ANSI/NFPA 266 An American National Standard August 5, 1994

NFPA 266
Standard Method of Test for Fire Characteristics of Upholstered Furniture Exposed to Flaming Ignition Source
1994 Edition

NFPA®

National Fire Protection Association, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101

NOTICE

All questions or other communications relating to this document should be sent only to NFPA headquarters, addressed to the attention of the Committee responsible for the document.

For information on the procedures for requesting Technical Committees to issue Formal Interpretations, proposing Tentative Interim Amendments, proposing amendments for Committee consideration, and appeals on matters relating to the content of the document, write to the Secretary, Standards Council, National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

A statement, written or oral, that is not processed in accordance with Section 16 of the Regulations Governing Committee Projects shall not be considered the official position of NFPA or any of its Committees and shall not be considered to be, nor be relied upon as, a Formal Interpretation.

Users of this document should consult applicable federal, state and local laws and regulations. NFPA does not, by the publication of this document, intend to urge action that is not in compliance with applicable laws, and this document may not be construed as doing so.

Policy Adopted by NFPA Board of Directors on December 3, 1982

The Board of Directors reaffirms that the National Fire Protection Association recognizes that the toxicity of the products of combustion is an important factor in the loss of life from fire. NFPA has dealt with that subject in its technical committee documents for many years.

There is a concern that the growing use of synthetic materials may produce more or additional toxic products of combustion in a fire environment. The Board has, therefore, asked all NFPA technical committees to review the documents for which they are responsible to be sure that the documents respond to this current concern. To assist the committees in meeting this request, the Board has appointed an advisory committee to provide specific guidance to the technical committees on questions relating to assessing the hazards of the products of combustion.

---

1. Adoption by Reference—Public authorities and others are urged to reference this document in laws, ordinances, regulations, administrative orders, or similar instruments. Any deletions, additions, and changes desired by the adopting authority must be noted separately. Those using this method are requested to notify the NFPA (Attention: Secretary, Standards Council) in writing of such use. The term "adoption by reference" means the citing of title and publishing information only.

2. Adoption by Transcription—**A.** Public authorities with lawmaking or rule-making powers only upon written notice to the NFPA (Attention: Secretary, Standards Council), will be granted a royalty-free license to print and republish this document in whole or in part, with changes and additions, if any, noted separately, in laws, ordinances, regulations, administrative orders, or similar instruments having the force of law, provided that: (I) due notice of NFPA's copyright is contained in each law and in each copy thereof; and (2) that such printing and republication is limited to numbers sufficient to satisfy the jurisdiction's lawmaking or rule-making process. **B.** Once this NFPA Code or Standard has been adopted into law, all printings of this document by public authorities with lawmaking or rule-making powers or any other persons desiring to reproduce this document or its contents as adopted by the jurisdiction in whole or in part, in any form, upon written request to NFPA (Attention: Secretary, Standards Council), will be granted a nonexclusive license to print, republish, and vend this document in whole or in part, with changes and additions, if any, noted separately, provided that due notice of NFPA's copyright is contained in each copy. Such license shall be granted only upon agreement to pay NFPA a royalty. This royalty is required to provide funds for the research and development necessary to continue the work of NFPA and its volunteers in continually updating and revising NFPA standards. Under certain circumstances, public authorities with lawmaking or rule-making powers may apply for and may receive a special royalty where the public interest will be served thereby.

3. Scope of License Grant—The terms and conditions set forth above do not extend to the index to this document.

(For further explanation, see the Policy Concerning the Adoption, Printing, and Publication of NFPA Documents, which is available upon request from the NFPA.)

Statement on NFPA Procedures

This material has been developed under the published procedures of the National Fire Protection Association, which are designed to assure the appointment of technically competent Committees having balanced representation. While these procedures assure the highest degree of care, neither the National Fire Protection Association, its members, nor those participating in its activities accept any liability resulting from compliance or noncompliance with the provisions given herein, for any restrictions imposed on materials or processes, or for the completeness of the text.

NFPA has no power or authority to police or enforce compliance with the contents of this document, and any certification of products stating compliance with requirements of this document is made at the peril of the certifier.

99 98 97 96 95 94 5 4 3 2 1 SC-AM-94

NFPA 266

Standard Method of Test for

Fire Characteristics of Upholstered Furniture Exposed to Flaming Ignition Source

1994 Edition

This edition of NFPA 266, *Standard Method of Test for Fire Characteristics of Upholstered Furniture Exposed to Flaming Ignition Source*, was prepared by the Technical Committee on Fire Tests and acted on by the National Fire Protection Association, Inc., at its Annual Meeting held May 16–18, 1994, in San Francisco, CA. It was issued by the Standards Council on July 14, 1994, with an effective date of August 5, 1994, and supersedes all previous editions.

The 1994 edition of this document has been approved by the American National Standards Institute.

Origin and Development of NFPA 266

This is a new standard that represents the current testing procedures for fire characteristics of upholstered furniture exposed to a flaming ignition source. This procedure was developed in response to the need to investigate the fire performance of upholstered furniture when exposed to a flaming ignition source. The performance data, heat release measurements, smoke density measurements, weight loss, and generation of carbon monoxide have been found to be useful in assessing the fire hazard of upholstered furniture. This standard was developed by research conducted by the National Institute of Standards and Technology (NIST) using a furniture calorimeter, Underwriters Laboratories Inc. (UL), and the California Bureau of Home Furnishings and Thermal Insulation (BHFTI).

Technical Committee on Fire Tests

Jesse J. Beitel, *Chair*
Hughes Assoc. Inc., MD

Peter J. Barbadoro, Westinghouse Savannah River Co., SC
April L. Berkol, ITT Sheraton Corp., MA
Rep. American Hotel & Motel Assn.
John A. Blair, The DuPont Co., DE
Rep. Society of the Plastics Industry Inc.
William E. Fitch, Omega Point Laboratories Inc., TX
Thomas W. Fritz, Armstrong World Industries Inc., PA
Robert Gallagher, IBM Corp., NY
Jeffrey E. Gould, Factory Mutual Research Corp., MA
Alfred J. Hogan, Reedy Creek Improvement District, FL
Rep. Fire Marshals Assn. of North America
Wayne D. Holmes, HSB Professional Loss Control Inc., PA
Marc L. Janssens, American Forest & Paper Assn., DC
Donald C. Knodel, Wilmington, DE
Rep. American Fiber Mfrs. Assn.
James R. Lawson, Nat'l Inst. of Standards & Technology, MD
Gerald E. Lingenfelter, American Insurance Services Group Inc., NY
George E. Meyer, Warnock Hersey Int'l Inc., CA
John W. Michener, Milliken Research Corp., DC
Rep. American Textile Mfrs. Inst. Inc.
James A. Milke, University of Maryland, MD
James C. Norris, Union Carbide, PA
Leon Przybyla, Underwriters Laboratories Inc., IL
Sivon C. Reznikoff, Arizona State University, AZ
Howard Stacy, Southwest Research Inst., TX
Herman Stone, General Foam, PA
T. Hugh Talley, Hugh Talley Co., TN
Rep. Upholstered Furniture Action Council
Richard P. Thornberry, The Code Consortium, Inc., CA
Robert J. Wills, American Iron & Steel Inst., AL
Peter J. Gore Willse, Industrial Risk Insurers, CT

Alternates

Robert M. Berhinig, Underwriters Laboratories Inc., IL
(Alt. to L. Przybyla)
Peter H. Billing, American Forest & Paper Assn., FL
(Alt. to M. L. Janssens)
Delbert F. Boring, American Iron & Steel Inst., OH
(Alt. to R. J. Wills)
Philip J. DiNenno, Hughes Assoc. Inc., MD
(Alt. to J. J. Beitel)
Richard D. Gottwald, Society of the Plastics Industry, Inc., DC
(Alt. to J. A. Blair)
R. Joseph Pearson, Warnock Hersey Int'l Inc., NY
(Alt. to G. E. Meyer)
John Roberts, Underwriters Laboratories of Canada, Ontario
(Alt. to Underwriters Laboratories of Canada)
William A. Thornberg, Industrial Risk Insurers, IL
(Alt. to P. J. G. Willse)
Kay M. Villa, American Textile Mfrs. Inst., DC
(Alt. to J. W. Michener)
Dee H. Wong, HSB Professional Loss Control Inc., TN
(Alt. to W. D. Holmes)
Joe Ziolkowski, American Furniture Mfrs. Assoc., NC
(Alt. to T. H. Talley)

Nonvoting

A. J. Bartosic, Rohm & Haas Co., PA
Herman H. Spaeth, Novato, CA
(Member Emeritus)

Walter P. Sterling, NFPA Staff Liaison

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.

