Report of Committee on Fire Tests

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Nonvoting

A. J. Bartosic, Rohm & Haas Co.

This list represents the membership at the time the Committee was balloted on the text of this edition. Since that time, changes in the membership may have occurred.

The Report of the Committee on Fire Tests is presented in 5 parts.

Part I, prepared by the Technical Committee on Fire Tests proposes reconfirmation of NFPA 256-1976, Standard Methods of Fire Tests of Roof Coverings. NFPA 256 is published in Volume 10 of the 1980 National Fire Codes and in separate pamphlet form.

Part I has been submitted to letter ballot of the Technical Committee on Fire Tests which consists of 21 voting members; of whom 18 voted affirmatively, 1 negatively (Mr. Christian), and 2 ballots not returned (Messrs. Dougherty and Vaughan).

Mr. Christian voted negatively as he feels the flame-off time for Class B in Section 5-3 should be changed from 1 minute to 2 minutes in order to agree with ASTM E108 and UL 790.

Part II, prepared by the Technical Committee on Fire Tests proposes reconfirmation of NFPA 258-1976, Standard Test Method for Measuring the Smoke Generated by Solid Materials. NFPA 258 is published in Volume 10 of the 1980 National Fire Codes and in separate pamphlet form.

Part II has been submitted to letter ballot of the Technical Committee on Fire Tests which consists of 22 voting members; of whom 20 voted affirmatively, and 2 ballots not returned (Messrs. Dougherty and Vaughan).

Part III, prepared by the Technical Committee on Fire Tests proposes reconfirmation of NFPA 259-1976, Standard Test Method for Potential Heat of Building Materials. NFPA 259 is published in Volume 10 of the 1980 National Fire Codes and in separate pamphlet form.

Part III has been submitted to letter ballot of the Technical Committee on Fire Tests which consists of 21 voting members; of whom 19 voted affirmatively, and 2 ballots not returned (Messrs. Dougherty and Vaughan).

Part IV, prepared by the Technical Committee on Fire Tests proposes a new standard NFPA 260A-1981, Standard Methods of Tests and Classification System for Cigarette Ignition Resistance of Components of Upholstered Furniture.

Part IV has been submitted to letter ballot of the Technical Committee on Fire Tests which consists of 22 voting members; of whom 14 voted affirmatively, 1 negatively (Mr. Lingenfelter), 1 not voting (Mr. Thornberry) and 6 ballots not returned (Messrs. Benjamin, Dougherty, Dutton, Hogan, Robertson and Vaughan).

Mr. Lingenfelter has voted negatively for the following reasons:

Unfortunately, we feel that if these two proposed test methods are adopted, it is quite likely that only one method (260A) will be used. It seems very desirable to somehow combine the two methods in one document. The performance of individual elements is not felt to be predictive of end-product performance. It is of note that the significance of this test method does not indicate that the method is intended to measure the performance of upholstered furniture "assemblies."

Second, the proposed NFPA 260A gives inadequate direction as to how results are to be reported. Specifically, can reports simply state "pass" or "fail," or must the length of char and "Class" of each component be reported? In other words, what kind of statement may be made regarding the ignition resistance of a piece of finished furniture? Or is it the case that no single statement is appropriate? How can a consumer interpret such test results?

Finally, although the commentary contains some information or guidance regarding use of the test results (A-2-2) in the design of finished products, this is much too scanty. A significantly expanded discussion of these "use" aspects and why they are important should be the primary content of the commentary, not UFAC and the UFAC program.

Mr. Thornberry has returned his ballot not voting as he does not feel technically qualified to vote on this subject especially since he just recently joined the Committee and has not been exposed to all the discussions.

Part V, prepared by the Technical Committee on Fire Tests proposes a new standard NFPA 260B-1981, Standard Method of Test for Determining Resistance of Mock-Up Upholstered Furniture Material Assemblies to Ignition by Smoldering Cigarettes.

Part V has been submitted to letter ballot of the Technical Committee on Fire Tests which consists of 22 voting members; of whom 15 voted affirmatively, 1 not voting (Mr. Thornberry) and 6 ballots not returned (Messrs. Benjamin, Dougherty, Dutton, Hogan, Robertson and Vaughan).

Mr. Thornberry has returned his ballot not voting as he does not feel technically qualified to vote on this subject especially since he just recently joined the Committee and has not been exposed to all the discussions.

PART I

256- 1 - (Entire Standard): Accept
SUBMITTER: Technical Committee on Fire Tests
RECOMMENDATION: The Technical Committee on Fire Tests proposes Reconfirmation of NFPA 256-1976, Fire Tests of Roof Coverings.
SUBSTANTIATION: The Technical Committee on Fire Tests recommends that the 1976 edition of NFPA 256, Fire Tests of Roof Coverings be reconfirmed as suitable for current use. References to existing NFPA standards will be updated in the reconfirmed edition, but no substantive change is considered necessary.
COMMITTEE ACTION: Accept.

PART II

258- 1 - (Entire Standard): Accept
SUBMITTER: Technical Committee on Fire Tests
RECOMMENDATION: The Technical Committee on Fire Tests proposes Reconfirmation of NFPA 258-1976, Smoke Generated by Solid Materials.
SUBSTANTIATION: The Technical Committee on Fire Tests recommends that the 1976 edition of NFPA 258, Smoke Generated by Solid Materials be reconfirmed as suitable for current use. References to existing NFPA standards will be updated in the reconfirmed edition, but no substantive change is considered necessary.
COMMITTEE ACTION: Accept.

PART III

259- 1 - (Entire Standard): Accept
SUBMITTER: Technical Committee on Fire Tests
RECOMMENDATION: The Technical Committee on Fire Tests proposes Reconfirmation of NFPA 259-1976, Standard Test Method for Potential Heat of Building Materials.
SUBSTANTIATION: The Technical Committee on Fire Tests recommends that the 1976 edition of NFPA 259, Standard Test Method for Potential Heat of Building Materials be reconfirmed as suitable for current use. References to existing NFPA standards will be updated in the reconfirmed edition, but no substantive change is considered necessary.
COMMITTEE ACTION: Accept.

PART IV

260A- 1 - (New Standard): Accept
SUBMITTER: Technical Committee on Fire Tests
RECOMMENDATION: The Technical Committee on Fire Tests recommends adoption of this new standard.
SUBSTANTIATION: The Fire Test Committee of NFPA has agreed unanimously that some standard development should proceed toward affecting the fire scenario with regards to "cigarette ignition of upholstered furniture in the residential area." Statistics have shown conclusively that cigarette ignition of upholstered furniture is a leading - if not the major - cause of fire fatalities in the home.

After a lengthy study and review period, the Fire Test Committee has developed two proposed standards for adoption by NFPA.

1. 260A, for testing of components of furniture and;
2. 260B, for testing composites of furniture.

Both tests are deemed necessary. The component test - NFPA 260A, Standard Methods of Tests and Classification System for Cigarette Ignition Resistant Components of Upholstered Furniture is used presently in the new voluntary standards program by UFAC (Upholstered Furniture Action Council) and covers approximately 85 percent of the residential furniture now being marketed in the U.S. The composite test - NFPA 260B, Standard Method of Test for Determining Resistance of Mock-Up Upholstered Furniture Material Assemblies to Ignition by Smoldering Cigarettes, is used presently for evaluation of the more expensive industrial type upholstered furniture.

