

NFPA® 701

Standard Methods of Fire Tests for Flame Propagation of Textiles and Films

2019



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NFPA® 701

Standard Methods of

Fire Tests for Flame Propagation of Textiles and Films

2019 Edition

This edition of NFPA 701, *Standard Methods of Fire Tests for Flame Propagation of Textiles and Films*, was prepared by the Technical Committee on Fire Tests. It was issued by the Standards Council on November 5, 2018, with an effective date of November 25, 2018, and supersedes all previous editions.

This edition of NFPA 701 was approved as an American National Standard on November 25, 2018.

Origin and Development of NFPA 701

Requirements for flameproofing of textiles were adopted by the NFPA on recommendation of the Committee on Fireproofing and Preservative Treatments in 1938. These requirements were amended in 1939, 1940, 1941, and 1951. This standard is now under the jurisdiction of the NFPA Technical Committee on Fire Tests; the 1966 edition, which was an extensive revision of the previous edition, was prepared by that committee, as were the 1968, 1969, 1975, 1976, and 1977 editions.

The 1989 edition was a complete rewrite with significant changes to the small-scale test.

The 1996 edition represented a significant departure from earlier editions, as it provided a new test for single-layer and multilayer fabric assemblies but maintained the large-scale test for multilayer assemblies involving coated fabric blackout linings. This new test was developed to address the problem presented by multilayer assemblies that could not be addressed by the current test procedures. The new Test 1 proved through experience to be an adequate predictor of the behavior of single-layer and multilayer assemblies. Chapter 10, "Field Test, Match Flame Test," of the 1989 edition was established as a separate document, NFPA 705, *Recommended Practice for a Field Flame Test for Textiles and Films*.

The 1999 edition incorporated mostly editorial revisions that reflected the appropriate terminologies used within the document. Many of the editorial changes applied to the application of test procedures for flame propagation of textiles and film in lieu of a material being designated as flame resistant. A section on conditioning of test specimens was added to assist the user.

The 2004 edition included a complete editorial rewrite of the document for compliance with the *Manual of Style for NFPA Technical Committee Documents*, resulting in significant chapter renumbering and rearranging of information. Technical changes in the 2004 edition clarified that Test Method 1 was not applicable for plastic blinds and multilayered fabrics. Advisory information was added to the annex regarding previous small-scale test methodologies that were no longer applicable.

The 2010 edition included a number of primarily organizational changes. The lists and examples of the types of materials that are governed by NFPA 701 were relocated from Chapter 1 to Annex A. The applicable test protocols for materials that are to be used as part of an interior finish application were revised to recognize the ASTM E84/UL 723 tests. NFPA 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*, was also included as an acceptable test for evaluation of materials for interior finish.

The 2015 edition included editorial revisions to clarify the differences between Test Method 1 and Test Method 2.

The 2019 edition includes updates to the burner fuel and to the reporting of flaming droplets.

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acceptable test standards for fire problems of concern to NFPA technical committees and members, and for acting in a liaison capacity between NFPA and the committees of other organizations writing fire test standards. This Committee does not cover fire tests that are used to evaluate extinguishing agents, devices, or systems.

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NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Annex A.

A reference in brackets [] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, the complete title and edition of the source documents for extracts in mandatory sections of the document are given in Chapter 2 and those for extracts in informational sections are given in Annex E. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

Information on referenced publications can be found in Chapter 2 and Annex E.

Chapter 1 Administration

1.1* Scope.

1.1.1* Test Method 1.

1.1.1.1 Test Method 1 shall apply to materials with an areal density less than or equal to 700 g/m² (21 oz/yd²), including the following:

- (1) Fabrics or other materials used in curtains, draperies, or other window treatments
- (2) Single-layer fabrics
- (3) Multilayer curtain and drapery assemblies in which the layers are fastened together by sewing or other means
- (4) Where required, fabrics with an areal density less than or equal to 700 g/m² (21 oz/yd²) and used in other construction applications

1.1.1.2 Test Method 1 shall not apply to the following, which shall be tested according to Test Method 2:

- (1) Vinyl-coated fabric blackout linings or lined draperies using a vinyl-coated fabric blackout lining
- (2) Plastic films
- (3) Decorative materials other than fabrics
- (4) Other materials where Test Method 2 is required by 1.1.2

1.1.2 Test Method 2.

1.1.2.1 Test Method 2 shall apply to the following:

- (1) Decorative materials other than fabrics meeting the requirements of 1.1.1.1
- (2) Fabrics, including multilayered fabrics, films, and plastic blinds, with or without reinforcement or backing, with areal densities greater than 700 g/m² (21 oz/yd²)
- (3) Vinyl-coated fabric blackout linings and lined draperies using a vinyl-coated fabric blackout lining
- (4) Plastic films
- (5) Fabrics, with or without reinforcement or backing, used for decorative or other purposes inside a building or as temporary or permanent enclosures for buildings under construction
- (6) Fabrics used in the assembly of awnings, tents, tarps, membrane structures, or banners

1.1.2.2 Test Method 2 shall not apply to the following:

- (1) Materials covered by Test Method 1 (See 1.1.1)
- (2) Wall coverings, ceiling coverings, floor coverings, and other interior finish

1.1.3 Test Methods 1 and 2.

1.1.3.1 When durability to cleaning or weathering is claimed, the textile or material shall be tested for flame propagation as produced and after being subjected to the applicable cleaning or exposure procedures, in accordance with Chapter 16.