NOTE: Membership on a Committee shall not in and of itself constitute an endorsement of the Association or any document developed by the Committee on which the member serves.

Committee Scope: This Committee shall have primary responsibility for documents on fire testing procedures where such documents are not available. The Committee shall review existing fire test standards and recommend appropriate action to NFPA; recommend the application of and advise on the interpretation of acceptable test standards for fire problems of concern to NFPA technical committees and members; and act in a liaison capacity between NFPA and the committees of other organizations writing fire test standards. The Committee shall not be responsible for fire tests that are used to evaluate extinguishing agents, devices, or systems.

Contents

NFPA 266

Standard Method of Test for

Fire Characteristics of Upholstered Furniture Exposed to Flaming Ignition Source

1994 Edition

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

Information on referenced publications can be found in Chapter 8 and Appendix D.

Chapter 1 General

1-1 Scope.

1-1.1 This test method, using a full-scale furniture calorimeter, shall be used to determine heat release, smoke density, weight loss, and generation of carbon monoxide of upholstered furniture or full-scale mock-up of furniture.

1-1.2 This test procedure shall be used to determine performance of upholstered furniture exposed to a flaming ignition source. This performance data has been found to be useful in assessing the fire hazard of upholstered furniture in occupancies that are identified as or considered to be public occupancies. Such occupancies include jails, prisons, nursing care homes, health care facilities, public auditoriums, and the public gathering areas of hotels and motels.

1-1.3 Heat release rate is indicated by measurement of oxygen depletion, and smoke generation is determined by smoke density measurement systems. Weight loss and carbon monoxide (CO) and carbon dioxide (CO_2) evolution are continuously recorded.

1-1.4* While this test method utilizes a full-scale furniture calorimeter, research has shown that both ASTM E1537, *Standard Method for Fire Testing of Real Scale Upholstered Furniture Items*, and California Technical Bulletin 133, *Flammability Test Procedure for Seating Furniture for Use in Public Occupancies*, provide comparable results for test specimens having heat release rates of 600 kW or less.

1-1.5 With respect to measurement of smoke and CO production, a quantitative relationship has not been established between measurements taken in the duct of the calorimeter exhaust system and measurements taken within the room. Accordingly, results of measurements of CO and smoke taken at different locations in different test environments shall not be considered equivalent.

1-2 Significance and Use.

1-2.1 This test method shall be used to determine the resulting fire performance characteristics of upholstered furniture or full-scale mock-ups where exposed to a standard flaming ignition source.

1-2.2 The results from this procedure provide information that can be used as an aid in the selection of upholstered furniture items that provide less contribution of heat, flame, smoke, and gases to fire scenarios.

1-2.3 Heat and smoke release rate measurements are sources of useful information for product development that provide a quantitative measure of specific changes in fire performance caused by product modifications.

1-2.4* For upholstered furniture products containing only wood or metal frame, or a combination of both, the procedure using a mock-up sample provides an indication of the open-flame performance of the finished article. For upholstered furniture products containing plastic frames and plastic decorative parts or special construction features, a mock-up sample is not always an accurate indicator of the open-flame performance of the finished article.

1-3 Summary of Test Method.

1-3.1 This procedure provides for exposure of full-size upholstered furniture specimens or furniture mock-ups to a standard flaming ignition source in a full-scale furniture calorimeter.

1-3.2 The standard ignition source shall be a gas burner.

1-3.3 Determinations shall be made and recorded for parameters including density of smoke, concentrations of carbon monoxide and carbon dioxide, weight loss, heat release rate, and total heat release.

Chapter 2 Test Specimens

2-1 Size and Preparation.

2-1.1 The test specimen shall consist of the actual upholstered furniture item or a full-scale mock-up of the furniture.

2-1.2 The construction of any full-scale mock-up of the furniture shall reflect the actual construction used in the upholstered items.

2-1.3 The test specimen for a full-scale mock-up shall consist of component cushions that duplicate the thickness, construction, and design features of the product.

2-1.4 In the case of mock-up testing, a metal test frame [*see Figures 2-1.4(a) and 2-1.4(b)*] shall be used to support the seat and back cushions and, if necessary, arm cushions. The chair frame shall be constructed of slotted L-angle iron and slotted flat-angle iron. The back shall be constructed so that it is adjustable to a maximum angle of 135 degrees ± 2 degrees from the horizontal plane. The test frame shall be adjustable to accommodate test cushions of various thicknesses and sizes, with or without arm cushions.

2-1.5 Component back, seat, and arm cushions shall be constructed into mock-up designs of the actual article of furniture. Construction shall duplicate all layers found in the actual article of furniture. Cushion construction shall consist of either a manufacturer's prefabricated cushion of the appropriate size or custom-made cushions. Custom-made cushions shall be constructed by covering all six faces of the filling material with the appropriate interliners and cover fabric.

2-1.6 In the case of mock-up testing, the constructed seat cushion shall be placed horizontally on the seat area of the test frame and pushed against the back of the frame. The constructed back cushion then is placed vertically against the back support of the test frame. The back cushion shall be held in place by wire to prevent it from falling forward.

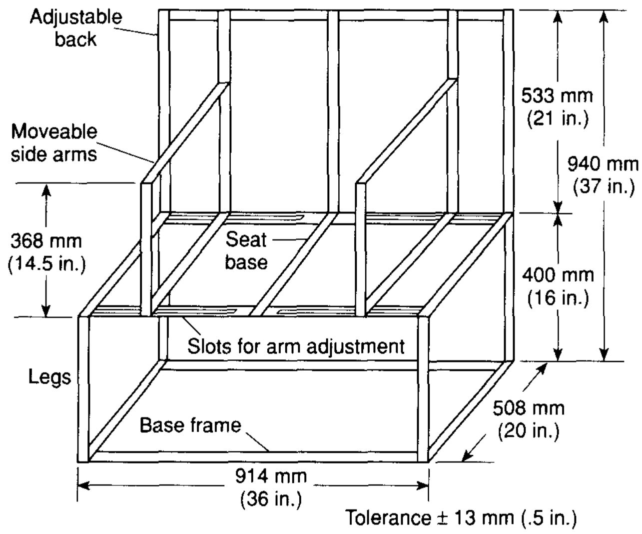


Figure 2-1.4(a) Metal test frame.

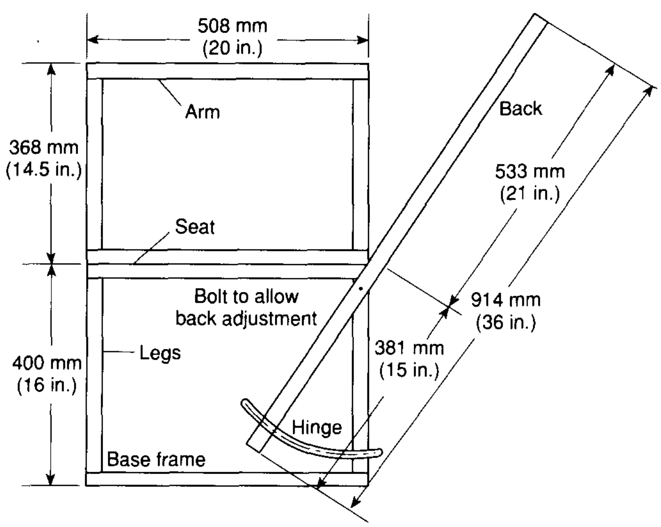


Figure 2-1.4(b) Metal test frame (end view).

If arm cushions are used, the constructed arm cushions shall be placed between the seat cushion and the arm supports of the test frame. However, the placement of the seat, back, and arm cushions shall simulate the design features of the completed article of furniture.

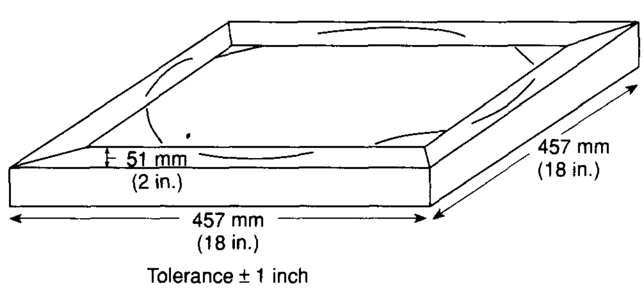


Figure 2-1.6 Back view of constructed cushion.

