NFPA® 260

Standard Methods of Tests and Classification System for Cigarette Ignition Resistance of Components of Upholstered Furniture

2024 Edition

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

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Tests and Classification System for Cigarette Ignition Resistance of Components of Upholstered Furniture

2024 Edition

This edition of NFPA 260, *Standard Methods of Tests and Classification System for Cigarette Ignition Resistance of Components of Upholstered Furniture,* was prepared by the Technical Committee on Fire Tests. It was issued by the Standards Council on July 13, 2023, with an effective date of August 2, 2023, and supersedes all previous editions.

This document has been amended by one or more Tentative Interim Amendments (TIAs) and/or Errata. See "Codes & Standards" at www.nfpa.org for more information.

This edition of NFPA 260 was approved as an American National Standard on August 2, 2023.

Origin and Development of NFPA 260

Regulation of the manufacture of furniture has been a subject of research and debate since 1967 when the Flammable Fabrics Act was amended by Congress to include products in addition to wearing apparel and home textiles that might constitute an unreasonable flammability risk. The National Bureau of Standards (NBS), now the National Institute of Standards and Technology (NIST), began funding laboratory research on the subject in 1968. With its formation in 1973, the U.S. Consumer Product Safety Commission (CPSC) became the government agency responsible for the administration of the Flammable Fabrics Act, including the adoption of any program or standard regulating upholstered furniture. The NBS retained responsibility for designing test methods related to flammable fabrics.

In 1976, the NBS submitted a draft to the CPSC for a proposed cigarette ignition resistance standard for upholstered furniture. Shortly thereafter, however, the CPSC was reorganized into separate program areas. This was followed by nearly a year's worth of study on its children's sleepwear standards, which was prompted by findings that a chemical used in sleepwear to make it flame-retardant might be carcinogenic. In November 1978, the CPSC staff, after modifying the originally proposed NBS standard on upholstered furniture, recommended to the CPSC commissioners that they publish the proposed standard.

In December 1978, at an informal meeting during which the CPSC asked that comments be submitted before publishing the final version of the standard, the upholstered furniture industry proposed its own voluntary program, the Upholstered Furniture Action Council (UFAC) Voluntary Action Program.

The UFAC voluntary program was adopted in April 1979. The 1983 edition of this standard (then NFPA 260A) was developed subsequent to that date by the Technical Committee on Fire Tests and drew heavily on the UFAC test method for components of upholstered furniture.

The 1986 edition brought the document into agreement with the UFAC test method. The 1989 edition was renumbered NFPA 260 and included refinements for further agreement with the UFAC test method.

The 1994 edition of this standard included further refinements that reflected minor changes and editorial clarification. Those changes involved current definitions and technology used within the upholstered furniture industry.

The 1998 edition added clarification of the pretest cigarette burn length.

For the 2003 edition, the chapter layout of NFPA 260 was reorganized to agree with the *Manual of Style for NFPA Technical Committee Documents.*

The 2009 edition contained mainly editorial revisions.

In 2013, the standard cigarette ignition source was replaced with an SRM 1196 (NIST) cigarette.

The 2019 edition of NFPA 260 included substantial revision of the requirements for standard cover fabrics and foam substrates in Chapter 4.

The 2024 edition includes a new reporting section and revisions to Chapter 7, Cigarette Resistance Classifications. The reference cigarette was updated and a new annex section was added to clarify the relationship between various test methods and codes and standards.

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

Chapter 1 Administration

1.1 Scope.

1.1.1* The tests described in this document apply to upholstered furniture components that are tested in a standard, defined composite.

Δ **1.1.2*** These tests shall apply to cover fabrics, interior fabrics, welt cords, decking materials, barrier materials, and filling/padding materials including but not limited to battings of natural or man-made fibers, foamed or cellular filling materials, resilient pads of natural or man-made fibers, and loose particulate filling materials, such as shredded polyurethane foam or feathers and down.

1.2 Purpose.

1.2.1 The test methods in this document are designed to evaluate the ignition resistance of upholstered furniture when it is exposed to smoldering cigarettes under specified conditions.

1.2.2 It is the intent of this standard to provide tests to determine whether covered upholstered furniture components, such as cover fabrics, welt cords, decking materials, interior fabrics, and filling/padding materials, are relatively resistant to ignition by smoldering cigarettes.

1.2.3* This standard establishes a classification system for determining the resistance of upholstered furniture components to cigarette ignition.

N **1.2.4** For the purposes of this standard, materials are designated Class II unless they are demonstrated to be Class I using the test methods in this document.

1.3 Application.

1.3.1 Tests specified by this standard are intended to measure the performance of upholstered furniture components under conditions of exposure to a smoldering cigarette.

1.3.2 Tests specified by this standard shall not be used to measure the performance of upholstered furniture under conditions of open flame exposure, and do not indicate whether the furniture will resist the propagation of flame under severe fire exposure or when tested in a manner that differs substantially from the test standard.

1.3.3 The test results obtained with a material component tested in a given mock-up, in accordance with this standard, do not necessarily indicate the performance of the same material component in the form of other geometric configurations, such as full-size furniture.

1.3.4 Tests specified by this standard shall be used to measure and describe the response of materials, products, or assemblies to a smoldering cigarette under controlled laboratory conditions, and do not necessarily describe or appraise the fire hazard or fire risk of materials, products, or furniture assemblies under actual fire conditions.

1.3.5 This standard is intended to assist in component selection and composite design for upholstered furniture in order to achieve a high level of resistance to cigarette ignition.

1.3.6 The effects of aging on components and on composites made from components have not been studied. As a result, the test methods contained in this standard might not predict changes caused by aging or contamination during normal use.

1.4 Test Selection.

1.4.1 All outer cover fabrics shall be subjected to the cover fabric test.

1.4.2 All interior fabrics used in intimate contact with outer fabrics shall be subjected to the interior fabric test.

1.4.3 All welt cord shall be subjected to the welt cord test.

1.4.4 All material used under the cover fabric in seats or within inside vertical walls (inside arms and inside backs) shall be subjected to the filling/padding component test.

1.4.5 Any material used in the deck under loose cushions shall be subjected to the decking materials test.

1.4.6 Any material intended to serve as a barrier between a Class II cover fabric or an interior fabric and the padding material in a seat or other padded section of an upholstered furniture item shall be subjected to the barrier materials test.

1.5* Precision. A repeatability and reproducibility study was conducted on the test methods of NFPA 260.

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. (Reserved)

2.3 Other Publications.

Δ **2.3.1 ASTM Publications.** ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959. www.astm.org

ASTM D737, *Standard Test Method for Air Permeability of Textile Fabrics*, 2018.

ASTM D3574, *Standard Test Methods for Flexible Cellular Materials — Slab, Bonded, and Molded Urethane Foams*, 2017.

2.3.2 GSA Publications. US General Services Administration, 1800 F Street, NW, Washington, DC 20405.

Federal Specification CCC-C-436E, *Cloth, Ticking, Twill, Cotton: Type I,* Feb 14, 1986.

2.3.3 Other Publications.

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

2.4 References for Extracts in Mandatory Sections. (Reserved)

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 Shall. Indicates a mandatory requirement.

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

3.2.3 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 phrases "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 Barrier/Barrier Fabric. The fabric or other material placed directly under the cover fabric when Class II cover fabric is used.

3.3.2 Char. Carbonaceous material formed by pyrolysis or incomplete combustion.

N **3.3.3 Cover Fabric.** Textile, vinyl, leather, or another material used as the outer surface of upholstered furniture everywhere except the bottom of the furniture.

