

NFPA[®]

260

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

2019



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NFPA® 260

Standard Methods of

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

2019 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 June 23, 2018, with an effective date of July 13, 2018, and supersedes all previous editions.

This edition of NFPA 260 was approved as an American National Standard on July 13, 2018.

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 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 substantial agreement with the UFAC test method. The 1989 edition was renumbered as NFPA 260 and included refinements for further agreement with the UFAC test method.

The 1994 edition of this standard provided 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 a clarification defining the pretest cigarette burn length.

For the 2003 edition, the chapter layout of NFPA 260 was reorganized to meet 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 includes substantial revisions to the standard cover fabric and the foam substrate cited in Chapter 4.

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NFPA 260

Standard Methods of

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

2019 Edition

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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 C. 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 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.

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 These test methods are designed to evaluate ignition resistance of upholstered furniture when 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.

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 Class II cover fabrics and conventional polyurethane foam in a seat shall be subjected to the barrier materials test.

N 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.

N 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*, 2016.

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

2.3.2 GSA Publications. U.S. 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 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 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.

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

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

3.3.4.1* Obvious Ignition. Pronounced, continuous, and self-sustaining combustion of the test system.

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

3.3.6 Sample. Material being tested.

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

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

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

3.3.10 Welt. 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.

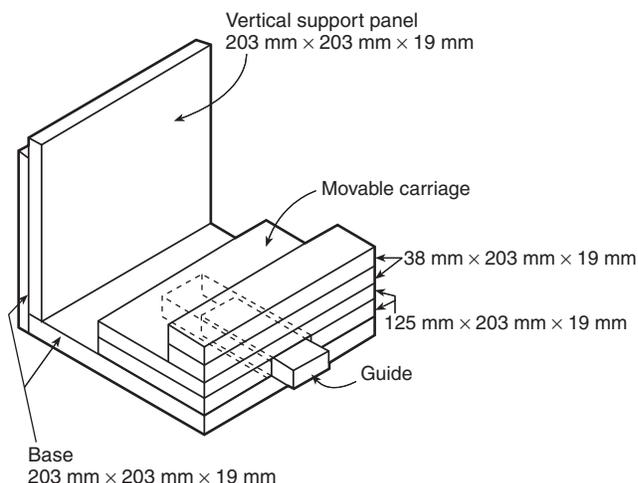


FIGURE 4.1.1 Mini-Mock-Up Tester.

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 be SRM 1196 cigarettes without filter tips made from natural tobacco, 83 mm ± 2 mm long, with a tobacco packing density of 0.270 g/cm³ ± 0.020 g/cm³, 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.436.D, *Cloth, Ticking, Twill, Cotton: Type I*.

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

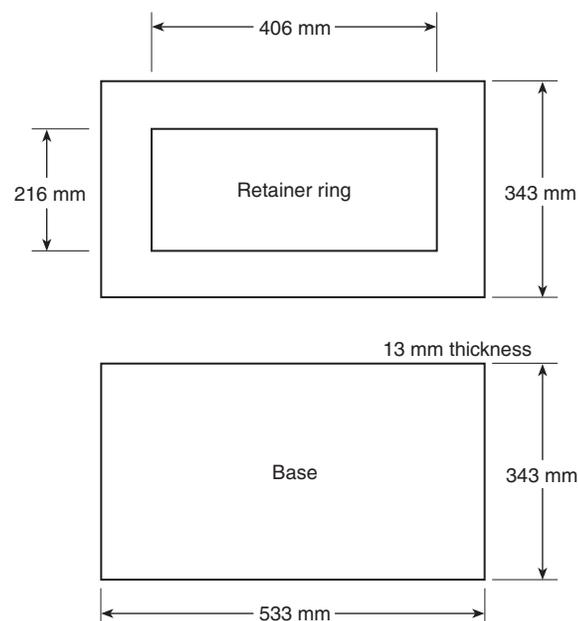


FIGURE 4.2.3 Decking Materials Tester.

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/m² ± 12 g/m², 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/m² ± 28 g/m² 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/m³, 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 × 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.

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.