2-2 Conditioning. The test specimen shall be conditioned for at least 48 hours prior to testing at 23°C ± 3°C (73°F ± 5°F) and a relative humidity of 50 percent ± 5 percent. Test specimens shall be tested within 10 minutes of removal from such conditions if the test conditions differ from those specified above.

Chapter 3 Test Equipment and Instrumentation

3-1 Ignition Source.

3-1.1 A 250 mm ± 10 mm × 250 mm ± 10 mm (10 in. ± 0.39 in. × 10 in. ± 0.39 in.) burner shall be used as the ignition source in this test method. It shall be constructed in accordance with this section. The burner shall be constructed of 13-mm ± 1 mm (0.5-in. ± 0.039 in.) outside diameter stainless steel tubing with 0.89-mm ± 0.05 mm (0.034-in. ± 0.002 in.) wall thickness [*see Figure 3-1.1(a)*]. The front side shall have 14 holes pointing straight out and spaced 13 mm ± 1 mm (0.5 in. ± 0.039 in.) apart. The right and left sides shall have 6 holes pointing straight out and spaced 13 mm ± 1 mm (0.5 in. ± 0.039 in.) apart, and 4 holes pointing inward at an angle of 45 degrees ± 2 degrees and spaced 50 mm ± 2 mm (2 in. ± 0.076 in.) apart. All holes shall be 1 mm ± 0.1 mm (0.039 in. ± 0.0039 in.) in diameter [*see Figure 3-1.1(b)*]. The 1.07-m ± 0.2 m (42-in. ± 7.9 in.) straight arm of the burner shall be welded onto the rear of the front side [*see Figure 3-1.1(c)*] at a 30-degree angle. The burner shall be mounted on an adjustable height pole and shall be balanced by a counterweight or other appropriate mechanism. [*See Figure 3-1.1(d).*]

3-1.2 The gas burner shall utilize commercial-grade propane gas as fuel.

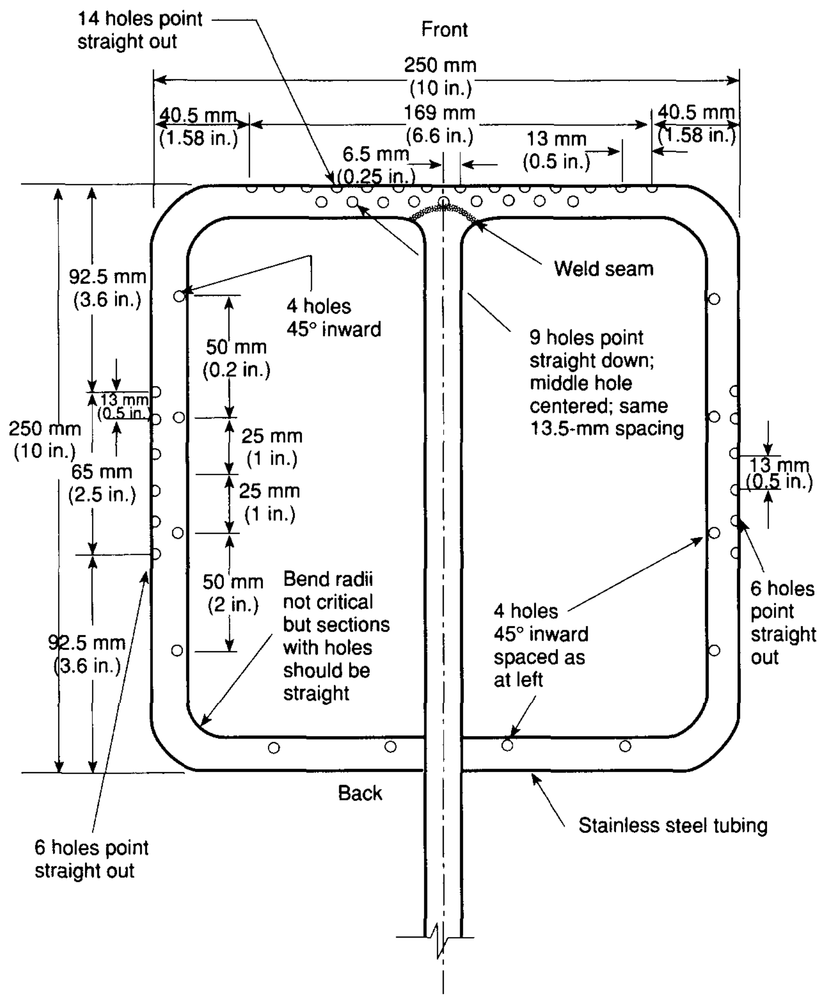
3-2 Collection — Exhaust System.

3-2.1 The hood shall be installed centrally above the weight-measuring system and test specimen. The face dimensions of the hood shall be 2.6 m ± 0.1 m × 2.6 m ± 0.1 m (8.53 ft ± 0.32 ft × 8.53 ft ± 0.32 ft), and the depth shall be 1.1 m ± 0.1 m (3.6 ft ± 0.32 ft). The hood shall exhaust into a plenum having a 0.9 m ± 0.05 m × 0.9 m ± 0.05 m (2.9 ft ± 0.16 ft × 2.9 ft ± 0.16 ft) cross section (*see Figure 3-2.1*). Other hood sizes shall be permitted, provided they produce equivalent test results. The distance between the lower edge of the hood and the weight-measuring system shall be 2.4 m (7.87 ft).

3-2.2* The exhaust duct connected to the plenum shall be a minimum of 406 mm (15.8 in.) in diameter and shall have a minimum circular aperture of 305 mm (11.9 in.) at its entrance.

3-2.3 The exhaust system shall have sufficient exhaust capacity to collect all products of combustion developed by the burning specimen. The exhaust hood system shall be capable of being operated within a range that varies from a minimum rate of 0.47 m^3/s (16.6 ft^3/s) to a maximum rate of at least 2.4 m^3/s (84.8 ft^3/s).

3-2.4 An alternate exhaust system design shall be permitted to be used if it has been shown to produce equivalent results.



Note: 1. All tubing 12.7 mm (1/2 in.) OD, SS, 0.035" wall thickness.
2. All holes 1 mm in diameter.
3. All units are mm unless otherwise noted.

Figure 3-1.1(a) Plan view of square gas burner.

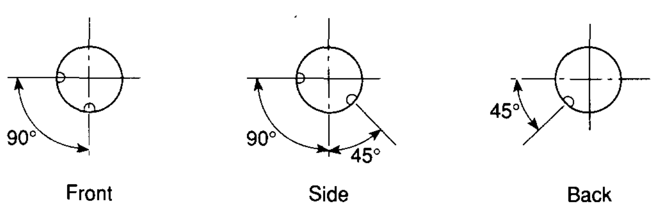


Figure 3-1.1(b) Cross-sectional view of each side of square gas burner.

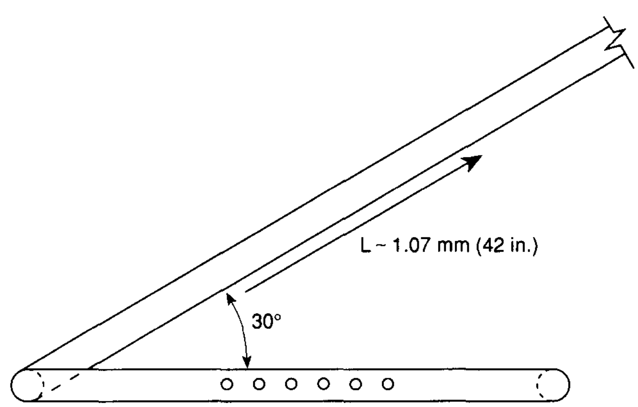


Figure 3-1.1(c) Side view of square gas burner.

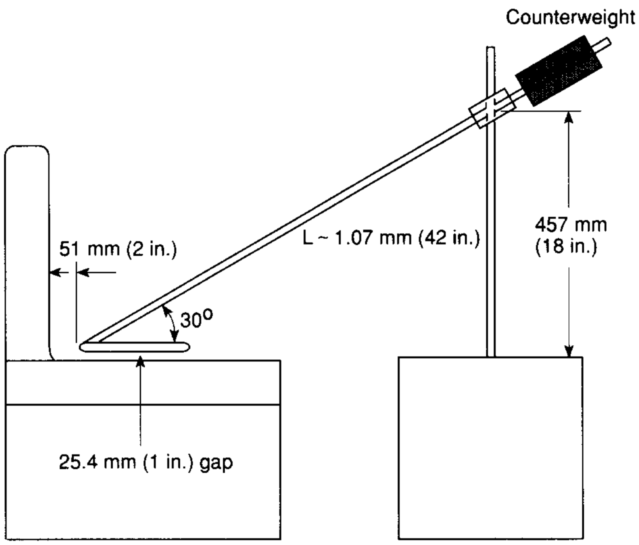


Figure 3-1.1(d) Positioning of square gas burner on the chair.