The Fire Test Committee has addressed the issue of an open flame test. The Committee agreed that all efforts should be placed first on the major scenario for deaths - cigarette ignition - and delay actions of flame ignition to a later date. The studies of flame ignition are continuing.
COMMITTEE ACTION: Accept.

Standard Methods of Tests and Classification System for

Cigarette Ignition Resistance of Components of Upholstered Furniture

NFPA 260A - 1981

Chapter 1 General

1-1 Purpose. The purpose is to provide test methods for determining resistance to cigarette ignition for materials used in the inside surfaces (sink) of upholstered furniture, and to provide classification guidelines.

1-2 Scope.

1-2.1 These tests apply to upholstered furniture components used or intended for use in or on the inside vertical surfaces, the seating surface or the deck under loose cushions.

1-2.2 These tests apply to covering 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, foamed or cellular filling materials, resilient pads of natural or man-made fibers, and loose particulate filling materials (such as shredded polyurethane or feathers and down).

1-2.3 It is the intent to provide tests to determine whether welt cords, decking materials and filling/padding materials are relatively resistant to ignition by smoldering cigarettes. Also provided is a means of classifying upholstered furniture components with respect to cigarette ignition resistance.

1-2.4 This standard measures and describes the properties of materials, products, or assemblies in response to a smoldering cigarette under controlled laboratory conditions and does not necessarily describe or appraise the fire hazard or fire risk of materials, products, or assemblies under actual fire conditions.

1-3 Significance.

1-3.1 This method is intended to measure the performance of upholstered furniture material components under conditions of exposure to a smoldering cigarette.

1-3.2 This method is not intended to measure the performance of upholstered furniture under conditions of open flame exposure and does not indicate whether the furniture will resist the propagation of flame under severe fire exposure or when tested in a manner which differs substantially from the test standard.

1-3.3 The results obtained with a material component tested in mockup, according to this method, do not necessarily indicate the performance of the same material component in other geometric configurations.

1-4 Test Selection.

(a) All outer cover fabrics shall be subjected to the fabric test.

(b) All welt cord shall be subjected to the welt cord test.

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

(d) Any material used in the deck under loose cushions shall be subjected to the decking test.

(e) 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 test.

Chapter 2 Test Apparatus

2-1 Mini-Mock-Up Tester (MMT) (Figure 2-1).

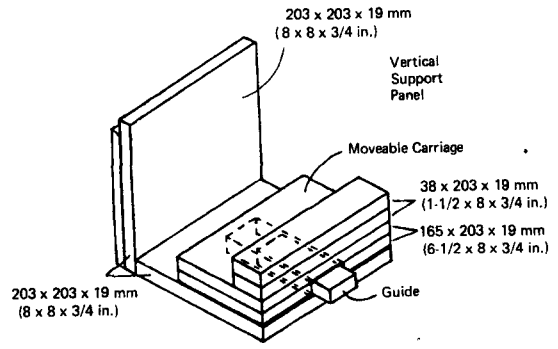

Figure 2-1 Mini-Mock-Up Tester

2-1.1 The mini-mock-up tester consists of a base with a centrally located guide and a stationary vertical panel, a movable horizontal carriage and a removable vertical support panel.

2-1.2 The base consists of two wooden panels, each nominally 203 x 203 mm (8 x 8 in.) with nominal 19 mm (0.75 in.) thickness, joined together at one edge. The carriage has a 125 x 203 mm (5 x 8 in.) platform to support a horizontal specimen. The platform is 38 mm (1.5 in.) above the floor of the base and has a 38 mm (1.5 in.) lip at the front edge. The carriage is grooved to fit over a guide provided on the floor of the base. The removable vertical support panel consists of a wooden panel nominal 203 x 203 mm (8 x 8 in.) and nominal 19 mm (0.75 in.) thickness, which stands against the vertical wall of the base.

2-2 Decking Materials Tester (DMT) (Figure 2-2). The decking materials tester consists of a plywood base and a plywood retainer ring. The base measures 533 x 343 x 13 mm (21 x 13.5 x 0.5 in.). The retainer ring measures 533 x 343 x 13 mm (21 x 13.5 x 0.5 in.) with an opening measuring 406 x 216 mm (16 x 8.5 in.).

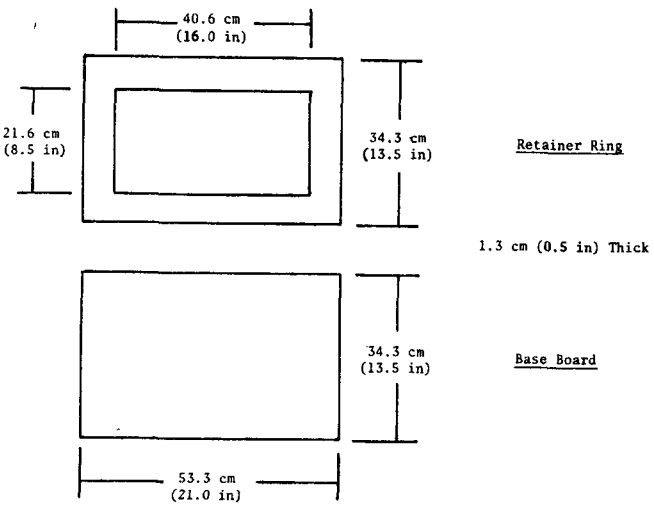

Figure 2-2 Decking Materials Tester

2-3 Ignition Source. The ignition source for the test shall be cigarettes without filter tips, made from natural tobacco, 85 ± 2 mm (3.4 ± 0.1 in.) long with a packing density of 0.270 ± 0.020 g/cm3 and a total weight of 1.1 ± 0.1 (Pall Mall or equivalent).

2-4 Standard Class II Cover Fabric. The standard Class II cover fabric shall be 100 percent cotton, Pattern #1112, 64 ends, and 34 picks, 515 g/m2 (15.2 oz/sq yd) La France.

2-5 Standard Ticking. The standard ticking shall be 100 percent cotton mattress ticking conforming to Federal Specification CCC-C-436-D, cloth, ticking; twill, cotton; Type 1, Class I.

NOTE: This fabric is available in short yardages from Guilford Laboratories, Inc., Box 9735, Greensboro, NC 27408, (919) 274-2907.

2-6 Sheeting Material. Sheeting material shall be cotton or polyester/cotton bedsheeting, weight 125 ± 28 g/m2 (3.7 ± oz/yd2), white in color and not treated with flame retardants. For testing, the fabric is cut into squares 125 x 125 mm (5 x 5 in.).

2-7 Polyurethane Foam Substrate. The polyurethane foam substrate shall be polyether type urethane, containing no inorganic fillers or flame retardants, having a density of 20 to 25 kg/m3 (1.3 to 1.6 lb/ft3).

2-8 Treated Cotton/Batting Substrate. The treated cotton batting substrate shall be nominal 51 mm (2 in.) thickness with a density of 32 ± 8 kg/m3 (2 ± 0.5 lb/ft3). The batting shall be at least a blend of 75 percent cotton linters and 25 percent cotton staple and shall consist of all new (unused) material. Each 203 x 203 x 51 mm (8 x 8 x 2 in.) piece shall weigh 64 ± 6 g. The batting should contain no synthetic fibers. The batting shall comply with applicable sections of California Bureau of Home Furnishings Bulletin #117-75.

