2021)

3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of terms used in this test method refer to Terminology E176. The term flame spread index from Terminology E176 is of particular interest to this standard and is defined in 3.1.2.

3.1.2 *flame spread index, n*—a number or classification indicating a comparative measure derived from observations made during the progress of the boundary of a zone of flame under defined test conditions.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *self-supporting (as related to fire testing of specimens), adj*—having the ability to remain on the ceiling of the test apparatus without the use of additional supporting elements and without exhibiting behavior, such as sagging and falling debris, that interferes with the burner flame and progression of the flame front over the surface of the specimen before the application of the burner flame and at any time during the test.

3.2.1.1 *Discussion*—Self-supporting specimens, after being mounted on the ledges of the test furnace, are structurally capable of supporting their own weight prior to the test and

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at www.astm.org/contact. 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.

[4] Available from National Fire Protection Association, 1 Battery March Park, Quincy, MA 02169.

[5] Available from Underwriters Laboratories, 333 Pfingsten Road, Northbrook, IL 60062.

[6] Available from International Code Council (ICC), 500 New Jersey Avenue, NW 6th Floor, Washington, DC 20001.