N 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 × 51 mm specimens shall be cut for the horizontal panels, and three 203 mm × 203 mm × 51 mm specimens shall be cut for the vertical panels.

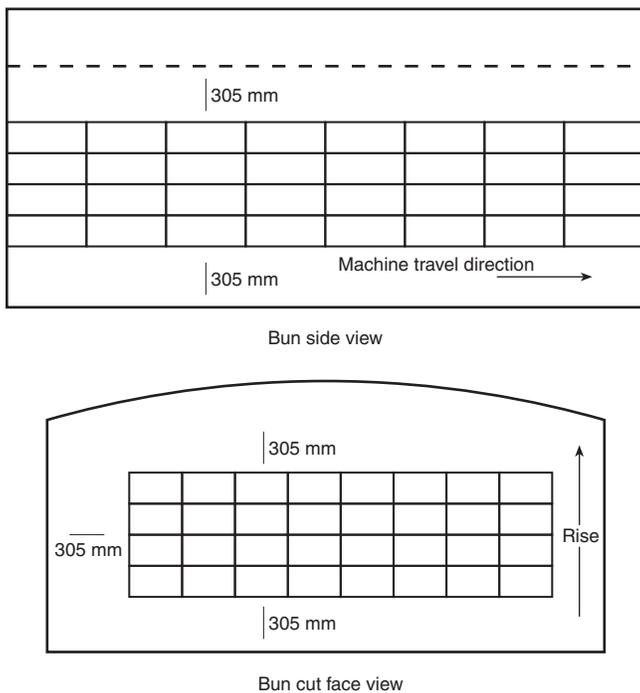


FIGURE 4.7.3 Foam Cut Direction.

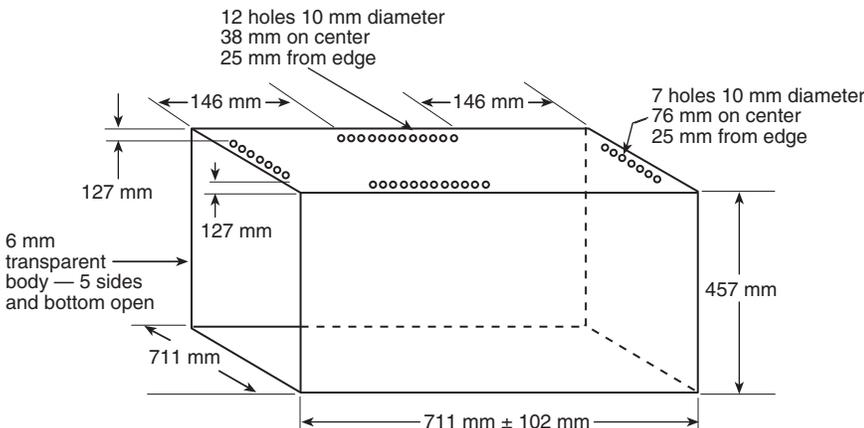


FIGURE 4.11 Draft Enclosure.

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

6.1 Cover Fabric Test.

6.1.1 For horizontal panels, the 203 mm × 280 mm cover fabric specimen shall be placed on a 203 mm × 127 mm × 51 mm polyurethane foam substrate, using pins in the ends of the fabric specimen to hold it in place, as shown in Figure 6.1.1.

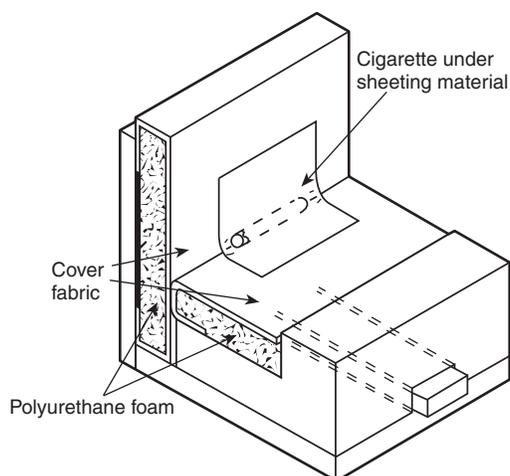


FIGURE 6.1.1 Cover Fabric Test Method.