2-9 Miscellaneous. Other apparatus required to carry out the testing are: straight pins, a staple gun, a knife or scissors, tongs, a linear scale graduated in millimeters and tenths of an inch.

2-10 Air Velocity. Air velocity across the test assemblies should be maintained below 15.2 m/min (50 ft/min) in order to minimize localized effects from draft super heating of cigarette embers. A fume hood with air curtains across the face and zero air velocity at the test locations is recommended.

Chapter 3 Test Specimens

3-1 Specimen Conditioning. All test upholstery fabrics and test materials (including cigarettes and sheeting material) shall be conditioned at a temperature of 21oC (70oF) ± 2.8oC (5oF) and less than 65 percent relative humidity for at least four hours prior to testing.

NOTE: If the test room conditions do not meet the specifications above for the conditioning room, then the testing shall be initiated within ten minutes after the specimens are removed from the conditioning room.

3-2 Fabric Test.

3-2.1 From the material to be tested, cut three specimens for horizontal panels each 203 x 203 mm (8 x 8 in.); and three specimens for vertical panels each 203 x 381 mm (8 x 15 in.).

3-2.2 Each specimen shall be cut with its long dimension in the direction of the warp and assembled for testing in a warp-to-warp orientation, and such that the major areas of weave variation will lie in the crevice of the assembled test apparatus.

3-2.3 For fabrics with complex weaves, specimens shall be cut such that portions of the three largest areas of weave are contacted by the cigarettes placed on the test assemblies. For dyed and/or printed fabrics, color shall not constitute a difference with respect to cigarette ignition resistance in this test.

3-3 Welt Cord Test. From the welt cord to be tested cut three 203 mm (8 in.) long specimens.

3-4 Filling/Padding Component Test.

3-4.1 For each sample of fillng/padding to be tested cut three specimens 203 x 203 x 51 mm (8 x 8 x 2 in.) for the vertical panels and three specimens 203 x 127 x 51 mm (8 x 5 x 2 in.) for the horizontal panels.

3-4.2 For loose or particulate materials (shredded polyurethane, down, etc.) sew bags of these dimensions using the same ticking and/or any other materials to be used in manufacturing the finished piece of furniture.

3-5 Decking Materials Test. From the decking material to be tested, cut a specimen 533 x 343 mm (21 x 13.5 in.) and at least 25 mm (1 in.) thick. If sample thickness is less than 25 mm (1 in.), multiple layers shall be used in this test to make up the required thickness.

3-6 Barrier Test.

3-6.1 From the barrier material to be tested, cut three 203 x 203 mm (8 x 8 in.) specimens for horizontal panels and three 203 x 203 mm (8 x 12 in.) specimens for vertical panels.

Chapter 4 Test Procedures

4-1 Fabric Test.

4-1.1 For horizontal panels, place the fabric specimen on a 203 x 127 x 51 mm (8 x 5 x 2 in) polyurethane substrate as shown in Figure 4-1, placing pins in the ends of the fabric specimen to hold it in place.

4-1.2 For vertical panels, place the fabric specimen on a 203 x 203 x 51 mm (8 x 8 x 2 in.) polyurethane substrate as shown in Figure 4-1. The fabric shall overlap the top and bottom of the substrate and be pinned into place on the corners. The warp or machine direction of the fabric shall run from front to back on the test assembly.

4-1.3 Place each assembled vertical and horizontal panel in a mini mock-up tester as shown in Figure 4-1.

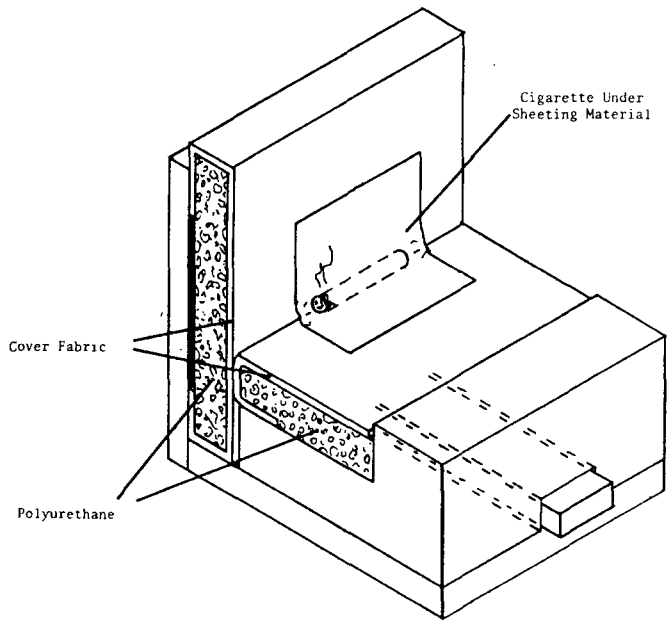

Figure 4-1 Fabric Classification Test Method

4-1.4 Light three cigarettes and place one cigarette on each of the three test assemblies such that the cigarette lies in the crevice and against the vertical panel with equal distance of cigarette ends from either side of the assembly.

4-1.5 Place a piece of sheeting material over each cigarette, smoothing it over the cigarette to ensure intimate contact.

NOTE: A finger run over the covered cigarettes ensures a good fabric-to-cigarette contact.

4-1.6 The cigarettes must be allowed to burn their full lengths unless an obvious ignition of the polyurethane substrate occurs. 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 either: (1) three cigarettes have burned their entire length on three individual test specimens, or (2) three cigarettes have self-extinguished on the sample.

4-1.7 If an obvious ignition occurs on any of the three specimens, extinguish the smoldering materials and record the results of the test as a determination that the fabric is a Class II cover fabric.

4-1.8 If no ignition occurs, measure the vertical char on the vertical panel from the original crevice position to the highest part of the destroyed or degraded cover fabric. The original crevice position may be determined by marking the crevice on the sides of the vertical panel with a pen or marking device and

laying a straight edge or ruler between the two marks. The highest point of destroyed or degraded fabric is defined as the highest point at which the entire fabric from face to back is charred.

4-2 Welt Cord Test.

4-2.1 From the standard ticking material cut three squares each 305 x 305 mm (12 x 12 in.) for vertical panels and three squares 203 x 203 mm (8 x 8 in.) for horizontal panels and three strips 203 x 25 mm (8 x 1 in.) which are folded to make unsewn welts. (Width of welt may have to be adjusted to the size of sample.)

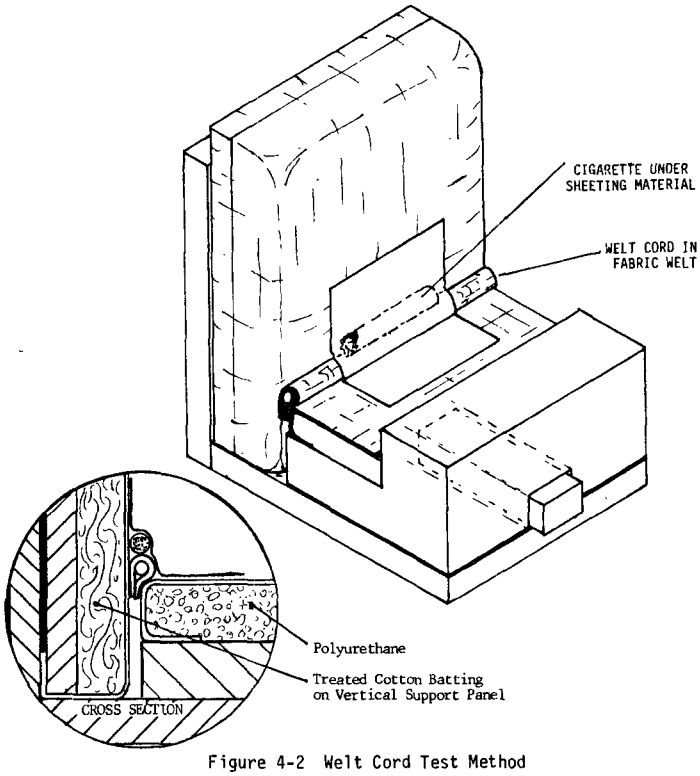

Figure 4-2 Welt Cord Test Method

4-2.2 Construct three vertical panels by covering one surface of a removable vertical support panel with a 51 mm (2 in.) layer of treated cotton batting followed by the ticking material. The ticking shall be stretched tightly over the surface of the assembly, wrapped around each edge, and fastened to the backside of the panel with staples.