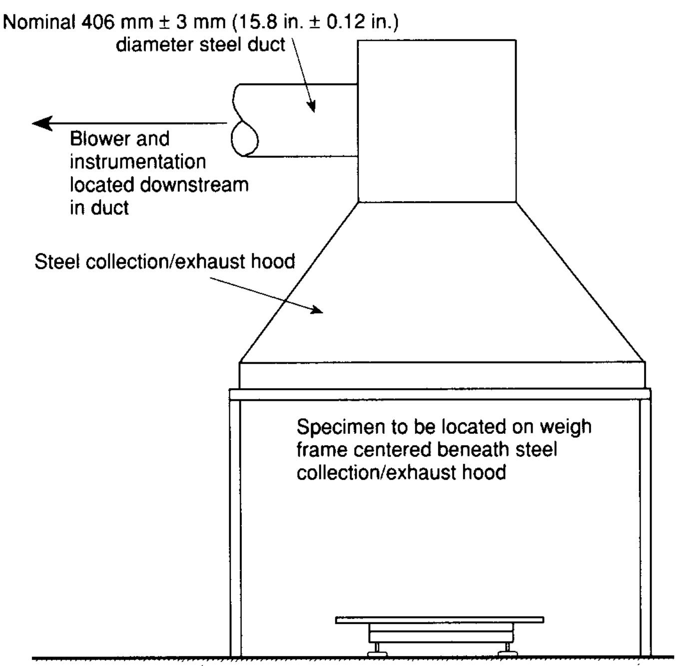


Figure 3-2.1 Collection hood and exhaust duct.

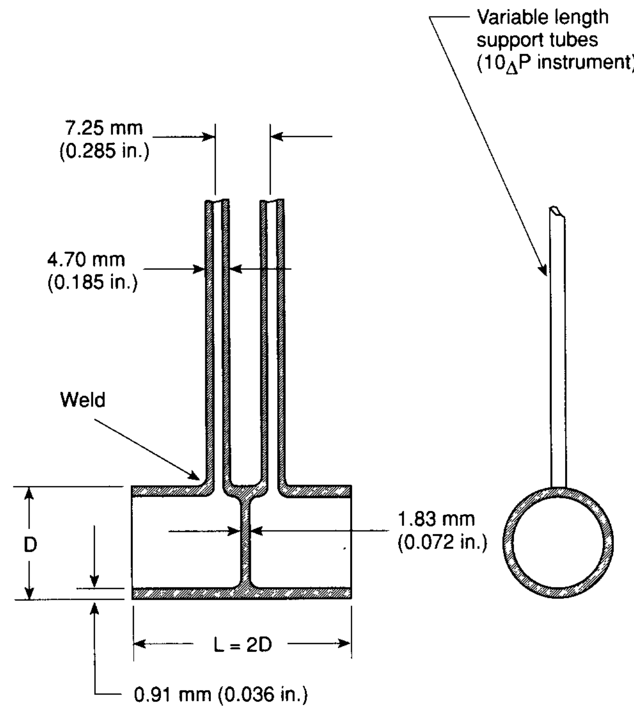


Figure 3-3.1 Bidirectional probe.

3-3 Velocity Measuring Instruments.

3-3.1 The velocity in the exhaust duct shall be determined by measuring the differential pressure in the flow path with the use of a bidirectional probe, as shown in Figure 3-3.1, connected to an electronic pressure gauge or an equivalent measuring system. The probe shall consist of a stainless steel cylinder with a solid diaphragm in the center that divides it into two chambers. The probe shall measure 44 mm (1.7 in.) long and 22 mm (0.86 in.) inside diameter. The pressure taps on either side of the diaphragm shall support the probe.

3-3.2 The axis of the probe shall be located at the centerline of the duct a minimum of 10 diameters downstream from the last turn in the duct. The taps shall be connected to a pressure transducer with a minimum resolution of 0.25 Pa (0.001 in. H_2O).

3-3.3 The temperature of the exhaust gas shall be measured upstream 152 mm ± 15 mm (5.9 in. ± 0.6 in.) from the probe at the centerline of the duct with a No. 28 AWG (0.08 mm^2), Type K thermocouple with an inconel sheath having a 16-mm (0.62-in.) outside diameter and a 3-mm (0.12-in.) thickness.

3-4 Gas Sampling and Analysis Equipment.

3-4.1* A stainless steel gas sampling tube shall be located at least 10 diameters downstream from the last turn in the duct to obtain a continuously flowing sample for determining the oxygen concentration of the exhaust gas as a function of time. A suitable filter and cold trap shall be placed in line ahead of the analyzer to remove particulates and water. The oxygen analyzer shall be of the paramagnetic type and shall be capable of measuring the oxygen concentration in a range of from 0 to 21 percent with an accuracy of ± 0.2 percent of full-scale setting. The signal from the oxygen analyzer shall attain 90 percent of the calibration value within 30 seconds after introducing a step change in composition of the gas stream flowing past the inlet to the sampling tube.

3-4.2* The gas sampling tube shall be located and defined as in 3-4.1. The carbon monoxide analyzer shall be capable of measuring the carbon monoxide in a range of from 0 to 1.0 percent with an accuracy of ± 0.02 percent of full-scale setting. The signal from the analyzer shall attain 90 percent of the calibration value within 30 seconds after introducing a step change in composition of the gas stream flowing past the inlet to the sampling tube.

3-4.3* The gas sampling tube shall be as located and described in 3-4.1. The carbon dioxide analyzer shall be capable of measuring the carbon dioxide concentration in a range of from 0 to 10 percent with an accuracy of ± 0.2 percent of full-scale setting. The signal from the analyzer shall attain 90 percent of the calibration value within 30 seconds after introducing a step change in composition of the gas stream flowing past the inlet to the sampling tube.

3-5 Smoke Density Measuring Instruments.

3-5.1 The smoke density measuring system shall be a white light system.

3-5.2 The lamp shall be of the incandescent filament type and shall operate at a color temperature of 2900 K ± 100 K. The lamp shall be supplied with stabilized direct current, stable within ± 0.2 percent, including temperature and short-term and long-term stability.

3-5.3 The lens system shall be selected such that the lens shall have a diameter, d, chosen with regard to the focal length, f, so that $d/f \leq 0.04$.

3-5.4 The aperture shall be placed in the focus of the lens.

3-5.5 The detector shall have a spectrally distributed response according to the CIE photopic curve. The detector shall be linear within 5 percent over an output range of at least 3.5 decades. This linearity shall be checked periodically with calibrated optical filters and shall cover the entire range of the instrument.

3-5.6 The system shall be mounted on a horizontal section of duct at a point where it will be preceded by a straight run of duct [at least 12 diameters or 5.2 m (17 ft)] and with the light beam directed upward along the vertical axis of the duct. A photoelectric cell whose output is directly proportional to the amount of light received shall be mounted over the light source and connected to a recording device having an accuracy within ± 1 percent of full scale for indicating changes in the attenuation of incident light resulting from the passage of smoke, particulate, and other effluents. The distance between the light source lens and the photocell lens shall be 914 mm ± 102 mm (35.6 in. ± 3.9 in.). The cylindrical light beam shall pass through 76-mm ± 3 mm (2.9-in. ± 0.12 in.) diameter openings at the top and bottom of the duct, with the resultant light beam centered on the photocell.

3-5.7* An alternate smoke density measuring system shall be permitted to be used if it has been shown to produce equivalent results.

3-6 Weighing Platform.

3-6.1 Mass loss rate of the burning specimen shall be measured during the test by means of a weight-measuring device.

3-6.2 A weighing platform shall be used to support the test specimen during the test. A reinforced inorganic board having the dimensions 1.2 m ± 0.1 m × 2.4 m ± 0.1 m (3.9 ft ± 0.32 ft × 7.87 ft ± 0.32 ft) shall be located on top of the weighing platform. The weighing platform perimeter shall have a rim extending 0.1 m ± 10 mm (0.32 ft ± 0.38 ft) above the top surface of the inorganic board to prevent spillage of test material.