3.3.4 Filling Direction. In woven fabrics, that direction perpendicular to the warp direction.

3.3.5 Ignition. Continuous, self-sustaining, smoldering combustion of upholstered furniture substrates after exposure to burning cigarettes.

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3.3.6* Machine Direction. In the case of nonwoven or film-type materials, that direction parallel to the longest dimension of the roll goods.

3.3.7 Sample. Material being tested.

3.3.8 Selvedge. The outermost edge of the width of the fabric.

3.3.9 Specimen. Individual pieces of a sample used in a single test assembly.

3.3.10 Warp Direction. In woven textiles, that direction on the roll of fabric that is parallel to the selvedges.

3.3.11 Welt Cord. The cord or piping sewn into the seam or border edge of a cushion, pillow, arm, or back of a furniture item.

Chapter 4 Test Apparatus

4.1 Mini-Mock-Up Tester.

4.1.1 The mini-mock-up tester shall consist of a base with a centrally located guide and a stationary vertical panel, a movable horizontal carriage, and a removable vertical support panel as shown in Figure 4.1.1.

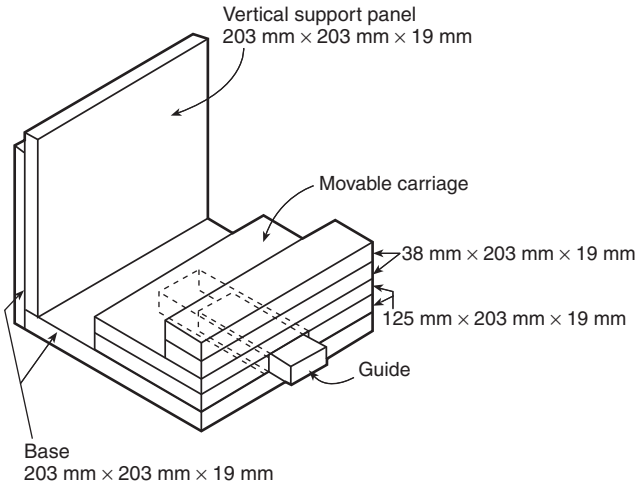

FIGURE 4.1.1 Mini-Mock-Up Tester.

4.1.2 The base shall consist of two wooden panels, each nominally 203 mm × 203 mm with nominal 19 mm thickness, joined together at one edge.

4.1.3 The carriage shall have a 125 mm × 203 mm platform to support a horizontal specimen.

4.1.4 The platform shall be 38 mm above the floor of the base and shall have a 32 mm lip at the front edge.

4.1.5 The carriage shall be grooved to fit over a guide provided on the floor of the base.

4.1.6 The removable vertical support panel shall consist of a wooden panel of nominal 203 mm × 203 mm area and nominal 19 mm thickness, which stands against the vertical wall of the base.

4.2 Decking Materials Tester.

4.2.1 The decking materials tester shall consist of a plywood base and a plywood retainer ring.

4.2.2 The base shall measure 533 mm × 343 mm × 13 mm.

4.2.3 The retainer ring shall measure 533 mm × 343 mm × 13 mm, with an opening measuring 406 mm × 216 mm as shown in Figure 4.2.3.

4.3* Ignition Source. The ignition source for the test shall consist of the current supply of SRM 1196 series cigarettes without filter tips made from natural tobacco, 83 mm ± 2 mm long, with a tobacco packing density of 0.270 g/cm^3 ± 0.020 g/cm^3, and a total weight of 1.1 g ± 0.1 g.

4.4 Standard Type I Cover Fabric.

4.4.1 Standard Type I cover fabric shall be 100 percent cotton mattress ticking conforming to Federal Specification CCC-C-436E, *Cloth, Ticking, Twill, Cotton: Type I.*

4.4.2 Standard Type I cover fabric shall be laundered and tumble-dried once before use.

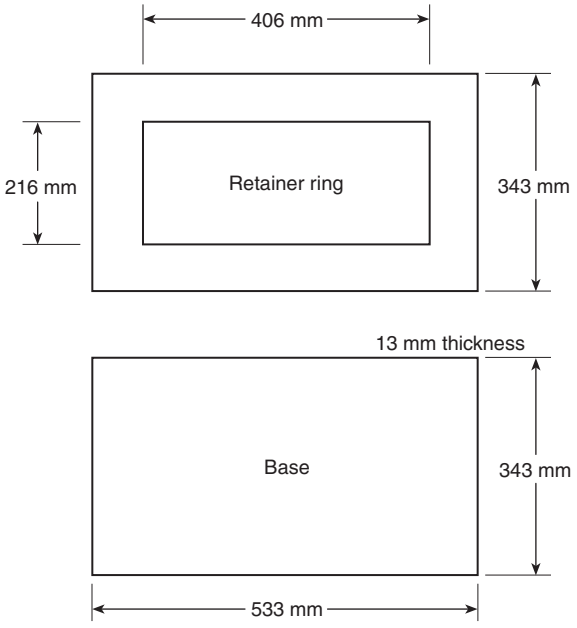

FIGURE 4.2.3 Decking Materials Tester.

4.5* Standard Type II Cover Fabric. Standard Type II cover fabric shall be UFAC Type II, 100 percent bright, regular rayon, scoured, 20/2, ring-spun, basket-weave construction, 271 g/m^2 ± 12 g/m^2, undyed, and shall not be treated with any flame-retardant finishes, whiteners, or back coating.

4.6 Sheeting Material.

4.6.1 Sheeting material shall be cotton bed sheeting weighing 125 g/m^2 ± 28 g/m^2 and white in color and shall not be treated with flame retardants.

4.6.2 For testing, the fabric shall be cut into squares of 127 mm × 127 mm.

4.6.3 If 100 percent cotton sheeting is unavailable, a 50/50 blend of cotton/polyester conforming to the other specifications (weight, color, and untreated) shall be permitted to be used.

4.7 Polyurethane Foam Substrate. The polyurethane foam substrate shall have the following specifications based on physical test methods described in ASTM D3574, *Standard Test Methods for Flexible Cellular Materials — Slab, Bonded, and Molded Urethane Foams.*

4.7.1 The foam shall be open-cell, polyether-based conventional flexible polyurethane foam, produced using propylene oxide/ethylene oxide polyol with no ethylene oxide end-capping with 80/20 toluene diisocyanate blend (no natural oil polyol content); with no added fire-retardant products, liquid or solid, or post-production FR treatment; with no antioxidant or foam stabilizer additives; with no antimicrobial or antistatic additives; natural color with no colorants or whitening additives; and crush foam to 90 percent after curing.

4.7.2 The polyurethane foam shall have a density of 28.0 – 29.6 kg/m^3, an indentation load deflection (25 percent IFD) of 27 to 33, and air permeability of 3.5 to 4.0 cfm in accordance with ASTM D737, *Standard Test Method for Air Permeability of Textile Fabrics*, using a 51 mm x 51 mm orifice plate, and airflow shall be tested using crushed foam.

4.7.3 Samples shall be cut as follows:

(1) The polyurethane foam shall be cut horizontally such that the thickness is perpendicular to the foam rise as shown in Figure 4.7.3.
(2) The polyurethane foam shall be cut from the top surface of the sample no less than 305 mm from the top of the bun, no less than 305 mm from the bottom of the bun, and no closer than 305 mm from the bun sidewalls, as shown in Figure 4.7.3.

4.8 Miscellaneous. Other apparatus needed to carry out the testing shall include straight pins, a staple gun, a knife or scissors, tongs, and a linear scale graduated in millimeter divisions.