4-2.3 Construct three horizontal panels by wrapping the ticking material around one edge of a 203 x 127 x 25 mm (8 x 5 x 1 in.) piece of polyurethane substrate as shown in Figure 4-2, placing pins in the ends of the fabric to hold it in place.

4-2.4 Place each assembled vertical and horizontal panel in a mini-mock-up tester as shown in Figure 4-2.

4-2.5 Place a welt cord specimen into the center of a folded strip of ticking material, to make an unsewn welt. Place an unsewn welt in each test assembly such that the 13 mm (0.5 in.) fabric ends are between the horizontal and vertical panels and held tightly in place by the panels (Figure 4-2).

4-2.6 Light three cigarettes and place one cigarette on each of the three test assemblies such that the cigarette lies on the welt and against the vertical panel with equal distance of cigarette ends from either side of the assembly.

4-2.7 Place a piece of sheeting material over each cigarette, smoothing it over the cigarette to ensure intimate contact.

NOTE: A finger run over the covered cigarettes ensures good fabric-to-cigarette contact.

4-2.8 The cigarettes are allowed to burn their full lengths. If a cigarette self-extinguished before burning its full length, a fresh cigarette shall be placed on a fresh area of the test assembly and covered with sheeting fabric until either: (1) three cigarettes have burned their full lengths on three individual specimens, or (2) three cigarettes have self-extinguished on the sample.

4-2.9 When a test cigarette has burned its full length and all smoldering and smoke evolution has ceased, measure from the original welt location the maximum length of char on the vertical panel surface.

4-2.10 An ignition is an obvious continued smoldering of the batting after the cigarette has extinguished.

4-3 Filling/Padding Component Test.

4-3.1 Cut three pieces of standard ticking fabric 203 x 203 mm (8 x 8 in.) for the horizontal panels and three 305 x 305 mm (12 x 12 in.) for vertical panels.

4-3.1.1 Construct three vertical panels by covering one surface of a removable vertical support panel with the vertical pad of the test specimen followed by the ticking material. The ticking shall be pulled around the edges of the panel and stapled to the backside, 25 mm (1 in.) from each edge.

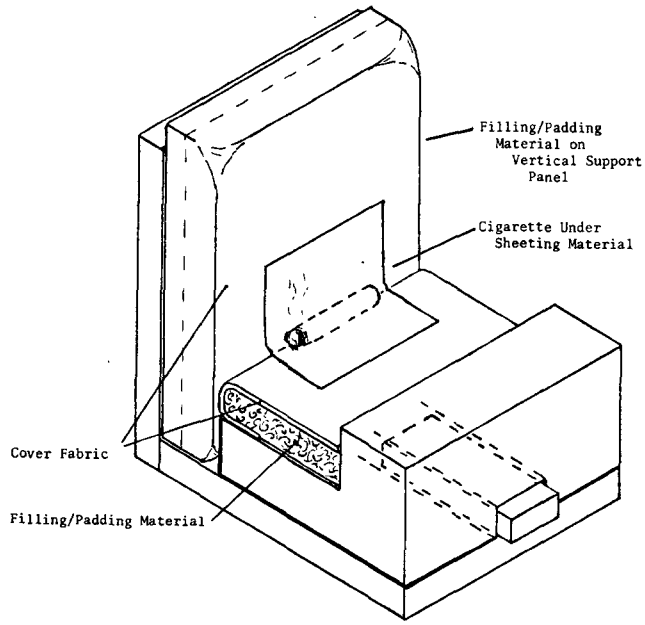

Figure 4-3 Filling/Padding Component Test Method

4-3.1.2 Construct three horizontal panels by wrapping each horizontal specimen panel with a piece of ticking material 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. Pin the cover fabric in place, top and bottom (Figure 4-3).

4-3.2 Place each assembled vertical and horizontal panel in a mini-mock-up tester as shown in Figure 4-3 such that a snug fit is obtained between the two panels.

4-3.3 Light three cigarettes and place one cigarette on each of the three test assemblies such that the cigarette lies in the crevice and against the vertical panel with equal distance of cigarette ends from either side of the assembly.

4-3.4 Place a piece of sheeting material over each cigarette, smoothing it over the cigarette to ensure intimate contact.

NOTE: A finger run over the covered cigarettes ensures good fabric-to-cigarette contact.

4-3.5 The cigarettes must be allowed to burn their full lengths unless an obvious ignition of the substrate occurs. 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 either: (1) three cigarettes have burned their entire length on three individual test specimens or (2) three cigarettes have self-extinguished on the sample.

4-3.6 If an obvious ignition occurs on any of the three specimens, extinguish the smoldering materials and record a failure.

4-3.7 If no ignition occurs, measure the vertical char on the vertical panel from the original crevice position to the highest part of the destroyed or degraded cover fabric.

4-4 Decking Materials Test.

4-4.1 From the standard Class II fabric cut a piece 533 x 343 mm (21 x 13.5 in.).

4-4.2 Place the decking material specimen on the plywood base of the decking materials tester and cover it with the standard Class II fabric. Place the plywood retainer ring on top of the cover fabric as shown in Figure 4-4.

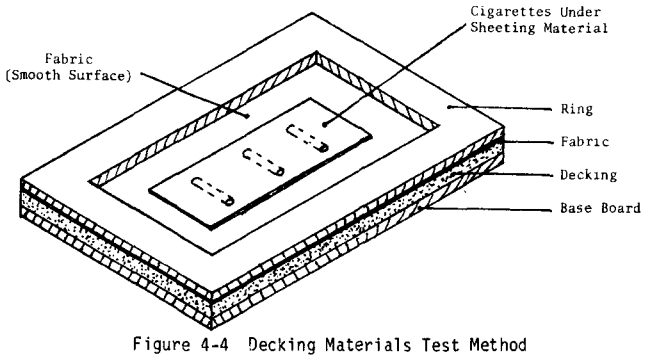

Figure 4-4 Decking Materials Test Method

4-4.3 Light three cigarettes and place them on the surface of the standard Class II fabric such that they are equally spaced from each other and from the edges of the retainer ring.

4-4.4 Place a piece of sheeting material over each of the cigarettes.

4-4.5 Allow the cigarettes to burn their full lengths. If a cigarette extinguishes before burning its entire length, another cigarette is placed on a fresh area of the standard cover fabric until either three cigarettes have burned their entire lengths or three cigarettes have self-extinguished.