1.1.3.2 For materials that are to be applied to surfaces of buildings or backing materials that are to be used in buildings as interior finishes, the test textiles and films shall be tested and classified in accordance with ASTM E84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, UL 723, *Standard Test for Surface Burning Characteristics of Building Materials*, NFPA 265, or NFPA 286, whichever is required by the authority having jurisdiction.

1.2* Purpose.

1.2.1 The purpose of Test Methods 1 and 2 shall be to assess the propagation of flame beyond the area exposed to the ignition source.

1.2.2 Test Methods 1 and 2 shall not be deemed to indicate whether the material tested resists the propagation of flame under more severe fire exposure conditions or when the material is used in a manner that differs from the test conditions.

1.3 Units.

1.3.1 If a value for measurement as given in this standard is followed by an equivalent value in other units, the first stated value shall be regarded as the requirement.

1.3.2 A given equivalent value shall be considered to be approximate.

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

2.2 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 265, *Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile or Expanded Vinyl Wall Coverings on Full Height Panels and Walls*, 2019 edition.

NFPA 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*, 2019 edition.

2.3 Other Publications.

2.3.1 AATCC Publications. American Association of Textile Chemists and Colorists, P.O. Box 12215, Research Triangle Park, NC 27709.

AATCC Test Method 124, *Smoothness Appearance of Fabrics After Repeated Home Laundering*, 2011.

2.3.2 ASTM Publications. ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM D5025, *Standard Specification for Laboratory Burner Used for Small-Scale Burning Tests on Plastic Materials*, 2012 e1.

ASTM D5207, *Standard Practice for Confirmation of 20-mm (50-W) and 125-mm (500-W) Test Flames for Small-Scale Burning Tests on Plastic Materials*, 2014.

ASTM E84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, 2018.

2.3.3 UL Publications. Underwriters Laboratories, 333 Pfingsten Road, Northbrook, IL 60062-2096.

UL 723, *Standard Test for Surface Burning Characteristics of Building Materials*, 2008, revised 2017.

2.3.4 Other Publications.

Merriam-Webster's Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

2.4 References for Extracts in Mandatory Sections.

NFPA 101®, *Life Safety Code*®, 2018 edition.

NFPA 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*, 2019 edition.

Chapter 3 Definitions

3.1 General. The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. *Merriam-Webster's Collegiate Dictionary*, 11th edition, shall be the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.

3.2.1* Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements

of a code or standard, or for approving equipment, materials, an installation, or a procedure.

3.2.2 Shall. Indicates a mandatory requirement.

3.2.3 Should. Indicates a recommendation or that which is advised but not required.

3.2.4 Standard. An NFPA Standard, the main text of which contains only mandatory provisions using the word "shall" to indicate requirements and that is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions are not to be considered a part of the requirements of a standard and shall be located in an appendix, annex, footnote, informational note, or other means as permitted in the NFPA Manuals of Style. When used in a generic sense, such as in the phrase "standards development process" or "standards development activities," the term "standards" includes all NFPA Standards, including Codes, Standards, Recommended Practices, and Guides.

3.3 General Definitions.

3.3.1* Decorative Materials. Materials suspended from walls, ceilings, or structural members for decorative, acoustical, or other effects.

3.3.2 Membrane Structure. A building or portion of a building incorporating an air-inflated, air-supported, tensioned-membrane structure; a membrane roof; or a membrane-covered rigid frame to protect habitable or usable space. [101, 2018]

3.3.3 Textile. A fabric made of natural or man-made fibers. [286, 2019]

Chapter 4 General Requirements for Test Method 1

4.1 General.

4.1.1 A weighed specimen consisting of one or more layers of textile shall be suspended vertically from a pin bar near the top rear of an open-face test cabinet.

4.1.2 A specified gas flame shall be applied to the center of the lower edge of the specimen for 45 seconds and then withdrawn.

4.1.3 The specimen shall be allowed to burn until the flame self-extinguishes and no further specimen damage occurs.

4.1.4 The specimen then shall be removed from the pin bar and, after room conditioning, shall be weighed again.

4.1.5 The percent weight loss shall be determined and used as a measure of total flame propagation and specimen damage.

Chapter 5 Test Apparatus and Materials for Test Method 1

5.1 Conditioning Oven. A forced-draft oven that is capable of maintaining a temperature of 105°C ± 3°C (220°F ± 5°F) shall be used to condition the test specimens prior to testing.

5.2 Hood.

5.2.1 A standard laboratory hood, minimum 820 mm wide × 750 mm high × 630 mm deep (32 in. × 30 in. × 25 in.), or other