4.9* Air Velocity.

4.9.1 The air velocity across the test assemblies shall be maintained below 15.2 m/min (which is virtually the velocity of natural convection created by the burning cigarette) in order to minimize localized effects from draft superheating of cigarette embers.

4.9.2 The smoke plume from the burning cigarette shall be visibly vertical and shall be a minimum of 152 mm in height.

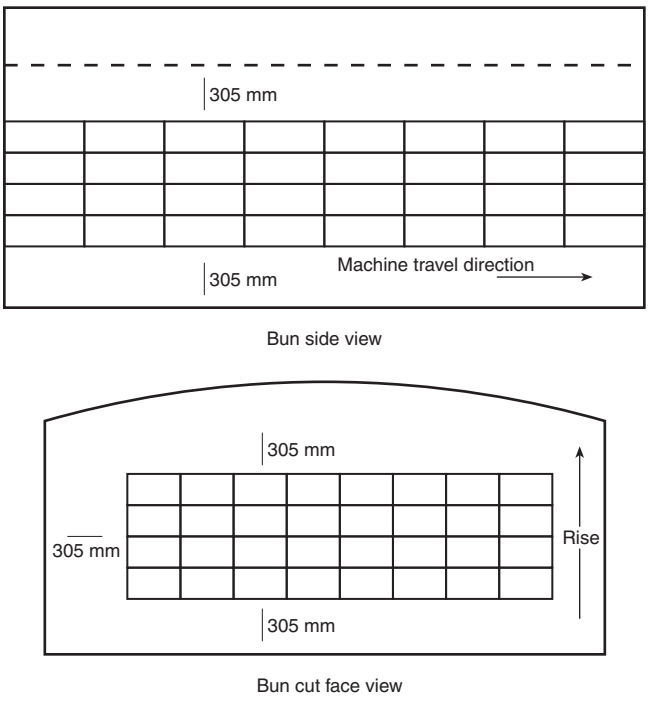

FIGURE 4.7.3 Foam Cut Direction.

4.10 Extinguishing Equipment.

4.10.1 A pressurized water fire extinguisher or other fire-extinguishing equipment shall be immediately available.

4.10.2 A water bottle fitted with a spray nozzle shall be provided to extinguish any ignited portions of the test specimen.

4.10.3 A bucket of water shall be provided for immersing smoldering or burning materials removed from the tester.

4.10.4 Tongs shall be provided for handling smoldering materials prior to immersion.

4.10.5 Gloves and breathing apparatus also shall be provided for handling smoldering or burning materials.

4.11 Draft Enclosure. A draft-preventive enclosure constructed in accordance with Figure 4.11 shall be provided to restrict airflow.

Chapter 5 Test Specimens

5.1 Specimen Conditioning.

5.1.1 All test upholstery fabrics and test materials, including cigarettes and sheeting material, shall be conditioned at a temperature of 21°C ± 2.8°C and a relative humidity of less than 65 percent for at least 4 hours prior to testing.

5.1.2 If the test room does not meet the specifications for conditioning described in 5.1.1, the testing shall be initiated within 10 minutes after the specimens are removed from the conditioning room.

5.2 Cover Fabric Specimen.

5.2.1 Three 203 mm × 203 mm specimens shall be cut from the material to be tested for horizontal panels, and three 203 mm × 381 mm specimens shall be cut for vertical panels.

5.2.2 Each specimen shall have its long dimension cut in the direction of the warp and assembled for testing in a warp-to-warp orientation, such that the major areas of weave variation lie in the crevice of the assembled test apparatus.

5.2.3 For fabrics with complex weaves, specimens shall be cut such that portions of the three largest areas of weave complexity are contacted by the cigarettes placed on the test assemblies.

5.2.3.1 For dyed fabrics, printed fabrics, or both, color shall not constitute a variation relative to cigarette ignition resistance in this test.

5.3 Interior Fabric Specimen. Three 203 mm × 203 mm specimens shall be cut from the material to be tested.

5.4 Welt Cord Specimen. Three 205 mm specimens shall be cut from the welt cord to be tested.

5.5 Filling/Padding Component Specimen.

5.5.1 Three 203 mm × 127 mm × 76 mm specimens shall be cut for the horizontal panels, and three 203 mm × 203 mm × 76 mm specimens shall be cut for the vertical panels.

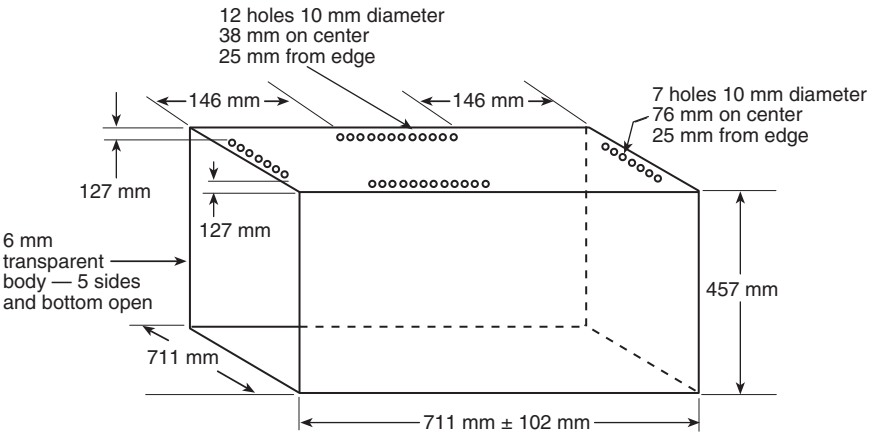

FIGURE 4.11 Draft Enclosure.

5.5.2* For loose or particulate materials such as shredded polyurethane foam and down, upholstery cover materials, or ticking used to contain the loose or particulate material, shall be sewn as follows:

(1) Knife edge–type bags shall measure 254 mm × 254 mm inside seam to inside seam.
(2) The bags shall be made of the same material used to manufacture the upholstered furniture, and the loose or particulate material shall be the same as that used to manufacture the upholstered furniture.
(3) The bags, sewn on three sides, then shall be filled with 40 g ± 2 g of the loose or particulate material, and the fourth side shall be sewn closed.
(4) The composite of the bag material and the loose or particulate material shall be tested using the filling/padding component test and shall pass the minimum Class I criteria for this test when tested in the vertical wall of the mini-mock-up.

5.6 Decking Materials Specimen.

5.6.1 One specimen measuring 533 mm × 343 mm and at least 25 mm thick shall be cut from the decking material to be tested.

5.6.2 If sample thickness is less than 25 mm, multiple layers shall be used in this test to achieve the required thickness.

5.7 Barrier Materials Specimen. Three 203 mm × 203 mm specimens shall be cut for horizontal panels from the material to be tested, and three 203 mm × 381 mm specimens shall be cut for vertical panels.

Chapter 6 Test Procedures

N **6.1 General.**

N **6.1.1** The test duration shall be 45 minutes from the time the lit cigarette is placed on the test specimen unless otherwise required by 6.1.2.

N **6.1.2** If the test is terminated before 45 minutes have elapsed due to any one of the reasons in 6.1.2.1 through 6.1.2.3, the material shall be designated Class II.

N **6.1.2.1** The test operator shall terminate a test prior to the 45-minute time limit if the vertical char length has exceeded the limit prescribed in Section 7.3.

N **6.1.2.2** The test operator shall terminate a test prior to the 45-minute time limit if the test specimen has transitioned to flaming combustion.

N **6.1.2.3** The test operator shall terminate a test prior to the 45-minute time limit if obvious ignition of the test specimen, in accordance with Section 7.2, has occurred.