4-4.6 If an obvious ignition (continued evolution of smoke and heat ten minutes after the cigarette has burned out) occurs, record a failure.

4-4.7 If no ignition occurs, measure and record to the nearest 2.5 mm (0.1 in.) the maximum length of char from the original cigarette position.

4-5 Barrier Test.

4-5.1 From the standard Class II cover fabric cut three 203 x 203 mm (8 x 8 in.) pieces for horizontal panels and three 203 x 381 mm (8 x 15 in.) pieces for vertical panels.

4-5.1.1 For vertical panels, place a vertical barrier specimen over the face of a 203 x 203 x 51 mm (8 x 8 x 2 in.) polyurethane substrate. Over each, attach a 203 x 381 mm (8 x 15 in.) piece of cover fabric and fasten it in place with pins as shown in Figure 4-5.

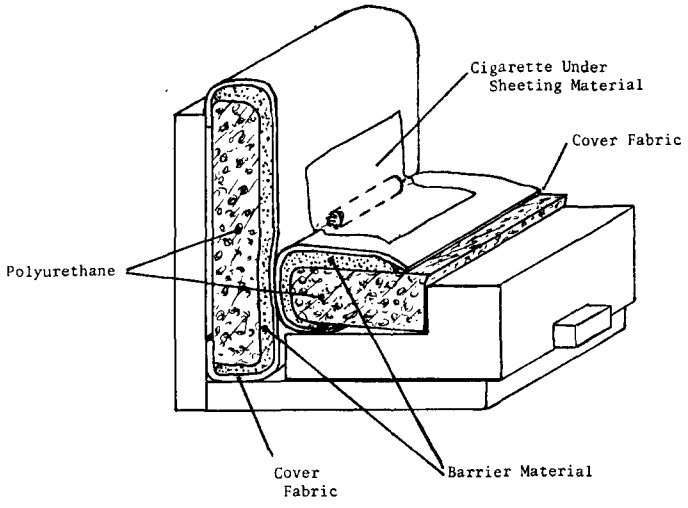

Figure 4-5 Barrier Materials Test Method

4-5.1.2 For horizontal panels, place a horizontal barrier specimen over a 203 x 127 mm (8 x 5 in.) piece of each horizontal polyurethane substrate. Fold the barrier around and under the polyurethane as shown in Figure 4-5. Fasten in place with pins. Over each place the horizontal cover fabric 203 x 203 mm (8 x 8 in.) and fasten in place with pins.

4-5.2 Place each assembled horizontal panel and vertical panel in the test assembly such that firm contact is achieved across the entire crevice formed by vertical and horizontal panels.

4-5.3 Light three cigarettes and place one cigarette on each of the three test assemblies such that the cigarette lies in the crevice and against the vertical panel with equal distance of cigarette ends from either side of the assembly.

4-5.4 Place a piece of sheeting material over each cigarette, smoothing it over the cigarette to ensure intimate contact.

NOTE: A finger run over the covered cigarettes ensures good fabric-to-cigarette contact.

4-5.5 The cigarettes must be allowed to burn their full lengths unless an obvious ignition of the substrate occurs. If a cigarette extinguished 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 either: (1) three cigarettes have burned their entire length on three individual test specimens or (2) three cigarettes have self-extinguished on the sample.

4-5.6 If an obvious ignition occurs on any of the three specimens, extinguish the smoldering materials and record a failure.

4-5.7 If no ignition occurs, measure the vertical char on the vertical panel from the original crevice position to the highest part of the destroyed or degraded cover fabric.

Chapter 5 Flame Resistance Classifications

5-1 Fabric Classification.

5-1.1 Class I. This class shall include all fabrics which exhibit a vertical char of less than 45 mm (1.75 in.) on each of three replications when subjected to the fabric classification test described in Chapter 4, Section 4-1.

5-1.2 Class II. This class shall include all fabrics which exhibit a vertical char equal to or greater than 45 mm (1.75 in.) on any one of three replications or which cause an ignition to occur on any of three replications when subjected to the fabric classification test described in Chapter 4, Section 4-1.

5-2 Welt Cord Classification.

5-2.1 Class I welt cord shall meet the criteria of 5-2.1.1 and 5-2.1.2.

5-2.1.1 When subjected to the welt cord test a specimen shall allow no ignition of any test assembly.

5-2.1.2 When measured from the original welt location (line where welt cord abuts the vertical panel), the vertical char on the cover fabric shall not exceed 38 mm (1.5 in.) on any of three replicate tests.

5-2.2 Class II. Welt cord that does not meet Class I criteria shall be designated Class II.

5-3 Filling/Padding Components Classification.

5-3.1 Class I components shall meet the criteria of 5-3.1.1 and 5-3.1.2.

5-3.1.1 When subjected to the filling/padding test a specimen shall allow no ignition of one or more test assembly.

5-3.1.2 When measured from the original crevice, the vertical char length on the cover fabric shall not exceed 38 mm (1.5 in.) on any of three replicate tests.

5-3.2 Components that do not meet Class I criteria shall be designated Class II.

5-4 Decking Material Classification.

5-4.1 Class I decking materials shall meet the criteria of 5-4.1.1 and 5-4.1.2.

5-4.1.1 When subjected to the decking test a specimen shall allow no ignition at one or more cigarette locations.

5-4.1.2 When measured from the original cigarette location, the char length on the cover fabric shall not exceed 38 mm (1.5 in.) at any of three cigarette locations.

5-4.2 Decking materials that do not meet Class I criteria shall be designated Class II.

5-5 Barriers Classification.

5-5.1 Class I barriers shall meet the criteria of 5-5.1.1 and 5-5.1.2.

5-5.1.1 When subjected to the barrier test a specimen shall allow no ignition of one or more test assembly.

5-5.1.2 When measured from the original crevice, the vertical char length on the cover fabric shall not exceed 51 mm (2.0 in.) on any of three replicate tests.

5-5.2 Barriers which do not meet Class I criteria shall be designated Class II.

Chapter 6 Safety Precautions

6-1 CAUTION: Even under the most carefully observed conditions, smoldering combustion can progress to a point where it cannot be readily extinguished. It is imperative that a test be discontinued as soon as continuing combustion has definitely occurred. Immediately wet the exposed area with a water spray from the water bottle, remove the charred or burned material, and immerse the material in a bucket of water. Ventilate the test area.

6-2 Products of combustion can be irritating and dangerous to test personnel. Test personnel must avoid exposure to smoke and gases produced during testing as much as possible. A large hood with a low air velocity may be in operation during testing to remove products of combustion.

Chapter 7 Precision and Accuracy

7-1 A precision and accuracy statement is under study and will be provided for later inclusion in the test method. For preliminary data - see the Appendix.

Appendix A

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

Commentary on Standard Methods of Test and Classification System for Cigarette Ignition Resistant Components of Upholstered Furniture

A-1 Introduction.

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

(a) Classification of cover fabrics.

(b) Construction criteria for use of complying materials.

(c) A labeling plan to inform the consumer of the safer product.

(d) A compliance verification program to assure that furniture manufacturers and their suppliers are utilizing proper materials and methods of construction.

A-1.2 The UFAC construction criteria are:

(a) The elimination of ignition-prone welt cords and the substitution of smolder resistant welt cords that will meet the requirements of the UFAC welt cord test.

(b) The elimination of untreated cotton batting as a substrate in immediate contact with decking fabrics and the substitution of materials that will meet the requirements of the UFAC decking material test.