6.1.2 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 6.1.1.

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

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

6.1.3 Each assembled vertical and horizontal panel shall be placed in a mini-mock-up tester as shown in Figure 6.1.1.

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

6.1.5 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.

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

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

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

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

6.1.8.1 If a cigarette extinguishes before burning its entire length, a fresh cigarette shall be placed on a fresh area of the 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.

6.1.9 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 cover fabric based on the results of this test.

6.1.10 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 cover fabric shall be recorded to the nearest 2.5 mm.

6.1.10.1 The original crevice position shall be determined by laying a straightedge or ruler between the two marks required by 6.1.4 on the edges of the vertical panel.

6.1.10.2 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.

6.2 Interior Fabric Test.

6.2.1 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 6.2.1.

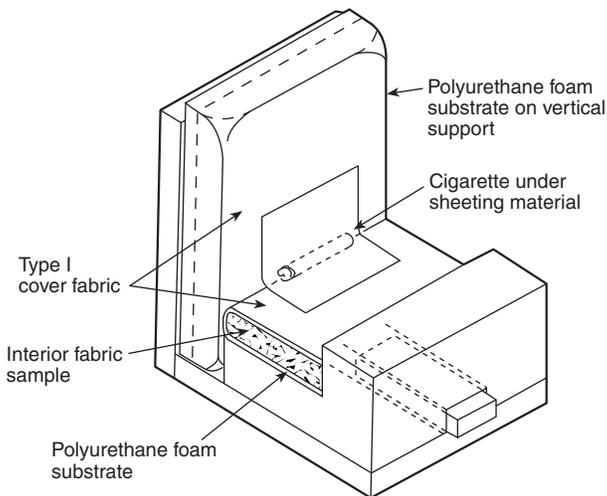


FIGURE 6.2.1 Interior Fabric Test Method.

6.2.2 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 6.2.1.

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

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 polyurethane foam substrate.

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 at 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 of the polyurethane foam substrate occurs.

6.2.8.1 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.

6.2.9 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.

6.2.10 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.

6.2.10.1 The original crevice position shall be determined by laying a straightedge or ruler between the two marks required by 6.2.4 on the 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 Welt Cord Test.

6.3.1 Sizes.

6.3.1.1 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 welts folded to measure 203 mm × 25 mm

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

6.3.1.3 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 6.3.1.3.

6.3.1.4 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 6.3.1.3.

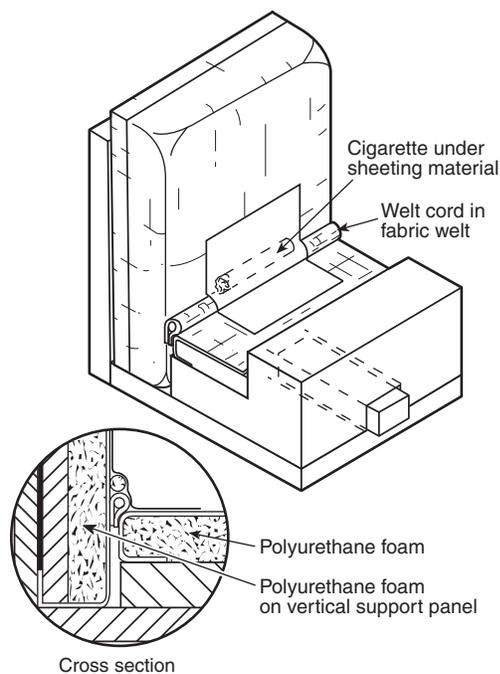


FIGURE 6.3.1.3 Welt Cord Test Method.

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

6.3.2 Each assembled vertical and horizontal panel shall be placed in a mini-mock-up tester as shown in Figure 6.3.1.3.

6.3.3 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.

6.3.3.1 An unsewn welt 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 6.3.1.3.

6.3.4 The position of the top of the welt 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 on the welt 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.

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 lengths on three individual 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 welt cord based on the results of this test.

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

6.3.10.1 The top of the original welt position shall be determined by laying a straightedge or ruler between the two marks required by 6.3.4 on the edges of 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 Filling/Padding Component Test.