6.2 Cover Fabric Test.

Δ 6.2.1 For horizontal panels, the 203 mm × 280 mm cover fabric specimen shall be placed on a 203 mm × 127 mm × 76 mm polyurethane foam substrate using pins at the ends of the fabric specimen to hold it in place as shown in Figure 6.2.1.

6.2.2 For vertical panels, the 203 mm × 432 mm fabric specimen shall be placed on a 203 mm × 203 mm × 76 mm polyurethane foam substrate as shown in Figure 6.2.1.

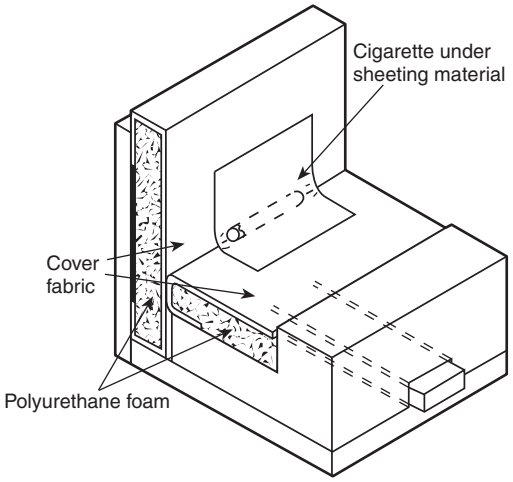

FIGURE 6.2.1 Cover Fabric Test Method.

6.2.2.1 The fabric shall overlap the top and bottom of the substrate and be pinned into place at the corners.

6.2.2.2 The warp or machine direction of the fabric shall run from front to back on the test assembly.

6.2.3 Each assembled vertical and horizontal panel shall be placed in a mini-mock-up tester as shown in Figure 6.2.1.

6.2.4 The position of the crevice shall be marked on the sides of the vertical substrate.

Δ 6.2.5 Three cigarettes shall be lighted and a lighted cigarette shall be placed on each of the three test assemblies such that the cigarette lies in the crevice and against the vertical panel, with each cigarette end equidistant from its respective side of the assembly.

6.2.6 Each cigarette shall be well lighted and burned not more than 4 mm when placed in a specific test location.

6.2.7* A piece of sheeting material shall be placed over each cigarette and shall be smoothed over the cigarette to ensure intimate contact.

6.2.7.1 The sheeting shall be pinned to the vertical panel approximately 63 mm above the crevice.

6.2.8 Each cigarette shall be allowed to burn its full length unless an obvious ignition (in accordance with Section 7.2) of the polyurethane foam substrate occurs.

Δ 6.2.8.1 If a cigarette extinguishes before burning through its entire length, a fresh cigarette shall be placed on a new test assembly and covered with sheeting fabric until one of the following occurs:

(1) Three cigarettes burn through their entire lengths on three individual test specimens.
(2) Three cigarettes self-extinguish on the sample.

Δ 6.2.9 If an obvious ignition (in accordance with Section 7.2) occurs on any of the three specimens, the smoldering materials shall be extinguished and the sample shall be recorded as a Class II cover fabric based on the results of this test.

6.2.10 If no obvious ignition occurs, the char on the vertical panel measured from the original crevice position to the high-

est part of the destroyed or degraded cover fabric shall be recorded to the nearest 2.5 mm.

6.2.10.1 The original crevice position shall be determined by laying a straightedge or ruler between the two marks required by 6.2.4 on the edges of the vertical panel.

6.2.10.2 The highest point of destroyed or degraded fabric shall be defined as the highest point at which any of the fabric is charred from front to back.

6.3 Interior Fabric Test.

6.3.1 For horizontal panels, the 203 mm × 280 mm piece of interior fabric and the 203 mm × 280 mm standard Type I cover fabric shall be placed with the interior fabric against the polyurethane foam substrate, using pins in the ends of the fabric specimens to hold them in place, as shown in Figure 6.3.1.

6.3.2 For vertical panels, 203 mm × 432 mm standard Type I cover fabric shall be placed on a 203 mm × 203 mm × 76 mm polyurethane foam substrate as shown in Figure 6.3.1.

6.3.2.1 The fabric shall overlap the top and bottom of the substrate and shall be pinned into place at the corners.

6.3.3 Each assembled vertical and horizontal panel shall be placed in a mini-mock-up tester as shown in Figure 6.3.1.

6.3.4 The position of the crevice shall be marked on the sides of the vertical polyurethane foam substrate.

6.3.5 Three cigarettes shall be lighted, and a lighted cigarette shall be placed on each of the three test assemblies such that the cigarette lies in the crevice and against the vertical panel, with each cigarette end equidistant from its respective side of the assembly.

6.3.6 Each cigarette shall be well lighted and burned not more than 4 mm when placed at a specific test location.

6.3.7* A piece of sheeting material shall be placed over each cigarette and shall be smoothed over the cigarette to ensure intimate contact.

6.3.7.1 The sheeting shall be pinned to the vertical panel approximately 63 mm above the crevice.

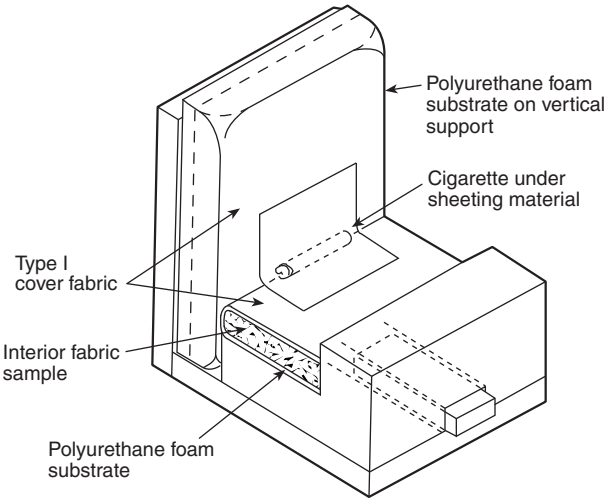

FIGURE 6.3.1 Interior Fabric Test Method.

6.3.8 Each cigarette shall be allowed to burn its full length unless an obvious ignition of the polyurethane foam substrate occurs.

6.3.8.1 If a cigarette extinguishes before burning its entire length, a fresh cigarette shall be placed on a new test assembly and covered with sheeting fabric until one of the following occurs:

(1) Three cigarettes have burned their entire length on three individual test specimens.
(2) Three cigarettes have self-extinguished on the sample.

6.3.9 If an obvious ignition occurs on any of the three specimens, the smoldering materials shall be extinguished, and the sample shall be recorded as a Class II interior fabric based on the results of this test.

6.3.10 If no obvious ignition occurs, the char on the vertical panel measured from the original crevice position to the highest part of the destroyed or degraded interior fabric shall be recorded to the nearest 2.5 mm.

6.3.10.1 The original crevice position shall be determined by laying a straightedge or ruler between the two marks required by 6.3.4 on the vertical panel.

6.3.10.2 The highest point of destroyed or degraded fabric shall be defined as the highest point at which any of the fabric is charred from front to back.

6.4 Welt Cord Test.

6.4.1 Sizes.

6.4.1.1 Three specimens of standard Type II cover fabric shall be cut for each of the following specified sizes:

(1) Horizontal panels measuring 203 mm × 280 mm
(2) Vertical panels measuring 203 mm × 432 mm
(3) Unsewn welt cords folded to measure 203 mm × 25 mm

6.4.1.2 The width of the welt shall be adjusted to the size of the welt cord.

6.4.1.3 For horizontal panels, the 203 mm × 280 mm Type II cover fabric shall be placed on a 203 mm × 127 mm × 76 mm polyurethane foam substrate, using pins in the ends of the fabric specimens to hold them in place, as shown in Figure 6.4.1.3.