(c) The elimination of untreated cotton batting in immediate contact with the covering of the inside vertical walls and the substitution of materials that will meet the requirements of the UFAC filling/padding test.

(d) Elimination of intimate contact between Class II fabrics and the horizontal seating surfaces of conventional polyurethane foam cushions. When Class II fabrics are used with conventional polyurethane foam cushions a barrier is required which will meet the requirements of the UFAC barrier test.

A-2 Nature of Tests.

A-2.1 The five test methods define the performances of welt cord, filling materials, decking substrates, barriers, and cover fabrics. These all are composite tests of individual ingredients combined with actual materials used by the upholstery industry. Certain standard materials have been selected for use in the tests. Performance of each component is evaluated in a fixture 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 performance of different components.

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

A-3 Experimental Study. The validity of the UFAC program utilizing these test methods was investigated in a series of chair tests in July, 1979. The series demonstrated that the UFAC program yielded a significant reduction in cigarette ignition propensity of upholstered pieces when compared to furniture items not meeting UFAC criteria. A significant improvement was brought about by application of the UFAC criteria. In pre-UFAC furniture, 41 percent of all cigarettes placed caused ignitions of the filling materials. In furniture manufactured by UFAC methods, only 4.5 percent of the cigarettes caused ignitions. This is an 89 percent improvement achieved by UFAC construction criteria.

NOTE: Reference: UFAC Voluntary Action Program Chair Tests, July 26, 27 and 28, 1979, UFAC, Box 2436, High Point, NC 27261.

260B- 1 - (New Standard): Accept
SUBMITTER: Technical Committee on Fire Tests
RECOMMENDATION: The Technical Committee on Fire Tests recommends adoption of this new standard.
SUBSTANTIATION: The Fire Test Committee of NFPA has agreed unanimously that some standard development should proceed toward affecting the fire scenario with regards to "cigarette ignition of upholstered furniture in the residential area." Statistics have shown conclusively that cigarette ignition of upholstered furniture is a leading - if not the major - cause of fire fatalities in the home.

After a lengthy study and review period, the Fire Test Committee has developed two proposed standards for adoption by NFPA.

1. 260A, for testing of components of furniture and;
2. 260B, for testing composites of furniture.

Both tests are deemed necessary. The component test - NFPA 260A, Standard Methods of Tests and Classification System for Cigarette Ignition Resistant Components of Upholstered Furniture is used presently in the new voluntary standards program by UFAC (Upholstered Furniture Action Council) and covers approximately 85 percent of the residential furniture now being marketed in the U.S. The composite test - NFPA 260B, Standard Method of Test for Determining Resistance of Mock-Up Upholstered Furniture Material Assemblies to Ignition by Smoldering Cigarettes, is used presently for evaluation of the more expensive industrial type upholstered furniture.

The Fire Test Committee has addressed the issue of an open flame test. The Committee agreed that all efforts should be placed first on the major scenario for deaths - cigarette ignition - and delay actions of flame ignition to a later date. The studies of flame ignition are continuing.
COMMITTEE ACTION: Accept.

Standard Method of Test for Determining Resistance

of Mock-Up Upholstered Furniture Material Assemblies to

Ignition by Smoldering Cigarettes

NFPA 260B - 1981

Chapter 1 General

1-1 Purpose. This method is to determine the ignition resistance of upholstered furniture material assemblies when exposed to smoldering cigarettes under specified conditions.

1-2 Scope. The method is applicable to all types of upholstered furniture material assemblies.

1-2.1 Mock-up testing is useful in assessing the relative resistance to continuing combustion of individual materials used in furniture, such as cover fabrics, filling materials, welt tape, etc., in realistic combinations but disregarding the geometric arrangement of the seat cushions, back and arms of furniture items.

1-2.2 This standard measures and describes the properties of materials, products, or assemblies in response to a smoldering cigarette under controlled laboratory conditions and does not necessarily describe or appraise the fire hazard or fire risk of materials, products, or assemblies under actual fire conditions.

1-3 Summary of Method.

1-3.1 The test uses lighted cigarettes (covered with a piece of sheeting material) to determine the ignition resistance of upholstered furniture items reproduced in mock-up (Figure 1-3(a) and (b)).

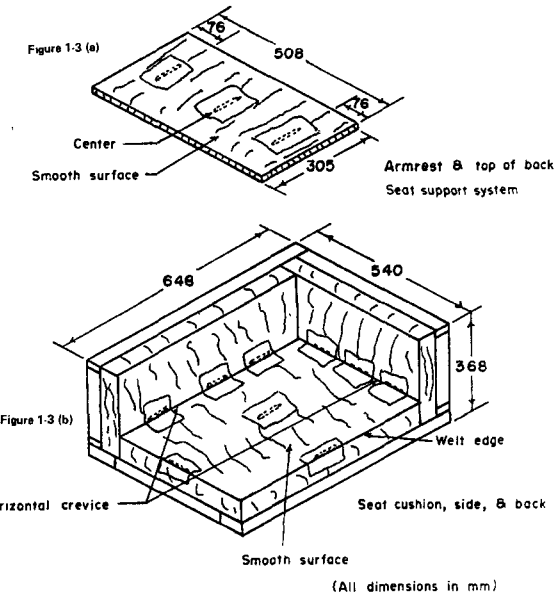

Figure 1-3(a) and (b) Upholstered Furniture Mock-up Test

1-3.2 Test locations include horizontal crevices occurring where seat cushions and vertical test panels meet; seat cushion surfaces including smooth surface, quilt, tuft, and welt edges; top surfaces of armrests, backs, and loose seat support systems (Figure 1-3(a) and (b)).

1-3.3 Obvious ignitions or char length measurements are used to determine if a particular combination of upholstering materials meet test criteria.

1-4 Significance.

1-4.1 This method is intended to measure the performance of upholstered furniture materials assemblies under conditions of exposure to a smoldering cigarette.

1-4.2 This method is not intended to measure the performance of upholstered furniture under conditions of open flame exposure and does not indicate whether the furniture will resist the propagation of flame under severe fire exposure or when tested in a manner which differs substantially from the test standard.

1-4.3 The results obtained with a material assembly tested in mockup, according to this method, do not necessarily indicate the performance of the same material assembly in other geometric configurations.

1-5 Definitions.

Bolsters. Pillows or similarly shaped units containing upholstery material covered by upholstery cover material, which may or may not be attached to the upholstered furniture item but are sold and delivered with it.

Char. Carbonaceous material formed by pyrolysis or incomplete combustion.

Deck. The upholstered support under the seat cushion in a loose seat construction.

Furniture. Mock-up or mock-up is a representation of production furniture that uses the same upholstery cover material and upholstery material, assembled in the same manner as in production furniture but with straight, vertical sides.

Quilted. Fused or stitched with thread through the upholstery cover material and one or more layers of upholstery material.

Tufted. Buttoned or laced through the upholstery cover material and upholstery material.

Upholstered Furniture. For the purpose of this test method, a unit of interior furnishing that contains any surface which is covered, in whole or in part, with a fabric or related upholstery cover material and contains upholstery material, which is intended or promoted for sitting or reclining upon, and which is intended for use or may reasonably be expected to be used in homes, offices, or places of assembly or accomodation.