6.4.1 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.

6.4.1.1 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.

6.4.1.2 The cover fabric shall be pinned into place on the top and bottom as shown in Figure 6.4.1.2.

6.4.1.3 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.

6.4.1.4 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.

6.4.2 Each assembled vertical and horizontal panel shall be placed in a mini-mock-up tester as shown in Figure 6.4.1.2, such that a snug fit is created between the two panels.

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

6.4.4 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.

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

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

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

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

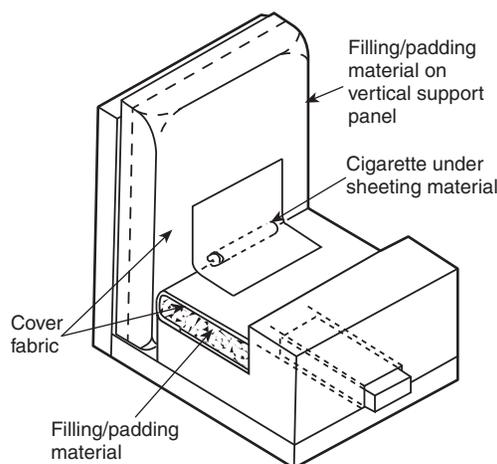


FIGURE 6.4.1.2 Filling/Padding Component Test Method.

6.4.7.1 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.

6.4.8 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.

6.4.9 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.

6.4.9.1 The original crevice position shall be determined by laying a straightedge or ruler between the two marks required by 6.4.3 on the edges of the vertical panel.

6.5 Decking Materials Test.

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

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

6.5.2.1 The plywood retainer ring shall be placed on top of the cover fabric as shown in Figure 6.5.2.1.

6.5.3 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.

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

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

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

6.5.6.1 If a cigarette extinguishes before burning its entire length, a fresh cigarette shall be placed on a fresh area of the cover fabric until one of the following occurs:

- (1) Three cigarettes have burned their entire lengths.
- (2) Three cigarettes have self-extinguished.

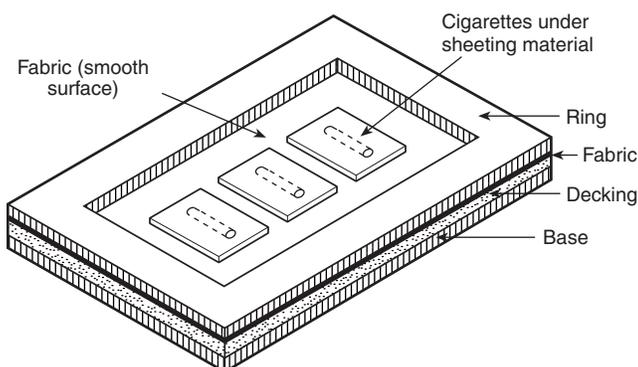


FIGURE 6.5.2.1 Decking Materials Test Method.

6.5.7 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.

6.5.8 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.

6.6 Barrier Materials Test.

6.6.1 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.

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

6.6.1.2 The barrier shall be folded around and under the polyurethane foam as shown in Figure 6.6.1.2 and fastened in place with pins.

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

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

6.6.1.5 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 6.6.1.2.

6.6.2 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.

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

6.6.4 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.

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

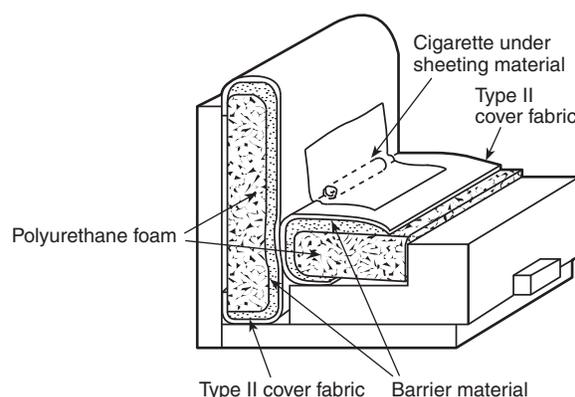


FIGURE 6.6.1.2 Barrier Materials Test Method.