6.4.1.4 For vertical panels, the 203 mm × 432 mm Type II cover fabric shall be placed on a 203 mm × 203 mm × 76 mm polyurethane foam substrate as shown in Figure 6.4.1.3.

6.4.1.4.1 The fabric shall overlap the top and bottom of the substrate and shall be pinned into place at the corners.

6.4.2 Each assembled vertical and horizontal panel shall be placed in a mini-mock-up tester as shown in Figure 6.4.1.3.

6.4.3 A welt cord specimen shall be placed into the center of a folded strip of standard Type II cover fabric to form an unsewn welt cord.

6.4.3.1 An unsewn welt cord shall be placed in each test assembly such that the fabric edges are located between the horizontal and vertical panels and are held tightly in place by the panels as shown in Figure 6.4.1.3.

6.4.4 The position of the top of the welt cord shall be marked on the sides of the vertical polyurethane foam substrate.

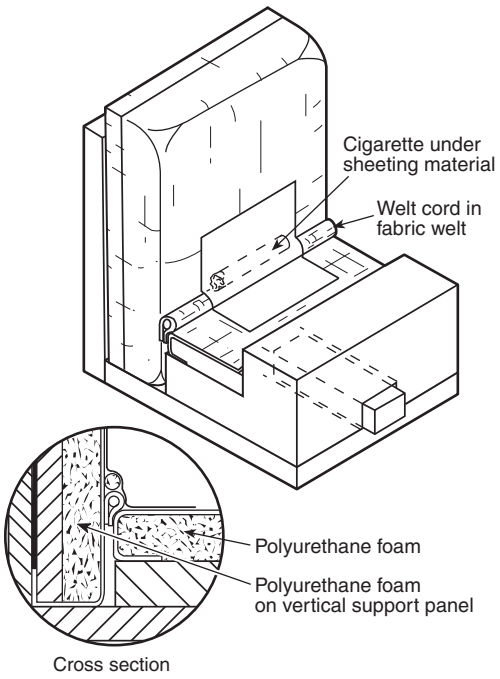

FIGURE 6.4.1.3 Welt Cord Test Method.

6.4.5 Three cigarettes shall be lighted, and a lighted cigarette shall be placed on each of the three test assemblies such that the cigarette lies on the welt cord and against the vertical panel, with each cigarette end equidistant from its respective side of the assembly.

6.4.6 Each cigarette shall be well lighted and burned not more than 4 mm when placed at a specific test location.

6.4.7* A piece of sheeting material shall be placed over each cigarette and shall be smoothed over the cigarette to ensure intimate contact.

6.4.7.1 The sheeting shall be pinned to the vertical panel approximately 63 mm above the crevice.

6.4.8 Each cigarette shall be allowed to burn its full length unless an obvious ignition of the polyurethane foam substrate occurs.

6.4.8.1 If a cigarette extinguishes before burning its entire length, a fresh cigarette shall be placed on a new test assembly and covered with sheeting fabric until one of the following occurs:

(1) Three cigarettes have burned their entire lengths on three individual specimens.
(2) Three cigarettes have self-extinguished on the sample.

6.4.9 If an obvious ignition occurs on any of the three specimens, the smoldering materials shall be extinguished, and the sample shall be recorded as a Class II welt cord based on the results of this test.

6.4.10 If no obvious ignition occurs, the char on the vertical panel measured from the top of the original welt cord position to the highest part of the destroyed or degraded fabric shall be recorded.

6.4.10.1 The top of the original welt cord position shall be determined by laying a straightedge or ruler between the two marks required by 6.4.4 on the edges of the vertical panel.

6.4.10.2 The highest point of destroyed or degraded fabric shall be defined as the highest point at which any of the fabric is charred from front to back.

6.5 Filling/Padding Component Test.

6.5.1 Three 203 mm × 280 mm specimens shall be cut from standard Type I cover fabric for the horizontal panels, and three 203 mm × 432 mm specimens shall be cut for the vertical panels.

6.5.1.1 Three horizontal panels shall be constructed by wrapping each panel with Type I cover fabric, such that the top surface is completely covered, and the long direction of the fabric continues over the crevice edge and partially covers the bottom surface.

6.5.1.2 The cover fabric shall be pinned into place on the top and bottom as shown in Figure 6.5.1.2.

6.5.1.3 Three vertical panels shall be constructed by covering one surface of a removable vertical support panel with a vertical pad of the test specimen material topped by the Type I cover fabric.

6.5.1.4 The Type I cover fabric shall be pulled around the top and bottom of the removable vertical support panel and stapled to the back side.

6.5.2 Each assembled vertical and horizontal panel shall be placed in a mini-mock-up tester as shown in Figure 6.5.1.2, such that a snug fit is created between the two panels.

6.5.3 The position of the crevice shall be marked on the edges of the cover fabric.

6.5.4 Three cigarettes shall be lighted, and a lighted cigarette shall be placed on each of the three test assemblies such that the cigarette lies in the crevice and against the vertical panel, with each cigarette end equidistant from its respective side of the assembly.

6.5.5 Each cigarette shall be well lighted and burned not more than 4 mm when placed at a specific test location.

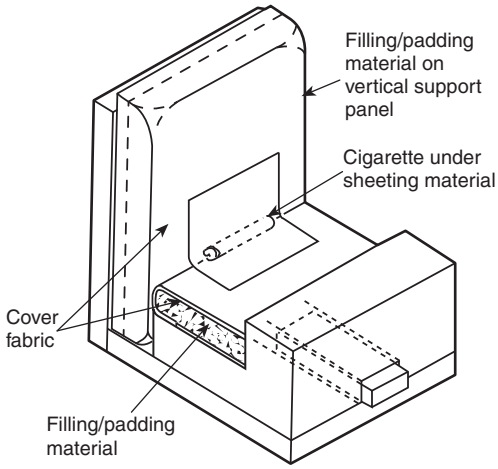

FIGURE 6.5.1.2 Filling/Padding Component Test Method.

6.5.6* A piece of sheeting material shall be placed over each cigarette and shall be smoothed over the cigarette to ensure intimate contact.

6.5.6.1 The sheeting shall be pinned to the vertical panel approximately 63 mm above the crevice.

6.5.7 Each cigarette shall be allowed to burn its full length unless an obvious ignition of the polyurethane foam substrate occurs.

6.5.7.1 If a cigarette extinguishes before burning its entire length, a fresh cigarette shall be placed on a new test assembly and covered with sheeting fabric until one of the following occurs:

(1) Three cigarettes have burned their entire lengths on three individual test specimens.
(2) Three cigarettes have self-extinguished on the sample.

6.5.8 If an obvious ignition occurs on any of the three specimens, the smoldering materials shall be extinguished, and the sample shall be recorded as a Class II filling/padding material based on the results of this test.

6.5.9 If no obvious ignition occurs, the char on the vertical panel measured from the original crevice position to the highest part of the destroyed or degraded fabric shall be recorded.

6.5.9.1 The original crevice position shall be determined by laying a straightedge or ruler between the two marks required by 6.5.3 on the edges of the vertical panel.

6.6 Decking Materials Test.

6.6.1 One 533 mm × 343 mm specimen shall be cut from standard Type II fabric.

6.6.2 The decking material specimen shall be placed on the plywood base of the decking materials tester and covered with the standard Type II fabric.