3-6.3 The weight-measuring device shall be capable of measuring a specimen mass up to at least 90 kg (198.5 lb) with an accuracy of at least ± 150 g (± 0.33 lb). It shall be installed in such a way that the heat from the burning specimen and any eccentricity of the load do not affect the accuracy. Care shall be taken to avoid range shifts during measurements. All parts of the weight-measuring device shall be located below the top level of the slab.

3-6.4 The weighing platform shall support the base of the furniture specimen at a height of 127 mm ± 76 mm (5 in. ± 3 in.) above the floor.

3-6.5 The weighing platform shall be located beneath the collection hood at its geometric center.

3-7 Data Acquisition. A digital data acquisition system shall be used to collect and record oxygen, carbon monoxide, and carbon dioxide analyzer measurements; pressure gauge measurements; temperatures; smoke measurements; and weight-measuring device measurements. The speed and capacity of the data system shall be sufficient to collect the data every 5 seconds.

3-8 Photographic and Video Equipment. A camera and video equipment shall be used to record the test specimen performance throughout each test.

Chapter 4 Calibration

4-1 Calibration of Equipment.

4-1.1 The equipment and instrumentation shall be calibrated.

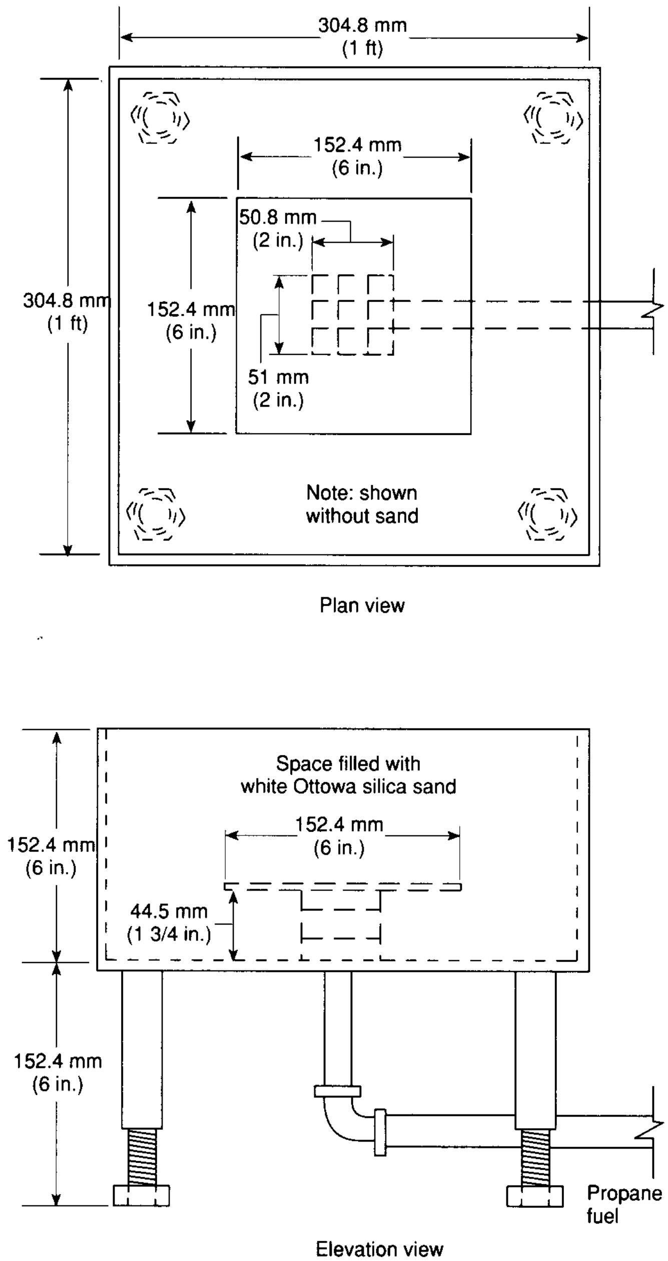
4-1.2 The heat release instrumentation shall be calibrated by burning propane. A gas burner shall be constructed with a 100-mm ± 6 mm (3.9-in. ± 0.23 in.) layer of Ottawa sand to provide the horizontal surface through which the gas is supplied. This type of burner is shown in Figure 4-1.2. The gas supply to the burner shall be of commercial-grade propane and shall have a net heat of combustion of 46.4 MJ/kg ± 0.5 MJ/kg (20,000 Btu/lb ± 200 Btu/lb). The flow rate of propane shall be metered and kept constant throughout the calibration test. A heat release value of 160 kW shall be used for calibration. The test shall be conducted for a period of 10 minutes.

4-1.3 A calibration constant, C, shall be obtained as described in Chapter 6. A value for C differing more than 10 percent from the theoretical value shall not be permitted, and the equipment shall be checked. For the exhaust duct configuration described in Section 3-2 and the velocity probe described in Section 3-3, C shall have a theoretical value of 2.8.

4-2 Daily Calibration.

4-2.1 Prior to the start of each day of testing, the equipment calibrations described in 4-2.2 through 4-2.7 shall be performed.

4-2.2 The oxygen analyzer shall be zeroed and spanned. The analyzer shall be zeroed by introducing 100 percent nitrogen gas to the instrument at the same pressure and flow rate as set for the test specimen combustion gases. The analyzer shall be spanned by introducing ambient duct air



All dimensions shown are ± 0.3 mm (± 0.012 in.)

Figure 4-1.2 Calibration gas burner.

via the sample probe and adjusting the span to 20.95 percent oxygen. The spanning and zeroing process shall continue until adjustment-free accuracy is obtained.

4-2.3 Following zeroing and spanning, linearity of the oxygen analyzer response curve shall be verified by introducing bottled gas of a known oxygen concentration to the analyzer. The delay time of the analyzer shall be checked by introducing ambient duct air to the analyzer and noting the time at which the analyzer readings reach 90 percent of the final reading.

4-2.4 The CO analyzer and CO_2 analyzer shall be zeroed and spanned in the same manner as the oxygen analyzer. The analyzer shall be zeroed by introducing 100 percent nitrogen gas to the instrument at the same pressure and flow rate as for the test specimen combustion gases. The analyzer shall be spanned by feeding each analyzer with bottled gas containing the selected concentration of span gas and adjusting for the response range of each analyzer.

4-2.5 The delay time of each analyzer shall be determined. The delay time shall be measured by introducing either a calibration span gas (for CO and CO_2) or a zero gas (for O_2) at the sample line just outside the duct and noting the time at which the analyzer readings reach 90 percent of the final reading.

4-2.6 The weight-measuring device shall be calibrated with known weights suitable for the capacity of the equipment and the specimen being tested.

4-2.7 Linearity of the smoke density measuring system shall be verified by interrupting the light beam with multiple calibrated neutral density filters to cover the range of the recording instrument. Transmittance values measured by the photometer, using neutral density filters, shall be within ± 3 percent of the calibrated value for each filter.

Chapter 5 Test Procedure

5-1 Testing Procedure.

5-1.1 The test specimen and weighing platform shall be located as shown in Figure 3-2.1.

5-1.2 The initial exhaust hood flow rate shall be set at a minimum of 0.47 m^3/s (16.6 ft^3/s).

5-1.3 The burner shall be positioned 51 mm ± 3 mm (2 in. ± 0.12 in.) from the back and 25 mm ± 3 mm (0.97 in. ± 0.12 in.) above the seat, with the center of the burner at the centerline of the test specimen.

5-1.4 The data acquisition shall begin in order to monitor test instrumentation.

5-1.5 The gas flow rate to the burner shall be set at a volume flow rate of 13 L/min ± 0.5 L/min (3.4 gal/min ± 0.13 gal/min). Care shall be taken to allow free flow of propane through the burner holes. Periodic cleaning of soot deposits and blowing of pressurized air through the tube shall be required.

5-1.6 The burner shall be ignited.

5-1.7 The exhaust hood flow rate shall be increased as required to collect all products of combustion from the test specimen.

5-1.8 The burner shall be removed from the test specimen after an exposure of 80 seconds ± 2 seconds.

5-1.9 The burner shall be turned off.

5-1.10 Combustion shall be allowed to continue until one or more of the following conditions are reached:

(a) All flaming combustion has ceased;

(b) Thirty minutes have elapsed from the time the burner was ignited.

Chapter 6 Calculations

6-1 Method of Calculation. The symbols used in this chapter are defined in Appendix C. The equations in this chapter assume that only oxygen is measured. Appropriate equations that shall be used for those cases where additional gas analysis equipment (CO_2, CO, water vapor) is used are provided in Appendix C. If a CO_2 analyzer is used and CO_2 is not removed from the oxygen sampling lines, then the appropriate equations in Appendix C shall be used.