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

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

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

6.6.7.1 If a cigarette extinguishes before burning its entire length, a fresh cigarette shall be placed on a fresh area of the 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.

6.6.8 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.

6.6.9 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.

6.6.9.1 The original crevice position shall be determined by laying a straightedge or ruler between the two marks required by 6.6.3 on the edges of the vertical panel.

6.6.9.2 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 7.7.

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

7.2 Cover Fabric Classification.

7.2.1 Class I. Class I cover fabric shall meet the criteria of 7.2.1.1 and 7.2.1.2.

7.2.1.1 When subjected to the cover fabric test, a specimen shall show no evidence of ignition of any test assembly.

7.2.1.2 The vertical char on any of the three specimens shall not exceed 45 mm.

7.2.2 Class II. Cover fabrics that do not meet Class I criteria shall be designated as Class II.

7.3 Interior Fabric Classification.

7.3.1 Class I. Class I interior fabric shall meet the criteria of 7.3.1.1 and 7.3.1.2.

7.3.1.1 When subjected to the interior fabric test, a specimen shall show no evidence of ignition of any test assembly.

7.3.1.2 The vertical char on the cover fabric of any of the three specimens shall not exceed 38 mm.

7.3.2 Class II. Interior fabrics that do not meet Class I criteria shall be designated as Class II.

7.4 Welt Cord Classification.

7.4.1 Class I. Class I welt cord shall meet the criteria of 7.4.1.1 and 7.4.1.2.

7.4.1.1 When subjected to the welt cord test, a specimen shall show no evidence of ignition of any test assembly.

7.4.1.2 When measured from the top of the original welt position, the vertical char on the cover fabric shall not exceed 38 mm for any of three replicated tests.

7.4.2 Class II. Welt cord that does not meet Class I criteria shall be designated as Class II.

7.5 Filling/Padding Components Classification.

7.5.1 Class I. Class I components shall meet the criteria of 7.5.1.1 and 7.5.1.2.

7.5.1.1 When subjected to the filling/padding component test, a specimen shall show no evidence of ignition of any test assembly.

7.5.1.2 When measured from the original crevice position, the vertical char length on the cover fabric shall not exceed 38 mm for any of three replicated tests.

7.5.2 Class II. Components that do not meet Class I criteria shall be designated as Class II.

7.6 Decking Materials Classification.

7.6.1 Class I. Class I decking materials shall meet the criteria of 7.6.1.1 and 7.6.1.2.

7.6.1.1 When subjected to the decking materials test, a specimen shall show no evidence of ignition at any cigarette location.

7.6.1.2 When measured from the original cigarette position, the char length on the cover fabric shall not exceed 38 mm at any of three cigarette locations.

7.6.2 Class II. Decking materials that do not meet Class I criteria shall be designated as Class II.

7.7 Barrier Materials Classification.

7.7.1 All barrier materials used in cigarette-resistant furniture construction shall be classified as Class I barrier fabric using the test method described in Section 6.6.

7.7.2 Class I. Class I barriers shall meet the criteria of 7.7.2.1 and 7.7.2.2.

7.7.2.1 When subjected to the barrier materials test, a specimen shall show no evidence of ignition of any test assembly.

7.7.2.2 When measured from the original crevice position, the vertical char length on the cover fabric shall not exceed 51 mm for any of three replicated tests.

7.7.3 Class II. Barriers that do not meet Class I criteria shall be designated as Class II.

Chapter 8 Safety Precautions

8.1* Combustion.

8.1.1 Any test shall be discontinued as soon as continuing combustion occurs.

8.1.2 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.

8.1.3 The test area then shall be ventilated.

8.2* Exposure.

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

8.2.2 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). The change in ignition source for ASTM E1353 did not occur until 2016. There is insufficient information as to the effect of the cigarette covered with fabric on ignition potency.

A.1.2.3 Cover fabrics determined to be Class II by this test should not be used in the manufacture of furniture intended to be resistant to cigarette ignition without a Class I-type barrier. Barrier materials also are classified by this test. Any other components determined to be Class II by this test should not be used in the manufacture of furniture intended to be resistant to cigarette ignition.

