

NFPA 701

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

2004 Edition



NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
An International Codes and Standards Organization

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Fire Tests for Flame Propagation of Textiles and Films
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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 and acted on by NFPA at its May Association Technical Meeting held May 23–26, 2004, in Salt Lake City, UT. It was issued by the Standards Council on July 16, 2004, with an effective date of August 5, 2004, and supersedes all previous editions.

This edition of NFPA 701 was approved as an American National Standard on August 5, 2004.

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 includes a complete editorial rewrite of the document to come into compliance with NFPA’s *Manual of Style*. As such, significant chapter renumbering and rearranging of information has occurred. Technical changes include text that makes it clear that Test Method 1 is not applicable for plastic blinds and multilayered fabrics. Advisory information has been added to the annex regarding previous small-scale test methodologies that are no longer included in the standard.

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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.

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 fabrics or other materials used in curtains, draperies, or other window treatments. Vinyl-coated fabric blackout linings shall be tested according to Test Method 2.

1.1.1.2 Test Method 1 shall apply to single-layer fabrics and to multilayer curtain and drapery assemblies in which the layers are fastened together by sewing or other means. Vinyl-coated fabric blackout linings shall be tested according to Test Method 2.

1.1.1.3 Test Method 1 shall apply to the following textile items:

- (1) Table skirts
- (2) Table linens
- (3) Display booth separators
- (4) Textile wall hangings

1.1.1.4 Test Method 1 shall not apply to specimens having an areal density greater than 700 g/m^2 (21 oz/yd^2).

1.1.1.5 For the purposes of Test Method 1, the terms *curtains*, *draperies*, or other types of window treatments, where used, shall include, but not be limited to, the following items:

- (1) Window curtains
- (2) Stage or theater curtains
- (3) Vertical folding shades
- (4) Roll-type window shades
- (5) Hospital privacy curtains
- (6) Window draperies
- (7) Fabric vertical shades or blinds
- (8) Horizontal folding shades
- (9) Swags
- (10) Fabric horizontal shades or blinds

1.1.2 Test Method 2.

1.1.2.1 Test Method 2 (flat specimen configuration) shall be used for fabrics, including multilayered fabrics, films, and

plastic blinds, with or without reinforcement or backing, with areal densities greater than 700 g/m^2 (21 oz/yd^2).

1.1.2.2 Test Method 2 shall be used for testing vinyl-coated fabric blackout linings and lined draperies using a vinyl-coated fabric blackout lining.

1.1.2.3 Test Method 2 shall be used for testing plastic films, with or without reinforcement or backing, when used for decorative or other purposes inside a building or as temporary or permanent enclosures for buildings under construction.

1.1.2.4 Test Method 2 shall apply to fabrics used in the assembly of awnings, tents, tarps, and similar architectural fabric structures and banners.

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 NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials*, or NFPA 265, *Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls*, 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 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials*, 2000 edition.

NFPA 265, *Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls*, 2002 edition.

2.3 Other Publications.

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

AATCC Technical Manual, *Standard Laboratory Practice for Home Laundering Fabrics Prior to Flammability Testing to Differentiate Between Durable and Non-Durable Finishes*, 1994.

2.3.2 ASTM Publications. American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM D 5025, *Standard Specification for Laboratory Burner Used for Small-Scale Burning Tests on Plastic Materials*, 1999.

ASTM D 5207, *Standard Practice for Calibration of 20 mm and 125 mm Test Flames for Small-Scale Burning Tests on Plastic Materials*, 1998.

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 included, common usage of the terms shall apply.

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. A document, the main text of which contains only mandatory provisions using the word "shall" to indicate requirements and which is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions shall be located in an appendix or annex, footnote, or fine-print note and are not to be considered a part of the requirements of a standard.

3.3 General Definitions. (Reserved)

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 $105^{\circ}\text{C} \pm 3^{\circ}\text{C}$ ($220^{\circ}\text{F} \pm 5^{\circ}\text{F}$) 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 $\times$ 750 mm high $\times$ 630 mm deep (32 in. $\times$ 30 in. $\times$ 25 in.), or other suitable enclosure shall be used and shall provide a draft-free environment around an open-face test chamber.

5.2.2 The hood or other enclosure shall be equipped with an exhaust fan for exhausting the smoke as provided in 8.3.7.

5.3 Test Chamber, Specimen Mounting Pin Bar, and Gas Burner.

5.3.1 An open-face test chamber shall be constructed in accordance with Figure 5.3.1 using 12 mm (0.5 in.) thick marinite mineral board.

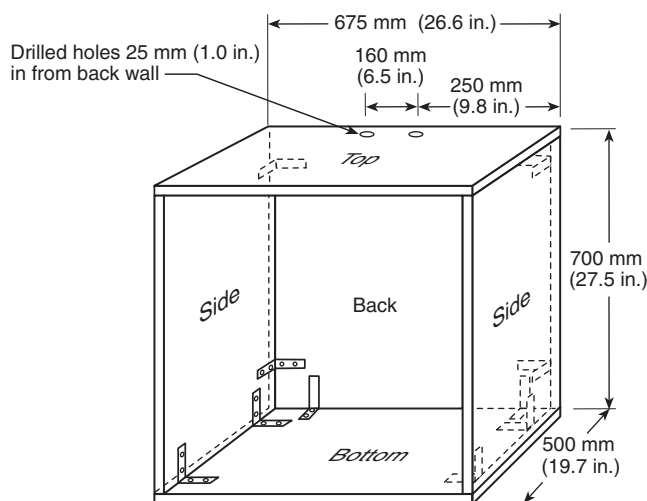


FIGURE 5.3.1 Test Cabinet for Test Method 1.

5.3.1.1 All interior surfaces of the cabinet shall be painted with a flat black paint that withstands the heating that occurs in the cabinet.

5.3.1.2 The cabinet with the burner and specimen in place shall be arranged as depicted in Figure 5.3.1.2.

5.3.2 The pin bar for mounting the specimen shall be a 9 mm (0.36 in.) square stainless steel bar, 190 mm (7.5 in.) in length, with steel pins 0.7 mm (0.027 in.) in diameter and 11 mm (0.43 in.) long, mounted at distances of 37 mm, 66 mm, 95 mm, 124 mm, and 153 mm (1.45 in., 2.60 in., 3.75 in., 4.90 in., and 6.05 in.) from each end of the bar.

5.3.3* A Meker (Fisher) tapered laboratory burner with grid-top adjustable channels, which provides a premixed flame, shall be used as the ignition source.

5.4 Gas and Control System.

5.4.1 Methane gas that is at least 97 percent pure shall be used for the burner fuel.