6-2 Calibration Constant Using Propane. The calibration constant shall be obtained from the following equation:

$$C = \frac{160}{1.10(12.77 \times 10^3)} \times \sqrt{\frac{T_c}{\Delta h}} \times \left[\frac{1.084 - 1.4X_{O_2}}{X^{\circ}_{O_2} - X_{O_2}}\right]$$

where:

160 corresponds to 160 kW propane supplied, 12.77×10^3 equals $\Delta h_c / r_o$ for propane, and 1.10 is the ratio of oxygen to air molecular weight.

6-3 Heat Release for Test Specimens.

6-3.1 Prior to performing additional calculations, the oxygen analyzer time shift shall be determined by the following equation:

$$X_{O_2}(t) = X'_{O_2}(t - t_o)$$

6-3.2 The heat release rate then shall be determined by the following equation:

$$\dot{Q}(t) = \left(\frac{\Delta h}{r_o}\right) \times 1.10C \sqrt{\frac{\Delta P}{Tc}} \left[\frac{X^{\circ}_{O_2} - X_{O_2}(t)}{1.084 - 1.4X_{O_2}(t)}\right]$$

6-3.3 The value of $(\Delta h_c/r_o)$ for the test specimen shall be set to equal 13.1×10^3 kJ/kg unless a more accurate value is known for the test specimen.

6-3.4 The total heat released during the first 10 minutes of the test shall be determined by the following equation:

$$\dot{q}''i = \sum_{i=o}^{10} \dot{q}''i\ (t)\ \Delta t$$

6-4 Smoke Obscuration.

6-4.1 The extinction coefficient (k) of smoke shall be determined by the following equation:

$$k = \frac{1}{L} \ln\left(\frac{I_o}{I}\right)$$

where:

L = path length in meters.

6-4.2 The smoke release rate (SRR) shall be calculated using the optical density per linear path length and the volumetric flow rate in the duct. The SRR shall be determined by the following equation:

$$SRR = km$$

where:

SRR equals the smoke release rate in m^2/s; k equals the extinction coefficient; and m equals the volumetric flow rate (in m^3/s) referred to 298 K.

Chapter 7 Report of Results

7-1 The following shall be reported for each test specimen:

(a) Test specimen identification or number
(b) Manufacturer or submitter
(c) Date of test
(d) Operator
(e) Composition or generic identification
(f) Details of preparation
(g) Number of replicate test specimens tested
(h) Time to termination of test (seconds)
(i) Maximum mass (kg) loss
(j) Maximum rate of heat release (kW)
(k) Total heat release (MJ) during the first 10 minutes of the test
(l) Maximum smoke release rate (m^2/s)
(m) Maximum carbon monoxide concentration (ppm)
(n) Maximum carbon dioxide concentration (ppm).

Chapter 8 Referenced Publications

8-1 The following documents or portions thereof are referenced within this standard and shall be considered part of the requirements of this document. The edition indicated for each reference is the current edition as of the date of the NFPA issuance of this document.

8-1.1 ASTM Publication. American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM E1537-93, *Standard Method for Fire Testing of Real Scale Upholstered Furniture Items.*

8-1.2 State of California Publication. State of California, Department of Consumer Affairs, Bureau of Home Furnishings and Thermal Insulation.

Technical Bulletin 133, *Flammability Test Procedure for Seating Furniture for Use in Public Occupancies,* January 1991.

Appendix A Explanatory Material

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

A-1-1.4 For further information on other test environments, see the following publications:

"Furniture Flammability: An Investigation of the California Technical Bulletin 133 Test — Part 1: Measuring the Hazards of Furniture Fires," by J. Quintiere.

"Furniture Flammability: An Investigation of the California Technical Bulletin 133 Test — Part 2: Characterization of Ignition Source and Comparable Gas Burner," by J. Ohlemiller and K. Villa.

"Furniture Flammability: An Investigation of the California Technical Bulletin 133 Test — Part 3: Full-Scale Chair Burns," by W. J. Parker.

A-1-2.4 While using frames or features other than wood or metal, actual articles of furniture (not mock-ups) should be tested.

A-3-2.2 The locations for velocity, temperature, gas analysis, and smoke photometer should be chosen to ensure that the products of combustion are well-mixed and not stratified at the sampling location. The general rule should be for the duct to run a sufficient length (10 diameters) downstream from the last turn in the duct prior to location of instrumentation in order to provide for a fully developed gas flow. Mixing vanes should be used in the duct if concentration gradients are found to exist.

A-3-4.1 One type of oxygen analyzer is a Beckman Instrument Model 755 paramagnetic-type oxygen analyzer. Other equivalent oxygen analyzers may be permitted to be used.

A-3-4.2 One type of carbon monoxide analyzer is a Horiba Instrument Model PIR-2000 analyzer. Other equivalent carbon monoxide analyzers may be permitted to be used.

A-3-4.3 One type of carbon dioxide analyzer is a Horiba Instrument Model PIR-2000 analyzer. Other equivalent carbon dioxide analyzers may be permitted to be used.

A-3-5.7 A laser beam system may be permitted to be used as an alternate system for measuring smoke obscuration.

Appendix B Commentary

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

B-1 This appendix was developed in response to the need to investigate the fire performance of upholstered furniture when exposed to open-flame ignition sources. This performance data has been found to be useful in assessing the fire hazard of upholstered furniture in occupancies that are identified as or considered to be public occupancies.

B-2 In consideration of the statistics that document the involvement of upholstered furniture in fires in public occupancies and in response to the need expressed by fire departments, authorities having jurisdiction, procurement officials, and others, the California Bureau of Home Furnishings and Thermal Insulation (BHFTI) developed Technical Bulletin (TB) 133, *Flammability Test Procedure for Seating Furniture for Use in Public Occupancies.*

B-3 In the development of TB 133, the BHFTI considered such public occupancies as:

(a) Jails, prisons, and penal institutions;

(b) Health care facilities, such as hospitals;

(c) Old-age and convalescent facilities;

(d) Board and care occupancies;

(e) Licensed child care facilities;

(f) Public stadiums and auditoriums;

(g) Public gathering areas of hotels and motels, defined as areas where there are ten or more upholstered seats.

B-4 The TB 133 fire test was initially published in 1984 and consisted of an instrumented test room measuring 3.7 m × 3.0 m (12 ft × 10 ft) with an 2.4-m (8-ft) ceiling and a 0.96 m × 2 m (3 ft 2 in. × 6 ft 9 in.) doorway. The ignition source consisted of five double sheets of loosely crumpled newspaper placed inside a ventilated ignition box that was set on the seating surface of the furniture. The box was designed to contain the flames and direct them onto the sample surface. The sample furniture item weight was monitored by load cells. Test measurements in the TB 133 test included the following:

(a) Temperature increase at several points in the test room;

(b) Smoke opacity at several elevations in the room;

(c) A single point measurement of CO;

(d) Weight loss of the furniture both during and following the test.

B-5 In an actual full-scale fire, research has shown that one of the most significant characteristics of the items involved in a fire is their rate of heat release. The rate of heat release governs the rate of growth and spread of the fire to surrounding objects and the phenomenon of room flashover. In recognition of this fact, fire research of various types of upholstered furniture was conducted at the National Institute of Standards and Technology (NIST) using a full-scale calorimeter. Using this equipment, heat release measurements of furniture were obtained. At Underwriters Laboratories, a test method was developed (UL 1056, *Fire Tests of Upholstered Furniture*) utilizing the calorimeter approach to measurement. The method was intended to investigate the fire growth performance of upholstered furniture for use in public occupancies.

B-6 In consideration of the advance of heat release technology, the BHFTI and NIST undertook a study to expand and modify TB 133 in three areas:

(a) Inclusion of heat measurements;

(b) Development of a gas ignition source to substitute for a newspaper ignition source for increased repeatability and reproducibility;

(c) Development of correlations between the BHFTI test room, the American Society for Testing and Materials (ASTM) Standard Fire Test Room, and the full-scale furniture calorimeter.

B-7 The results of the study were reported in three NIST reports. Based on the findings of the study, TB 133 was modified to include heat release measurement as an optional test procedure. The criteria of acceptance in the January 1991 TB 133 document are provided in B-7.1.