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.3.3.4.1 Obvious Ignition. This is a matter of operator judgment based on experience in this type of operation.

A.3.3.5 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 is 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.

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

Class of Test	Material	Average	STD Repeat	STD Repro	<i>r</i>	<i>R</i>
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	<i>r</i>	<i>R</i>
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.

Table A.1.5(c) Repeatability and Reproducibility of Test Method

	Numerical Data	Pass/Fail
Avg	0.58	0.96
<i>r</i>	0.24	0.11
<i>R</i>	0.75	0.18
Coeff STD fit	1.99	1.68
Coeff variance fit	2.39	3.09
RSQ STD fit	-0.22	0.96
RSQ variance fit	0.17	0.93

Avg: average. *r*: overall repeatability. *R*: overall reproducibility. Coeff STD fit: multiplicative coefficient of the linear regression analysis of reproducibility vs. repeatability. Coeff variance fit: multiplicative coefficient of the linear regression analysis of reproducibility variance vs. repeatability variance. RSQ STD fit: linear least squares correlation coefficient of the fit between reproducibility and repeatability. RSQ variance fit: linear least squares correlation coefficient of the fit between reproducibility variance and repeatability variance.

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 are now available from NIST as SRM 1196, one of over 2000 standard reference materials that they produce for various uses.

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-mock-up 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.6.1.7 Proper fabric-to-cigarette contact can be ensured by running a finger over the covered cigarettes.

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

A.6.3.7 Proper fabric-to-cigarette contact can be ensured by running a finger over the covered cigarettes.

A.6.4.6 Proper fabric-to-cigarette contact can be ensured by running a finger over the covered cigarettes.

A.6.6.6 Proper fabric-to-cigarette contact can be ensured by running a finger over the covered cigarettes.

A.8.1 Even under the most carefully observed conditions, smoldering combustion can progress to a point where it cannot be extinguished readily.

A.8.2 Products of combustion can cause irritation and be dangerous to test personnel.

Annex B Commentary

This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

B.1 Introduction.

B.1.1 In April 1979, the Upholstered Furniture Action Council (UFAC) adopted a voluntary program designed to reduce the cigarette ignition propensity of upholstered furniture. The UFAC program is based on the six test methods described in this standard and consists of the following four elements:

- (1) Classification of cover fabrics
- (2) Construction criteria for use of complying materials
- (3) Labeling plan to inform the consumer of the safer product
- (4) Compliance verification program to ensure that furniture manufacturers and their suppliers utilize materials and methods of construction as required by the voluntary program

B.1.2 The UFAC construction criteria are intended to effect the following changes:

- (1) Eliminate ignition-prone welt cords and substitute smolder-resistant welt cords that meet the requirements of the UFAC welt cord test.
- (2) Eliminate untreated cotton batting as a substrate in immediate contact with decking fabrics and substitute materials that meet the requirements of the UFAC decking materials test.
- (3) Eliminate untreated cotton batting in immediate contact with the covering of the inside vertical walls and substitute materials that meet the requirements of the UFAC filling/padding component test.
- (4) Eliminate intimate contact between Class II fabrics and the horizontal seating surfaces of conventional polyurethane foam cushions. Where Class II fabrics are used with conventional polyurethane foam cushions, a barrier meeting the requirements of the UFAC barrier materials test should be used.

B.2 Nature of Tests.

B.2.1 The six test methods outlined in this standard define the performance of welt cord, filling materials, decking substrates, barriers, interior fabrics, and cover fabrics. All are composite tests of individual components in combination with actual materials used by the upholstery industry. Certain standard materials have been selected for use in these tests. Performance of each component is evaluated in an assembly in which all other materials are standard. Thus, individual performance can be measured. The test methods are essentially similar. They are varied only as necessary to measure the performance of different components.

B.2.2 In the UFAC program, only those welt cords, filling materials, decking substrates, and barrier materials that meet the requirements for Class I performance can be permitted to be used. Class I cover fabrics can be permitted to be used in contact with other Class I materials. Class II cover fabrics can be permitted to be used only in conjunction with Class I barrier materials.