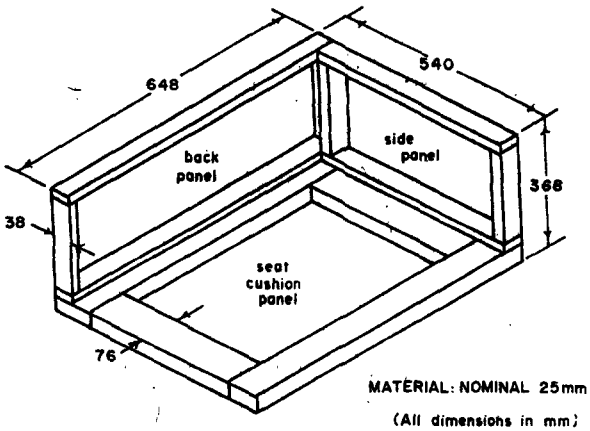

Figure 2-1 Frame for Upholstered Furniture Mock-up Test

Upholstery Cover Material. The outermost layer of fabric or related material used to enclose the main support system or upholstery materials or both used in the furniture item.

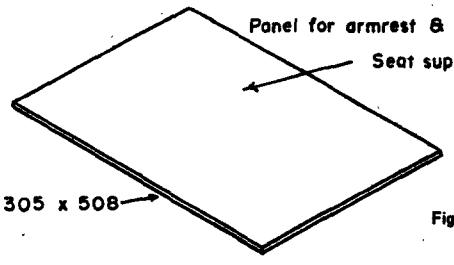

Figure 2-2 (a)

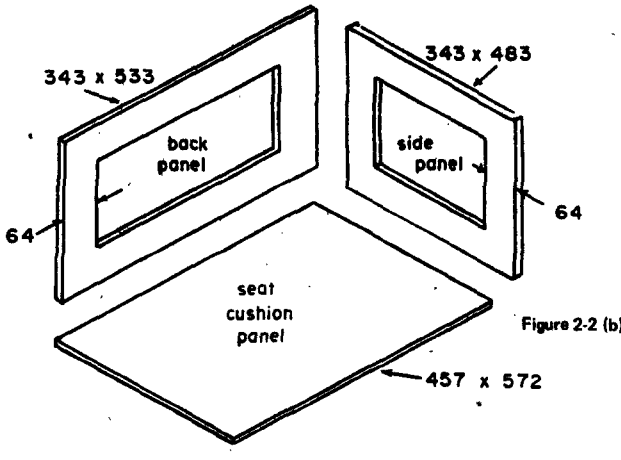

Figure 2-2 (b)

MATERIAL: NOMINAL 13mm PLYWOOD

(All dimensions in mm)

Figure 2-2 (a) and (b) Panels for Upholstered Furniture Mock-up Test

Upholstery Material. The padding, stuffing, or filling material used in a furniture item, which may be either loose or attached, enclosed by an upholstery cover material, or located between the upholstery cover material and support system, if present. (This definition includes, but is not limited to material such as foams, cottom batting, polyester fiberfill, bonded cellulose, or down.)

Welt. The seam or border edge of a cushion, pillow, arm, or back of an item.

260B

Chapter 2 Test Apparatus

2-1 Mock-up Elements for the mock-up test jig are illustrated in Figures 2-1 and 2-2 (a) and (b). Figure 3 shows the completed mock-up assemblies.

2-2 Ignition Sources. The ignition sources for test are cigarettes without filter tips, made from natural tobacco, 85 ± 2 mm (3.4 ± 0.1 in.) long with a packing density of 0.270 ± 0.020 g/cm3 and a total weight of 1.1 ± 0.1.g. The smoldering rate of this cigarette is 0.10 ± 0.01 mm/sec when the cigarette is allowed to burn downward in a draft-protected area.

NOTE: The cigarette is supported at the bottom in a vertical position. The burning rate is determined in the region from 10 mm to 50 mm, measured from the top.)

2-3 Sheeting Material. The sheeting material to cover the test cigarettes shall be 50/50 percent cotton/polyester or 100 percent cotton bed sheeting material, weight 125 ± 28 g/m2 (3.7± 0.8 oz/yd2). The material shall be laundered in an automatic clothes home washing machine and dried in a tumble drier at least once before use. For testing, the sheeting material is cut into pieces approximately 12.5 x 12.5 cm (5 x 5 in.).

2-4 Test Area. The test room shall be draft protected and equipped with a suitable system for exhausting smoke and noxious gases produced during testing.

2-5 Extinguishing Equipment. A pressurized water fire extinguisher or other suitable fire extinguishing equipment shall be immediately available. A water bottle fitted with a spray nozzle shall be provided to extinguish any ignited portions of the mock-up. A bucket of water shall be provided for immersing smoldering or burning materials removed from the mock-up.

2-6 Scale. A linear scale at least 15 cm (6 in.) long graduated in millimeters or inches in 1/10 or 1/16 in. divisions.

2-7 Other Apparatus. Straight pins, a knife or scissors, and tongs.

Chapter 3 Conditioning

3-1 Test samples, cigarettes, and sheeting material shall be conditioned at a temperature of 23o + 5oC and a relative humidity of 50 ± 5% for at least 48 hours immediately prior to testing. If the test room conditions do not meet the above specifications, then testing must be initiated within 10 minutes after the materials are removed from the conditioned room. The mock-up assembly shall be constructed in the conditioned area.

Chapter 4 Test Specimens

4-1 Furniture mock-ups are produced by arranging upholstery cover material and upholstery materials in the same sequence as they were used in the production furniture.

The various parts of the mock-up are constructed as described in Sections 4-2 to 4-6 below. In all cases, the arrangement and thickness of upholstery material in the mock-up shall reproduce the construction details of production furniture.

4-2 Loose seat cushions. Seat cushions are made in the same size and manner and with the same material as production furniture. If actual cushions exceed 65 x 55 cm (25 x 22 in.), then the smaller dimensions may be used. The cushion thickness shall be a maximum of 13 cm (5 in.).

4-3 Decks. Decks are prepared (if they are part of the furniture item) by attaching to the horizontal panel (Figure 2-2(a)) of the test apparatus the same materials in the same thickness as used in the actual furniture construction. The decking or upholstery cover material shall be stretched over the upholstery materials and securely fastened to the underside of the wood panel.

4-4 Tight seat. If the type of furniture item is constructed with only tight seats, then the seat is duplicated for test in mock-up. Tight seat cushions are made 45 ± 5 x 55 ± 5 cm (18 ± 2 x 22 ± 2 in.) and with the same fabric and the same thickness used in production furniture. The cushion assembly shall be attached to the horizontal panel of the test apparatus (Figure 2-2(b)) by extending the upholstery cover material around the panel edges and fastening the cover material to the underside of the wood panel.

4-5 Side and back panels. Furniture sides and backs shall be mocked-up if, in the type of furniture to be respresented by the mock-up, they are within 2.5 cm (1 in.) of a seat cushion. They are made by upholstering one surface of the vertical test panel (Figure 2-2(b)) with the same upholstery material and upholstery cover material used in production furniture. The upholstery cover material is stretched over the upholstery material and is fastened to the back side of the framework. All edges of the panels shall be covered with cover material. If the side and back construction of the furniture item are the same, only one vertical panel must be assembled and tested.