B-7.1 Seating furniture meets the requirements of this test procedure if all of the following criteria are satisfied in a room fire test using the following room instrumentations:

(a) A temperature increase less than 111°C (200°F) at ceiling thermocouple;

(b) A temperature increase less than 28°C (50°F) at the mid-height thermocouple;

(c) An opacity of smoke of 75 percent or less at the (1.2-m) 4-ft smoke density meter;

(d) Carbon monoxide concentration of less than 100 ppm for 5 minutes;

(e) Weight loss of the seating furniture due to combustion of 1.36 kg (3 lb) or less during the first 10 minutes of the test.

B-7.2 Seating furniture meets the requirements of this test procedure if the following criteria are satisfied in a calorimeter test using oxygen consumption calorimetry:

(a) Peak rate of heat release of 80 kW or less;

(b) Total heat release of 25 MJ or less during the first 10 minutes of the test.

B-7.3 TB 133 does not require that upholstered furniture be subjected to both of the test procedures (room test and calorimeter test). Upholstered furniture may be permitted to be tested by either procedure to fulfill the applicable criteria.

B-8 Furniture that meets these criteria reduces the contribution of the furniture to the creation of untenable conditions in a room involved in fire.

B-9 The test method described in this standard provides data useful in evaluating upholstered furniture products in accordance with the January 1991 TB 133 criteria.

B-10 NFPA *101®*, *Life Safety Code®*, 31-1.4.3, requires that upholstered furniture shall have limited rates of heat release as follows:

(a) The peak rate of heat release shall not exceed 250 kW unless rooms have approved smoke detectors or approved automatic sprinkler systems.

(b) The peak rate of heat release shall not exceed 500 kW unless rooms have an approved, automatic sprinkler system.

(c) Total energy release during the first 5 minutes of the test shall not exceed 75 MJ unless rooms have an approved, automatic sprinkler system.

B-11 During the past several years, upholstered furniture for public occupancies has been investigated for response to open-flame sources using the TB 133 method and other similar methods such as UL 1056, *Fire Tests of Upholstered Furniture*, and ASTM E1537, *Standard Method for Fire Testing of Real Scale Upholstered Furniture Items*.

Appendix C Heat Release Calculations Using Additional Gas Analysis

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

C-1 Calculation of Heat Release with Additional Gas Analysis.

C-1.1 The equations used to calculate heat release rate in Chapter 6 assume CO_2 is removed from the gas sample in a chemical scrubber before oxygen is measured. Some laboratories are equipped to measure CO_2; in such a case, it is not necessary to remove the CO_2 from the oxygen line. The advantage is that the chemical scrubbing agent, which is costly and needs careful handling, can be avoided.

C-1.2 In this appendix, equations are provided that are to be used when CO_2 is measured but *not* scrubbed out of the sampling lines. Two cases are considered. In the first case, part of the dried and filtered sample stream is diverted into infrared CO_2 and CO analyzers. In the second case, a water-vapor analyzer is also added. To avoid condensation, when measuring water-vapor concentration in the flow of combustion products, a separate sampling system with heated filters, heated sampling lines, and a heated analyzer is needed.

C-2 Symbols. The following symbols are used in this appendix:

M_a = molecular weight of air (kg/kmol).

M_e = molecular weight of the combustion products (kg/kmol).

$\dot{m}_e$ = exhaust duct mass flow rate (kg/s).

t_d^1 = delay time of the CO_2 analyzer(s).

t_d^2 = delay time of the CO analyzer(s).

t_d^3 = delay time of the water-vapor analyzer(s).

$X_{CO_2}^{\circ}$ = initial CO_2 reading, mole fraction.

X_{CO}° = initial CO reading, mole fraction.

$X_{H_2O}^{\circ}$ = initial water-vapor reading, mole fraction.

$X_{O_2}^{a}$ = ambient oxygen mole fraction.

$X_{CO_2}^{1}$ = CO_2 reading before delay time correction, mole fraction.

X_{CO}^{1} = CO reading before delay time correction, mole fraction.

$X_{H_2O}^{1}$ = water-vapor reading before delay time correction, mole fraction.

X_{CO_2} = CO_2 reading after delay time correction, mole fraction.

X_{CO} = CO reading after delay time correction, mole fraction.

X_{H_2O} = water reading after delay time correction, mole fraction.

ϕ = oxygen depletion factor.

C-3 Where CO_2 and CO Are Measured.

C-3.1 As in the case of the oxygen analyzer, measurements of CO_2 and CO should be time-shifted to take transport time in the sampling lines into account as follows:

$$X_{O_2}(t) = X_{O_2}^{1}(t + t_d)$$

$$X_{CO_2}(t) = X_{CO_2}^{1}(t + t_d^{1})$$

$$X_{CO}(t) = X_{CO}^{1}(t + t_d^{2})$$

The delay times, t_d^1 and t_d^2, for the CO_2 and CO analyzers, respectively, are usually different (smaller) than the delay time, t_d, for the oxygen (O_2) analyzer.

C-3.2 The exhaust duct flow is determined as follows:

$$\dot{m}_e = C\sqrt{\frac{\Delta P}{T_e}}$$

C-3.3 The rate of heat release now can be determined as follows:

$$\dot{q} = 1.10\left(\frac{\Delta h_c}{r_o}\right) X_{O_2}^{a}\left[\frac{\phi - 0.172(1-\phi)X_{CO}}{(1-\phi) + 1.084\phi}\right]\dot{m}_e$$

C-3.4 The oxygen depletion factor, ø, is calculated as follows:

$$ø = \frac{X^{\circ}_{O_2}(1 - X_{CO_2} - X_{CO}) - X_{O_2}(1 - X^{\circ}_{CO_2})}{X^{\circ}_{O_2}(1 - X_{CO_2} - X_{CO} - X_{O_2})}$$

C-3.5 The ambient mole fraction of oxygen (O_2) is determined as follows:

$$X^{3}_{O_2} = (1 - X^{\circ}_{H_2O})(X^{\circ}_{O_2})$$

C-3.6 The second value in the numerator of the factor in brackets in the equation in C-3.3 is a correction factor for incomplete combustion of some carbon to CO instead of CO_2. In fact, the value for X_{CO} is usually very small, so that it can be disregarded in the equations in C-3.3 and C-3.4. The practical implication of this value is that a CO analyzer will generally not result in a noticeable increase in accuracy of heat release rate measurements. Consequently, the equations in C-3.3 and C-3.4 may be permitted to be used even if no CO analyzer is present by using the setting $X_{CO} = 0$.

C-4 Where Water Vapor Is also Measured.

C-4.1 In an open combustion system, such as that used in this test method, the flow rate of air entering the system cannot be measured directly but is inferred from the flow rate measured in the exhaust duct. An assumption regarding the expansion due to combustion of the fraction of the air that is fully depleted of its oxygen is necessary. This expansion depends on the composition of the fuel and the actual stoichiometry of the combustion. A suitable average value for the volumetric expansion factor is 1.084, which is the factor for propane.

C-4.2 This expansion factor value is already incorporated within the equation in 6-3.2 and the equation in C-3.3 for q. It can be assumed that the exhaust gases consist primarily of nitrogen, oxygen, CO_2, water vapor, and CO; thus, measurements of these gases can be used to determine the actual expansion. (It is assumed that the measurements of oxygen, CO_2, and CO refer to a dry gas stream, while the water-vapor measurement corresponds to total stream flow.) The mass flow rate in the exhaust duct is then more accurately provided by the following equation:

$$M_e = C\sqrt{\frac{\Delta P}{T_c}}\ \sqrt{\frac{M_e}{M_a}}$$

C-4.2.1 The molecular weight, M_e, of the exhaust gases is determined as follows:

$$M_e = \left[4.5 + (1 - X_{H_2O})(2.5 + X_{O_2} + 4X_{CO_2})\right] x\ 4$$

C-4.2.2 Using 28.97 as the value for M_a , the heat release rate is determined as follows:

$$\dot{q}(t) = 1.10\left(\frac{\Delta h_c}{r_o}\right)\left(1\text{-}X_{H_2O}\right)\left[\frac{X^{\circ}_{O_2}(1\text{-}X_{O_2} - X_{CO_2}) - X_{O_2}}{1\text{-}X^{\circ}_{O_2} - X_{CO_2}}\right]M_e$$

C-4.3 The water-vapor readings used in the equation in C-4.2.2 are time-shifted in a similar way to those in the equations in C-3.1 for other types of analyzers as follows:

$$X^{\circ}_{H_2O}(t) = X^{1}_{H_2O}(t + t_d{}^{3})$$

Appendix D Referenced Publications

D-1 The following documents or portions thereof are referenced within this standard for informational purposes only and thus are not considered part of the requirements of this document. The edition indicated for each reference is the current edition as of the date of the NFPA issuance of this document.