B.3 Experimental Study. The significance of the UFAC program was validated by a series of chair tests in July 1979. These tests demonstrated that implementation of the UFAC program yielded a significant reduction in cigarette ignition propensity of upholstered furniture components compared to components not meeting UFAC criteria. An improvement of 89 percent was achieved by application of the UFAC criteria. In furniture manufactured before implementation of the UFAC program, 41 percent of all test cigarettes caused ignition of the filling materials. In furniture manufactured according to UFAC methods, only 4.5 percent of the cigarettes caused ignitions. For further information, see “UFAC Voluntary Action Program Chair Tests.”

B.4 Further Experimental Study. A sound and sensible method(s) for developing statistically significant precision and bias statements for tests contained in this standard has yet to be discovered. However, reproducibility within a laboratory and from laboratory to laboratory has been studied. The percentage of reproducibility when testing the same component in these two laboratory situations is specified in Table B.4(a) and Table B.4(b).

Table B.4(a) Reproducibility Within the Same Laboratory

Test Method	Percent Reproducibility*
Cover fabric classification	94
Interior fabric classification	94
Filling/padding classification:	
Slab and garnetted filling/padding	89
Loose and particulate filling/padding	89
Welt cord classification	94
Decking materials classification	95
Barrier materials classification	96

*The percentage of reproducibility equals the percentage of replicates tested that produced the same result. For example, for welt cord classification, 94 percent of the replicate tests produced the same pass/fail or the same classification results.

Table B.4(b) Reproducibility from Laboratory to Laboratory

Test Method	Percent Reproducibility*
Cover fabric classification	89
Interior fabric classification	91
Filling/padding classification:	
Slab and garnetted filling/padding	86
Loose and particulate filling/padding	85
Welt cord classification	91
Decking materials classification	94
Barrier materials classification	96

Note: For further information, see “UFAC Voluntary Action Program Interlab Tests,” 1981–1991, and Schnadig Corporation test data.

*The percentage of reproducibility equals the percentage of laboratories that obtained the same pass/fail or the same classification result. For example, for the filling/padding classification for slab and garnetted materials, the testing laboratories obtained the same results 86 percent of the time.

B.5 General Comments. Cover fabrics determined to be Class II by these test methods can be permitted to be used where a Class I barrier is provided.

Annex C Informational References

C.1 Referenced Publications. The following documents or portions thereof listed in this annex are referenced within the informational sections of this standard and are not part of the requirements of this document unless also listed in Chapter 2 for other reasons.

C.1.1 NFPA Publications. (Reserved)

C.1.2 Other Publications.

▲ **C.1.2.1 ASTM Publications.** ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM E691, *Standard Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method*, 2014.

ASTM E1353, *Standard Test Methods for Cigarette Ignition Resistance of Components of Upholstered Furniture*, 2016.

ASTM E2187, *Standard Test Method for Measuring the Ignition Strength of Cigarettes*, 2016.

C.1.2.2 Schnadig Corporation Publications. Schnadig International Corporation, P.O. Box 5909, High Point, NC 27262.

Schnadig Corporation test data.

C.1.2.3 UFAC Publications. Upholstered Furniture Action Council, P.O. Box 2436, High Point, NC 27261.

“UFAC Voluntary Action Program Chair Tests,” July 26, 27, and 28, 1979.

“UFAC Voluntary Action Program Interlab Tests,” 1981–1991.

■ C.1.2.4 Other Publications.

Gann, R.G., and E.J. Hnetkovsky, “Modification of ASTM E2187 for Measuring the Ignition Propensity of Conventional Cigarettes,” NIST Technical Note 1627, National Institute of Standards and Technology, Gaithersburg, MD, June 2009.

Memorandum to D. Ray, Project Manager, Upholstered Furniture, from W. Tao, “Upholstered Furniture — Evaluation of the Draft-Limiting Enclosure Specified in the Smoldering Ignition Test Method,” October 23, 2006.

C.2 Informational References. (Reserved)

C.3 References for Extracts in Informational Sections. (Reserved)

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