6.6.2.1 The plywood retainer ring shall be placed on top of the cover fabric as shown in Figure 6.6.2.1.

6.6.3 Three cigarettes shall be lighted and placed on the surface of the standard Type II fabric so that they are equally spaced from each other and from the edges of the retainer ring.

6.6.4 Each cigarette shall be well lighted and burned not more than 4 mm when placed at a specific test location.

6.6.5 A piece of sheeting material shall be placed over each of the cigarettes and shall be smoothed over the cigarette to ensure intimate contact.

6.6.6 Each cigarette shall be allowed to burn its full length.

Δ **6.6.6.1** If a cigarette extinguishes before burning through its entire length, a fresh cigarette shall be placed on a new test assembly until one of the following occurs:

(1) Three cigarettes burn through their entire lengths.
(2) Three cigarettes self-extinguish.

6.6.7 If an obvious ignition occurs at any of the cigarette locations, the smoldering material shall be extinguished, and the sample shall be recorded as a Class II decking material based on the results of this test.

6.6.8 If no obvious ignition occurs, the maximum length of char shall be measured from the original cigarette position and recorded to the nearest 2.5 mm.

6.7 Barrier Materials Test.

6.7.1 Three 203 mm × 280 mm specimens shall be cut from standard Type II cover fabric for horizontal panels, and three 203 mm × 432 mm specimens shall be cut for vertical panels.

6.7.1.1 For horizontal panels, a barrier specimen shall be placed on a 203 mm × 127 mm × 76 mm polyurethane foam substrate.

6.7.1.2 The barrier shall be folded around and under the polyurethane foam as shown in Figure 6.7.1.2 and fastened in place with pins.

6.7.1.3 The 203 mm × 203 mm cover fabric shall be placed over each barrier and fastened in place with pins.

6.7.1.4 For vertical panels, a barrier specimen shall be placed on a 203 mm × 203 mm × 76 mm polyurethane foam substrate.

6.7.1.5 The 203 mm × 432 mm cover fabric specimen shall be placed over each vertical panel and fastened in place with pins as shown in Figure 6.7.1.2.

6.7.2 Each assembled horizontal panel and vertical panel shall be arranged in the test assembly such that a firm contact is achieved across the entire crevice formed by the vertical and horizontal panels.

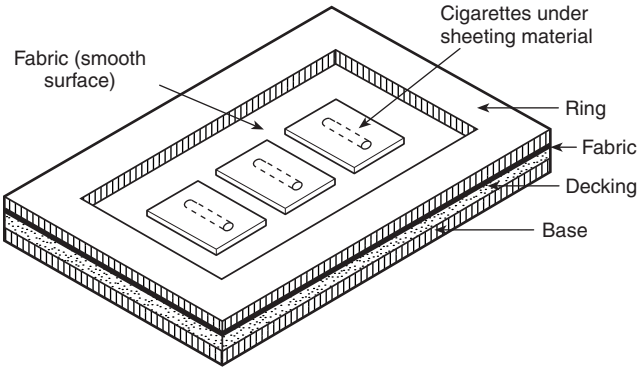

FIGURE 6.6.2.1 Decking Materials Test Method.

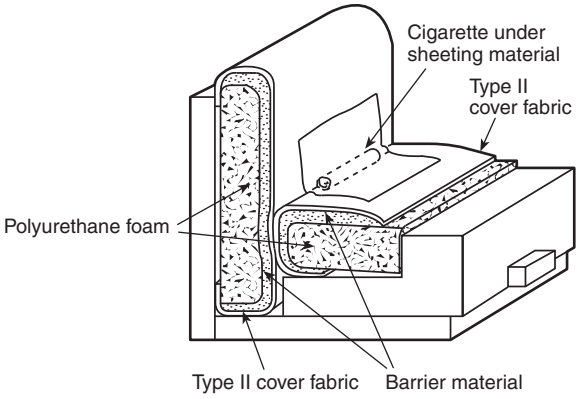

FIGURE 6.7.1.2 Barrier Materials Test Method.

6.7.3 The position of the crevice shall be marked on the sides of the vertical polyurethane foam substrate.

6.7.4 Three cigarettes shall be lighted, and a lighted cigarette shall be placed on each of the three test assemblies such that the cigarette lies in the crevice and against the vertical panel, with each cigarette end equidistant from its respective side of the assembly.

6.7.5 Each cigarette shall be well lighted and burned not more than 4 mm when placed at a specific test location.

6.7.6* A piece of sheeting material shall be placed over each cigarette and shall be smoothed over the cigarette to ensure intimate contact.

6.7.6.1 The sheeting shall be pinned to the vertical panel approximately 63 mm above the crevice.

6.7.7 Each cigarette shall be allowed to burn its full length unless an obvious ignition of the substrate occurs.

Δ **6.7.7.1** If a cigarette extinguishes before burning through its entire length, a fresh cigarette shall be placed on a new test assembly and covered with sheeting fabric until one of the following occurs:

(1) Three cigarettes burn through their entire lengths on three individual test specimens.
(2) Three cigarettes self-extinguish on the sample.

6.7.8 If an obvious ignition occurs on any of the three specimens, the smoldering materials shall be extinguished, and the sample shall be recorded as a Class II barrier material based on the results of this test.

6.7.9 If no obvious ignition occurs, the char on the vertical panel measured from the original crevice position to the highest part of the destroyed or degraded fabric shall be recorded to the nearest 2.5 mm.

6.7.9.1 The original crevice position shall be determined by laying a straightedge or ruler between the two marks required by 6.7.3 on the edges of the vertical panel.

6.7.9.2 The highest point of destroyed or degraded fabric shall be defined as the highest point at which any of the fabric is charred from front to back.

Chapter 7 Cigarette Resistance Classifications

7.1 General.

7.1.1 Furniture components shall be classified as Class I or Class II in accordance with Section 7.2 through Section 7.9.

7.1.2 An upholstered furniture component shall meet all the requirements of a Class I material to be considered resistant to cigarette ignition.

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N **7.1.3** Any material that does not meet all the requirements for a Class I material shall be designated a Class II material.

N **7.2 Evidence of Ignition.** For this test method, the existence of pronounced, continuous, and self-sustaining combustion of the test system or the generation of a flame or smoke shall be evidence of ignition.

N **7.3 Maximum Char Length.**

N **7.3.1** The maximum vertical char lengths for upholstered furniture components shall be as follows:

(1) Cover fabrics: < 45 mm
(2) Interior fabrics: < 38 mm
(3) Welt cords: < 38 mm
(4) Fillings or paddings: < 38 mm
(5) Barrier materials: < 38 mm

N **7.3.2** The maximum horizontal char length for decking materials, as measured from the original position of the cigarette, shall be < 38 mm.

N **7.4 Vertical Char Length.** A material shall be classified as a Class II material if the test specimen exhibits a vertical char length that meets or exceeds the prescribed limit set forth in Section 7.3.

N **7.5 Transitions.** A material shall be classified as a Class II material if the test specimen transitions from smoldering combustion to flaming combustion.

N **7.6 Obvious Ignition.** A material shall be classified as a Class II material if the test specimen exhibits obvious ignition by virtue of generating a visible flame or smoke (see Section 7.2).

N **7.7 Char Length After 45 Minutes.** A material shall be classified as a Class II material if, after 45 minutes have elapsed since the lit cigarette was placed on the test specimen, the char length is still growing or visible smoke is still emerging.