D-1.1 NFPA Publication. National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA *101, Life Safety Code*, 1994 edition.

D-1.2 Other Publications.

D-1.2.1 ASTM Publications. American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM E602-91, *Method for Sharp-Notch Tension Testing with Cylindrical Specimens.*

ASTM E1537-93, *Standard Method for Fire Testing of Real Scale Upholstered Furniture Items.*

D-1.2.2 NIST Publications. U.S. National Institute of Standards Technology, U.S. Department of Commerce, Technology Administration National Technical Information Service, Springfield, VA 22161.

NIST 4360, "Furniture Flammability: An Investigation of the California Technical Bulletin 133 Test — Part 1: Measuring the Hazards of Furniture Fires," J. Quintiere, July 1990.

NIST 4348, "Furniture Flammability: An Investigation of the California Technical Bulletin 133 Test — Part 2: Characterization of Ignition Source and Comparable Gas Burner," T. Ohlemiller and K. Villa, June 1990.

NIST 4375, "Furniture Flammability: An Investigation of the California Technical Bulletin 133 Test — Part 3: Full-Scale Chair Burns," W. J. Parker, K. M. Tu, S. Nurbakhsh, and G. H. Damant, July 1990.

D-1.2.3 UL Publication. Underwriters Laboratories Inc., 333 Pfingsten Road., Northbrook, IL 60062.

UL 1056-89, *Fire Tests of Upholstered Furniture.*

D-1-2.4 Additional Publications.

Babrauskas, Vytenis, Lawson, Randall J., Walton, W. D., and Twilley, William H., "Upholstered Furniture Heat Release Rates Measured with a Furniture Calorimeter," NMBSIR 82-2604, December 1982.

Damant, Gordon, "Flammability of Soft Furnishings. What's Happening in California?" *Journal of Fire Sciences*, Vol. 18, No. 5, September/October 1990, pp. 313-330.

Nurbakhsh, Said, "Development of Full-Scale Fire Test Facility," Proceedings of the International Conference on Fire Safety, Vol. 15, 1990.

Technical Bulletin 133, *Flammability Test Procedure for Seating Furniture for Use in Public Occupancies*, State of California, Department of Consumer Affairs, Bureau of Home Furnishings and Thermal Insulation, January 1991.

Index

The NFPA Codes and Standards Development Process

Since 1896, one of the primary purposes of the NFPA has been to develop and update the standards covering all areas of fire safety.

Calls for Proposals
The code adoption process takes place twice each year and begins with a call for proposals from the public to amend existing codes and standards or to develop the content of new fire safety documents.

Report on Proposals
Upon receipt of public proposals, the technical committee members meet to review, consider, and act on the proposals. The public proposals – together with the committee action on each proposal and committee-generated proposals – are published in the NFPA's Report on Proposals (ROP). The ROP is then subject to public review and comment.

Report on Comments
These public comments are considered and acted upon by the appropriate technical committees. All public comments – together with the committee action on each comment – are published as the Committee's supplementary report in the NFPA's Report on Comments (ROC).

The committee's report and supplementary report are then presented for adoption and open debate at either of NFPA's semi-annual meetings held throughout the United States and Canada.

Association Action
The Association meeting may, subject to review and issuance by the NFPA Standards Council, (a) adopt a report as published, (b) adopt a report as amended, contingent upon subsequent approval by the committee, (c) return a report to committee for further study, and (d) return a portion of a report to committee.

Standards Council Action
The Standards Council will make a judgement on whether or not to issue an NFPA document based upon the entire record before the Council, including the vote taken at the Association meeting on the technical committee's report.

Voting Procedures
Voting at an NFPA Annual or Fall Meeting is restricted to members of record for 180 days prior to the opening of the first general session of the meeting, except that individuals who join the Association at an Annual or Fall Meeting are entitled to vote at the next Fall or Annual Meeting.

"Members" are defined by Article 3.2 of the Bylaws as individuals, firms, corporations, trade or professional associations, institutes, fire departments, fire brigades, and other public or private agencies desiring to advance the purposes of the Association. Each member shall have one vote in the affairs of the Association. Under Article 4.5 of the Bylaws, the vote of such a member shall be cast by that member individually or by an employee designated in writing by the member of record who has registered for the meeting. Such a designated person shall not be eligible to represent more than one voting privilege on each issue, nor cast more than one vote on each issue.

Any member who wishes to designate an employee to cast that member's vote at an Association meeting in place of that member must provide that employee with written authorization to represent the member at the meeting. The authorization must be on company letterhead signed by the member of record, with the membership number indicated, and the authorization must be recorded with the President of NFPA or his designee before the start of the opening general session of the Meeting. That employee, irrespective of his or her own personal membership status, shall be privileged to cast only one vote on each issue before the Association.

Sequence of Events Leading to Publication of an NFPA Committee Document

Call for proposals to amend existing document or for recommendations on new document.

▼

Committee meets to act on proposals, to develop its own proposals, and to prepare its report.

▼

Committee votes on proposals by letter ballot. If two-thirds approve, report goes forward. Lacking two-thirds approval, report returns to committee.

▼

Report is published for public review and comment. (Report on Proposals - ROP)

▼

Committee meets to act on each public comment received.

▼

Committee votes on comments by letter ballot. If two-thirds approve, supplementary report goes forward. Lacking two-thirds approval, supplementary report returns to committee.

▼

Supplementary report is published for public review. (Report on Comments - ROC).

▼

NFPA membership meets (Annual or Fall Meeting) and acts on committee report (ROP and ROC).

▼

Committee votes on any amendments to report approved at NFPA Annual or Fall Meeting.

▼

Complaints to Standards Council on Association action must be filed within 20 days of the NFPA Annual or Fall Meeting.

▼

Standards Council decides, based on all evidence, whether or not to issue standard or to take other action, including hearing any complaints.

▼

Appeals to Board of Directors on Standards Council action must be filed within 20 days of Council action.

FORM FOR PROPOSALS ON NFPA TECHNICAL COMMITTEE DOCUMENTS

Mail to: Secretary, Standards Council
National Fire Protection Association, 1 Batterymarch Park, Quincy, Massachusetts 02269-9101
Fax No. 617-770-3500

Note: All proposals must be received by 5:00 p.m. EST/EDST on the published proposal-closing date.

If you need further information on the standards-making process, please contact the Standards Administration Department at 617-984-7249.

Date 9/18/93 **Name** John B. Smith **Tel. No.** 617-555-1212

Company ______

Street Address 9 Seattle St., Seattle, WA 02255

Please Indicate Organization Represented (if any) Fire Marshals Assn. of North America

1. a) NFPA Document Title National Fire Alarm Code **NFPA No. & Year** NFPA 72, 1993 ed.

b) Section/Paragraph 1-5.8.1 (Exception No.1)

FOR OFFICE USE ONLY
Log # ______
Date Rec'd ______

2. Proposal recommends: (Check one)
- ☐ **new text**
- ☐ **revised text**
- ☒ **deleted text**

3. Proposal (include proposed new or revised wording, or identification of wording to be deleted):

Delete exception.

SAMPLE

4. Statement of Problem and Substantiation for Proposal: (Note: State the problem that will be resolved by your recommendation; give the specific reason for your proposal including copies of tests, research papers, fire experience, etc. If more than 200 words, it may be abstracted for publication.)

A properly installed and maintained system should be free of ground faults. The occurrence of one or more ground faults should be required to cause a "trouble" signal because it indicates a condition that could contribute to future malfunction of the system. Ground fault protection has been widely available on these systems for years and its cost is negligible. Requiring it on all systems will promote better installations, maintenance and reliability.

5. ☒ **This Proposal is original material.** (Note: Original material is considered to be the submitter's own idea based on or as a result of his/her own experience, thought, or research and, to the best of his/her knowledge, is not copied from another source.)

☐ **This Proposal is not original material; its source (if known) is as follows:** ______

Note 1: Type or print legibly in black ink.
Note 2: If supplementary material (photographs. diagrams, reports, etc.) is included, you may be required to submit sufficient copies for all members and alternates of the technical committee.

I hereby grant NFPA the non-exclusive, royalty-free rights, including non-exclusive, royalty-free rights in copyright, in this proposal and I understand that I acquire no rights in any publication of NFPA in which this proposal in this or another similar or analogous form is used.

John B. Smith
Signature (Required)

PLEASE USE SEPARATE FORM FOR EACH PROPOSAL