4-6 Bolsters. Bolsters resting on the seat cushion or suspended above it, tend to confine the heat from the cigarette and often present a spatial arrangement different from the crevice. In such cases, a mock-up bolster should be prepared, with dimensions to fit into the mock-up arrangement and presenting to the cigarette the same spatial arrangement as in production furniture,

4-7 Armrests and tops of backs. Tops of armrests and backs are tested if (1) they present a surface large enough and so oriented as to support a cigarette and (2) if the construction differs in any way from the side panel and back panel constructions. Tops of armrests and backs are made by upholstering a piece of 1.3 cm (0.5 in.) thick plywood, approximately 30 cm x 50 cm (12 in x 20 in.) with the same materials used in the furniture item. The mock-up must reproduce significant details of the construction of full-size furniture.

Chapter 5 Testing Procedures

5-1 Assemble a mock-up test sample by attaching the side and/or back panels to the mock-up frame and placing a seat cushion (either loose or tight seat construction) against the panels, as shown in Figure 1-3(b). The assembly may be placed on a table or platform in the test area and shall be under an exhaust hood or other suitable means for exhausting the products of combustion from testing. The decks for loose cushion items, tops of armrests, and backs shall be tested separately. The test to evaluate upholstered furniture material assemblies for cigarette ignition resistance may require two vertical panels, one seat cushion (loose or tight), one bolster, one deck, one top of armrest, and one top of back.

5-2 At least three cigarettes shall be burned on each surface location (see Figures 1-3(a) and (b)). These locations include crevice(s) where seat cushion and vertical panels meet, seat cushion surfaces (including welt and smooth, quilted or tufted areas, top of upholstered armrest, tops of upholstered back and deck.

5-3 For crevice locations, the two cigarettes next to the center cigarette are placed in the crevice so that their butt ends burn out at least 7.5 cm (3 in.) from the outermost edge of the side of the back panel. The cigarettes shall be placed horizontally. Two of the three cigarettes shall be placed so that their entire length burns out against the welt cord and the vertical panel surface. The third cigarette shall be placed so that its entire length burns out against the welt cord and a horizontal surface of the seat cushion.

5-4 Each test cigarette must be well lighted and burned not more than 4 mm (0.16 in) when placed on a specific test location. After placement, each cigarette shall be covered with a piece of sheeting material. For crevice tests pin one end of the sheeting material to the vertical panels (approximately 5 cmm (2 in.) above the cigarette and drop the remaining material to completely cover the test cigarette. For all tests ensure that a good sheeting material-to-cigarette contact is made by running a finger across the full length of the covered cigarette.

5-5 Seat Cushion.

5-5.1 For the test of a seat cushion (either loose or tight), three covered cigarettes shall be burned on each different surface location encountered.

5-5.2 For the purposes of this test, smooth surfaces, welt edges, fused or threaded portions of quilts, and tuft depressions are considered different surface locations on a seat cushion. Test cigarettes shall be so arranged so that the butt ends burn out on the threads of a quilt or in tuft depressions. The smooth surface of a quilted or tufted cushion is not required to be tested. For smooth surface cushions, the test cigarettes shall be burned in the center of the cushion.

5-6 Three test cigarettes shall be burned on each horizontal mock-up test panel duplicating armrests, tops of backs, and seat cushion support systems. One shall be burned at the center of the panel and the other two shall be burned at least 7.5 cm (3 in.) from the edges of the test panel. See Figure 1-3(a) for the location of the cigarettes on the test panels.

5-7 A test on any location is considered complete if any of the following occurs:

(a) three cigarettes in a given location have burned their full lengths without sustained ignition;

(b) three cigarettes in a given location have extinguished before burning their full lengths;

(c) three cigarettes in a given location sustained ignition.

5-8 If continuing ignition occurs, i.e., fabric and filling materials are ignited and are smoldering and generating smoke at a rapid rate, there is no need to wait until a cigarette has burned its full length; the test shall be stopped and the burning material extinguished. The test room shall be ventilated and an ignition recorded for the cigarette test location.

5-9 If the cigarette burns to completion in a test location, the maximum char length in any direction of any material from the nearest point of the original location of the cigarette shall be measured.

The char length measurement for each cigarette shall be recorded, except when the cigarette has extinguished without burning to completion or where continuing combustion occurs. If the char from one cigarette runs into that from another, the results of the test are invalid and the test must be repeated running one cigarette at a time. All mock-ups shall be disassembled.

NOTE: If when disassembling the apparatus, it is shown that smoldering is still in progress, then the test is invalid and must be repeated.

5-10 The test shall be carried out in a draft-protected area. The maximum airflow across the sample face shall be less than 15.2 m (50 ft) per minute.

Chapter 6 Safety Precautions

6-1 CAUTION: Even under the most carefully observed conditions, smoldering combustion can progress to a point where it cannot be readily extinguished. It is imperative that a test be discontinued as soon as continuing combustion has definitely occurred. Immediately wet the exposed area with a water spray from the water bottle, remove the charred or burned material, and immerse the material in a bucket of water. Ventilate the test area.

6-2 Products of combustion can be irritating and dangerous to test personnel. Test personnel must avoid exposure to smoke and gases produced during testing as much as possible. A large hood with a low air velocity may be in operation during testing to remove products of combustion.

Chapter 7 Report

7-1 The maximum char distance measured to the nearest 0.5 cm (0.2 in.) from the center of the original location of the test cigarette shall be recorded for each cigarette location, except when a continuing combustion occurs. In this case, an "ignition" shall be recorded for the test location.

Chapter 8 Precision and Accuracy

7-2 A precision and accuracy statement is under study and will be provided for later inclusion in the test method. For preliminary data, see Appendix.

Appendix

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

Commentary on Standard Method of Test for Determining Resistance of Upholstered Furniture Material Assemblies To Ignition by Smoldering Cigarettes

A-1 Introduction. The test for determining the smoldering cigarette ignition resistance of mock-up furniture material assemblies was developed by the National Bureau of Standards with the cooperation of various industry groups and individuals. The work was done in response to data indicating that cigarette ignition of upholstered furniture is a major cause of life loss due to fire in the United States.

A-2 Nature of Test.

A-2.1 Upholstered furniture consists of upholstery cover fabric and interior components (filling/padding), such as foam, polyester, or cotton batting. Often a welt cord is attached to the pillow and other edges of the upholstery. These materials are arranged in complex geometrical forms, including flat, tufted, convex, concave, and horizontal and vertical surfaces. Both the combination of fabric and filling/padding materials, and their geometrical arrangement, affect their propensity to ignite when exposed to burning cigarettes.

A-2.2 During original development, it was attempted to develop separate tests for each of the component materials: fabric, filling/padding, and welt cord. It soon became obvious that there was considerable interaction among these components, and it was decided that they would have to be tested in the combination in which they would be used in the actual furniture. However, to avoid the cost and effort required to build prototype furniture for each combination of materials, the test is limited to a simple mock-up of the seating surface and vertical members, with the fabric, filling/padding, and welt cord arranged as in the proposed construction of the furniture.

A-3 Experimental Studies. In the only controlled study, the relationship of the mock-up test to the performance of actual furniture was shown to be good.

Thirty-eight chair locations in both mock-up and full-size were tested by 3 laboratories for a total of 114 tests. Fourteen test locations out of 114 gave different results for the mock-up than for the actual item of furniture. There was 87 percent agreement.

A-4 Agreement Between Laboratories. In the only controlled study, the agreement between laboratories was good.

Two thousand two hundred-four total tests were conducted on mock-ups in 38 laboratories. One hundred twenty-six test results differed from the majority. There was 94 percent agreement.