N **7.8 Procedure After 45 Minutes.** If the material has not exhibited any of the criteria in Section 7.3 through Section 7.7 after 45 minutes have elapsed since the lit cigarette was placed on the test specimen and the cigarette has burnt its full length, the test operator shall separate the vertical panel from the horizontal carriage.

N **7.8.1** If any of the interior surfaces of the material are still glowing, visible smoke continues to be emitted for another 10 seconds, or the specimen transitions to flaming combustion, the material shall be designated a Class II material.

N **7.8.2** The observation of a cavity in the filling or padding (possibly due to decomposition) or of discoloration on the surface of the filling or padding, shall not, by itself, be construed as an indication of ignition having occurred.

N **7.8.3** If the formation of a cavity in the filling or padding or discoloration of the filling or padding is observed, those observations shall be reported.

N **7.9 Class I.** If a material does not exhibit any of the criteria in Section 7.2 through 7.8.1, the material shall be designated a Class I material.

N **7.10 Mass Loss.** Optionally, the test operator shall determine and report the amount and percentage of the mass of the filling or padding that was lost during the test.

Chapter 8 Report

8.1 The following shall be reported:

(1) The edition of the test method used, including an explanation if it was not the latest edition
(2) A description of the material being tested, including the source
(3) The test laboratory used
(4) The date the test was conducted
(5) The temperature and relative humidity in the test laboratory
(6) The section from Chapter 6 that was used
(7) The classification of the material tested
(8) If the material was classified a Class II material, the criterion used for that classification
(9) If determined, the mass loss (grams) and the percentage of mass lost (%) of filling or padding

Chapter 9 Safety Precautions

9.1 Combustion.

9.1.1* Any test shall be discontinued as soon as continuing combustion occurs.

9.1.2 The exposed area shall be wet immediately with a water spray from the water bottle, and the charred or burned material shall be removed and immersed in a bucket of water.

9.1.3 The test area then shall be ventilated.

9.2* Exposure.

9.2.1 Test personnel shall avoid exposure to smoke and gases produced during testing as much as possible.

9.2.2 A large hood with a low air velocity shall be permitted to be in operation during testing to remove products of combustion.

Annex A Explanatory Material

Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.

A.1.1.1 These test methods were originally similar to those described in ASTM E1353, *Standard Test Methods for Cigarette Ignition Resistance of Components of Upholstered Furniture.* When the use of reduced ignition propensity cigarettes became required in the United States, this test method (NFPA 260) changed its ignition source and started using a cigarette developed by NIST (SRM 1196). The cigarette ignition potency of SRM 1196 cigarettes [as assessed by NIST (Gann and Hnetkovsky 2009) utilizing a method close to that in ASTM E2187, *Standard Test Method for Measuring the Ignition Strength of Cigarettes*] is similar to that of the ignition source used when the test method was developed initially and is much higher than that of reduced ignition propensity cigarettes *(see also A.4.3).* There is insufficient information as to the effect of a cigarette covered with fabric on ignition potency. Once the SRM 1196 cigarettes ceased being available, NIST procured equivalent cigarettes that are now designated as SRM 1196 series cigarettes. The 2016 edition of ASTM E1353 references the SRM 1196 cigarettes as the ignition source even though these cigarettes are no longer available.

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A.1.1.2 Codes that govern the use of upholstered furniture, including NFPA *101* and the *International Fire Code*, reference these test methods as part of their requirements.

The issuance of 16 CFR Part 1640, "Standard for the Flammability of Upholstered Furniture," and the COVID-19 Regulatory Relief and Work From Home Safety Act adopted Technical Bulletin 117-2013, "Requirements, Test Procedure and Apparatus for Testing the Smolder Resistance of Materials Used in Upholstered Furniture," as a national requirement for upholstered furniture materials sold in the United States. This does not replace the requirements contained in the applicable codes and regulations (such as those in the 2021 editions of NFPA *101* and the *International Fire Code*) for additional testing for compliance with NFPA 260.

A.1.2.3 The use of a barrier classified by this test method as a Class I-type barrier between a cover fabric or a padding material classified as a Class II-type material is not sufficient to ensure that the resulting upholstered furniture assembly will exhibit the appropriate ignition resistance when it is exposed to smoldering cigarettes.

A.1.5 An interlaboratory evaluation was performed to provide an estimate of the precision of the test method, wherein five laboratories tested five systems, each with eight different fabrics. The individual fabrics in each class are identified as Sample 1 through Sample 8 in Table A.1.5(a) and Table A.1.5(b). The five systems tested, in triplicate, are as follows:

(1) Fabric class urethane foam
(2) Barrier 1 in. PE/FR cotton
(3) Barrier 1 in. PE/foam
(4) Decking test FR cotton
(5) Decking test foam

The statistical analyses for repeatability and reproducibility were conducted in two ways: based on actual measurements of char length, as stated in the standard test method, and based on pass/fail, because the test method is, in practical use, a pass/fail test. The results of the statistical analyses for repeatability and reproducibility of the individual systems in the interlaboratory study were determined in accordance with ASTM E691, *Standard Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method,* in spite of the fact that the number of laboratories (i.e., five) is lower than that recommended by ASTM E691, which recommends six laboratories.

The results shown in Table A.1.5(a) correspond to the analysis involving actual numerical results. Note that results of char lengths over 2 in. were not reported by the laboratories; therefore, any result greater than 2 in. was considered to be 2 in., because testing was discontinued at that point. The reason for this is that 2 in. is the maximum char length usually permitted by users. The precision calculated by assuming that the maximum char length measurement is 2 in. does not address the precision of the measurement over the entire possible range, but includes all values up to the point of failure, which are the measurements of concern.

The results of the statistical analyses for repeatability and reproducibility of the individual systems for the interlaboratory study, with the data analyzed as if pass/fail results were produced (with a fail taken to be a char length value of over 2 in., as used in practice) are shown in Table A.1.5(b). Test

results greater than 2 in. were assigned a fail value of 0 and test results less than 2 in. were assigned a pass value of 1, for a binary analysis. This analysis was conducted assuming that there can be only two possible outcomes: pass or fail.

Table A.1.5(c) contains the overall repeatability and reproducibility of the test, analyzed both ways. The precision of the pass/fail data is significantly better than that of the numerical data. There is a lack of fit between the repeatability and reproducibility analyses and it indicates that *r* and *R* are not correlated.

The true value of cigarette ignition resistance of upholstered furniture composites can only be defined in terms of a test method. Within this limitation, this test method has no known bias and is generally accepted as a referee method.

• **A.3.3.6 Machine Direction.** Where rolls or sheets are cut into small pieces, the machine direction can become impossible to distinguish unless the samples are identified individually prior to cutting.

A.4.3 Standard Reference Material (SRM) 1196 series cigarettes must be obtained from the National Institute of Standards and Technology (NIST).

In previous editions of this test method, the ignition source was a commercially available cigarette identified by certain characteristics that corresponded to an unfiltered Pall Mall cigarette. Based on regulations for reduced ignition propensity cigarettes, these particular cigarettes are no longer available in the United States. That cigarette has been replaced by the manufacturer with a banded cigarette that meets the regulations for reduced ignition propensity. Banded cigarettes very frequently go out when placed on a test substrate. Since the test requires that a test cigarette burn its full length, the new version of the old test cigarette is not usable.

NIST had samples of the old cigarettes and was able to characterize their ignition propensity. They commissioned cigarettes to be manufactured to those specifications. Then, they verified that the new cigarettes met the physical and performance requirements of the previously used cigarettes. These cigarettes were made available by NIST as SRM 1196, one of over 1300 standard reference materials that they produce for various uses. When the original SRM 1196 cigarettes ceased to be available, NIST procured SRM 1196a cigarettes and is planning to continue providing cigarettes to be designated as SRM 1196 series cigarettes in the future. In view of the fact that SRM 1196 cigarettes are no longer available, the test method was changed to reflect the use of an SRM 1196 series cigarette.

A.4.5 UFAC refers to the Upholstered Furniture Action Council. Standard Type II cover fabric can be obtained from Testfabrics, Inc., 415 Delaware Avenue, P.O. Box 26, West Pittston, PA 18643.

A.4.9 It is recommended that the properly loaded mini-mockup tester or the decking materials tester, or both, be placed in a fume hood having air curtains or a door across the hood face and containing virtually zero air velocity.

A fume hood with air curtains drawn across the face and zero air velocity at the test locations is recommended.

A.5.5.2 Composites of loose/particulate materials and bag materials that are not classified as Class I should not be used in upholstered furniture that is expected to be resistant to cigarette ignition.

A.6.2.7 Proper fabric-to-cigarette contact can be ensured by running a finger over the covered cigarettes.

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• *N* **A.9.1.1** Even under the most carefully observed conditions, smoldering combustion can progress to a point where it cannot be extinguished readily.

N **A.9.2** Products of combustion can cause irritation and be dangerous to test personnel.

Table A.1.5(a) Interlaboratory Study for NFPA 260 (Results in Inches)

Class of Test	Material	Average	STD Repeat	STD Repro	*r*	*R*
Fabric class urethane foam	Sample 1	0.693	0.320	0.343	0.90	0.96
	Sample 2	1.300	0.063	0.642	0.18	1.80
	Sample 3	0.633	0.047	0.128	0.13	0.36
	Sample 4	0.687	0.099	0.144	0.28	0.40
	Sample 5	1.353	0.414	0.708	1.16	1.98
	Sample 6	1.107	0.097	0.575	0.27	1.61
	Sample 7	1.013	0.141	0.372	0.40	1.04
	Sample 8	0.940	0.067	0.603	0.19	1.69
Barrier 1 in. PE/FR cotton	Sample 1	0.492	0.033	0.157	0.09	0.44
	Sample 2	0.792	0.435	0.575	1.22	1.61
	Sample 3	0.508	0.075	0.297	0.21	0.83
	Sample 4	0.483	0.058	0.205	0.16	0.57
	Sample 5	0.542	0.058	0.260	0.16	0.73
	Sample 6	0.525	0.058	0.232	0.16	0.65
	Sample 7	0.517	0.058	0.249	0.16	0.70
	Sample 8	0.492	0.041	0.249	0.11	0.70
Barrier 1 in. PE/foam	Sample 1	0.493	0.052	0.145	0.14	0.40
	Sample 2	0.753	0.256	0.541	0.72	1.52
	Sample 3	0.520	0.073	0.269	0.20	0.75
	Sample 4	0.647	0.094	0.294	0.26	0.82
	Sample 5	0.580	0.079	0.200	0.22	0.56
	Sample 6	0.700	0.060	0.211	0.17	0.59
	Sample 7	0.607	0.042	0.199	0.12	0.56
	Sample 8	0.573	0.037	0.163	0.10	0.46
Decking test FR cotton	Sample 1	0.347	0.021	0.151	0.06	0.42
	Sample 2	0.387	0.047	0.231	0.13	0.65
	Sample 3	0.360	0.030	0.202	0.08	0.57
	Sample 4	0.407	0.037	0.242	0.10	0.68
	Sample 5	0.353	0.030	0.161	0.08	0.45
	Sample 6	0.407	0.042	0.199	0.12	0.56
	Sample 7	0.407	0.063	0.200	0.18	0.56
	Sample 8	0.387	0.042	0.131	0.12	0.37
Decking test foam	Sample 1	0.333	0.037	0.148	0.10	0.42
	Sample 2	0.380	0.067	0.203	0.19	0.57
	Sample 3	0.400	0.037	0.180	0.10	0.51
	Sample 4	0.387	0.037	0.218	0.10	0.61
	Sample 5	0.333	0.030	0.103	0.08	0.29
	Sample 6	0.400	0.047	0.174	0.13	0.49
	Sample 7	0.400	0.037	0.145	0.10	0.40
	Sample 8	0.380	0.042	0.15	0.12	0.42

STD Repeat: standard deviation of the repeatability. STD Repro: standard deviation of the reproducibility. *r*: system repeatability. *R*: system reproducibility.

Table A.1.5(b) Interlaboratory Study for NFPA 260 (Results as Pass/Fail)

Class of Test	Material	Average	STD Repeat	STD Repro	*r*	*R*
Fabric class urethane foam	Sample 1	0.93	0.14	0.15	0.40	0.42
	Sample 2	0.60	0.28	0.55	0.79	1.53
	Sample 3	1.00	0.00	0.00	0.00	0.00
	Sample 4	1.00	0.00	0.00	0.00	0.00
	Sample 5	0.47	0.29	0.45	0.81	1.25
	Sample 6	0.80	0.23	0.45	0.65	1.25
	Sample 7	1.00	0.00	0.00	0.00	0.00
	Sample 8	0.80	0.23	0.45	0.65	1.25
Barrier 1 in. PE/FR cotton	Sample 1	1.00	0.00	0.00	0.00	0.00
	Sample 2	0.92	0.16	0.17	0.45	0.47
	Sample 3	1.00	0.00	0.00	0.00	0.00
	Sample 4	1.00	0.00	0.00	0.00	0.00
	Sample 5	1.00	0.00	0.00	0.00	0.00
	Sample 6	1.00	0.00	0.00	0.00	0.00
	Sample 7	1.00	0.00	0.00	0.00	0.00
	Sample 8	1.00	0.00	0.00	0.00	0.00
Barrier 1 in. PE/foam	Sample 1	1.00	0.00	0.00	0.00	0.00
	Sample 2	0.87	0.20	0.30	0.55	0.83
	Sample 3	1.00	0.00	0.00	0.00	0.00
	Sample 4	1.00	0.00	0.00	0.00	0.00
	Sample 5	1.00	0.00	0.00	0.00	0.00
	Sample 6	1.00	0.00	0.00	0.00	0.00
	Sample 7	1.00	0.00	0.00	0.00	0.00
	Sample 8	1.00	0.00	0.00	0.00	0.00
Decking test FR cotton	Sample 1	1.00	0.00	0.00	0.00	0.00
	Sample 2	1.00	0.00	0.00	0.00	0.00
	Sample 3	1.00	0.00	0.00	0.00	0.00
	Sample 4	1.00	0.00	0.00	0.00	0.00
	Sample 5	1.00	0.00	0.00	0.00	0.00
	Sample 6	1.00	0.00	0.00	0.00	0.00
	Sample 7	1.00	0.00	0.00	0.00	0.00
	Sample 8	1.00	0.00	0.00	0.00	0.00
Decking test foam	Sample 1	1.00	0.00	0.00	0.00	0.00
	Sample 2	1.00	0.00	0.00	0.00	0.00
	Sample 3	1.00	0.00	0.00	0.00	0.00
	Sample 4	1.00	0.00	0.00	0.00	0.00
	Sample 5	1.00	0.00	0.00	0.00	0.00
	Sample 6	1.00	0.00	0.00	0.00	0.00
	Sample 7	1.00	0.00	0.00	0.00	0.00
	Sample 8	1.00	0.00	0.00	0.00	0.00

STD Repeat: standard deviation of the repeatability. STD Repro: standard deviation of the reproducibility. *r*: system repeatability. *R*: system reproducibility.