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NFPA 265
Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Wall Coverings
1994 Edition

NFPA

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

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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.

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.

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NFPA 265

Standard Methods of

Fire Tests for Evaluating Room Fire Growth Contribution of Textile Wall Coverings

1994 Edition

This edition of NFPA 265, *Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Wall Coverings*, was prepared by the Technical Committee on Fire Tests and acted on by the National Fire Protection Association, Inc. at its Fall Meeting held November 15-18, 1993, in Phoenix, AZ. It was issued by the Standards Council on January 14, 1994, with an effective date of February 11, 1994.

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

Origin and Development of NFPA 265

The danger of carpet-like textile coverings used on walls and ceilings is well known and these coverings have been recognized as a major contributing factor in many fires. Research conducted by the Fire Research Laboratory of the University of California at Berkeley and the American Textile Manufacturers Institute produced a report "Room Fire Experience of Textile Wall Coverings," which indicated that consideration of only the flame spread rating as measured by NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials*, might not reliably predict the fire behavior of textile wall and ceiling coverings. Concerns were raised regarding the findings that low flame-spread textile wall coverings, when placed in a room/corner test procedure, produced a rapidly growing, large fire.

This proposed standard will fill a void and complement the series of interior finish fire tests that are currently being referenced in other codes, i.e., NFPA *101®*, *Life Safety Code®*. This standard creates a testing method that would address the recognized hazards of using textile materials for wall coverings by supplying a means to evaluate the performance characteristics under specified fire exposure conditions and providing a valid repeatable and reproducible fire test method.

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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 when such standards are not available. The Committee also 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 as liaison between NFPA and the committees of other organizations developing fire test standards. The Committee is not responsible for fire tests that are used to evaluate extinguishing agents, devices, or systems.

Contents

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Fire Tests for Evaluating Room Fire Growth Contribution of Textile Wall Coverings

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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 10 and Appendix C.

Chapter 1 General

1-1 Scope.

1-1.1 This standard describes a method for determining the contribution of textile wall coverings to room fire growth during specified fire exposure conditions. This method shall be used to evaluate the flammability characteristics of textile wall coverings where such materials constitute the exposed interior surfaces of buildings.

1-1.2 This method is not intended to evaluate the fire endurance of assemblies, nor is it able to evaluate the effect of fires originating within a wall assembly. The method is not intended for the evaluation of floor or ceiling finishes. This test method shall not apply to fabric-covered, lower-than-ceiling-height, freestanding, prefabricated panel furniture systems or demountable, relocatable, full-height partitions used in open building interiors. Freestanding panel furniture systems include all freestanding panels that provide visual and/or acoustical separation and are intended to be used to divide space and that might support components to form complete work stations. Demountable, relocatable, full-height partitions include demountable, relocatable, full-height partitions that fill the space between the finished floor and the finished ceiling.

1-2 Significance.

1-2.1 This method of test measures certain fire performance characteristics of textile wall covering materials in an enclosure under specified fire exposure conditions. It determines the extent to which the textile wall covering materials might contribute to fire growth in a room and the potential for fire spread beyond the room, under the particular conditions simulated.

The method of test provides:

(a) Extent of fire growth in the test room.

(b) Rate of heat release in the test room.

(c) Time to flashover in the test room, if it occurs.

(d) Time to flame extension beyond the doorway of the test room, if it occurs.

(e) Total heat flux incident to the floor of the test room.

(f) Upper level gas temperature in the test room.

(g) Rate of production of carbon monoxide.

This method does not provide data that can be generalized to apply to rooms or spaces of different shapes, sizes, and ventilation. However, the method does provide a general ranking of wall covering materials for use in making judgments, provided it is understood that the conditions observed in the test might or might not be repeated in actual exposures of the tested wall coverings to fire.

1-2.2 The method of test does not provide:

(a) The full information concerning toxicity of combustion gases.

(b) Fire resistance of wall/ceiling systems.

1-3 Summary of Method.

1-3.1 The sample shall be tested by one of the two protocols described. The Method A protocol shall use a corner test exposure with the specimens mounted on two walls of the test compartment. The Method B protocol shall use the same test in a compartment having three fully lined walls.

These methods shall use a gas burner to produce a diffusion flame to expose the walls in the corner of a room 8 ft × 12 ft × 8 ft (2.4 m × 3.7 m × 2.4 m). The burner shall produce a prescribed rate of heat output of 40 kW (gross) for 5 min followed by 150 kW (gross) for 10 min, for total exposure period of 15 min. The contribution of the textile wall covering to fire growth shall be measured by constant monitoring of the incident heat flux on the center of the floor, the temperature of the gases in the upper part of the room, the rate of heat release, and the time to flashover. The test shall be conducted with natural ventilation to the room provided through a single doorway of 30 in. × 80 in. (0.8 m × 2.0 m). The combustion products shall be collected in a hood feeding into a plenum connected to an exhaust duct in which measurements of the gas velocity, temperature, and concentrations of selected gases are made.

1-4 Definitions.

Average Upper Gas Layer Temperature. This temperature shall be based on the average of the four ceiling quadrant thermocouples and the center of the room ceiling thermocouple.

Flashover. Flashover shall be determined to have occurred when any two of the following conditions have been attained:

(a) Heat flux at floor reaches 25 kW/m^2

(b) Average upper air temperature exceeds 1200°F (650°C)

(c) Flames exit doorway

(d) Spontaneous ignition of paper target on floor occurs.

Chapter 2 Test Equipment

2-1 Ignition Source.

2-1.1 The ignition source for the test shall be a gas burner with a nominal 12 in. × 12 in. (0.3 m × 0.3 m) porous top surface of refractory material (*see Figure 2-1.1*). A burner shall be constructed with a 1 in. (25.4 mm) thick porous ceramic fiberboard over a 6 in. (152 mm) plenum, or a minimum 4 in. (102 mm) layer of Ottawa sand shall be permitted to be used to provide the horizontal surface through which the gas is supplied.

2-1.2 The top surface of the burner through which the gas is applied shall be 12 in. (0.3 m) above the floor, and the burner enclosure shall be located such that the edge of the diffusion surface is located 2 in. (51 mm) from both walls, in the left corner of the room, opposite the door.

2-1.3 The gas supply to the burner shall be of C.P. grade propane (99 percent purity). The burner shall be capable of producing a gross heat output of 40 kW ± 1 kW (net heat output of 37 kW) for 5 min followed by a gross heat output of 150 kW ± 5 kW (net heat output of 138 kW) for 10 min.

Flow rates shall be calculated using propane's net heat of combustion, which is 2280 Btu/ft^3 (85 MJ/m^3) at 68°F (20°C) and 14.70 psia (100 kPa) The flow rate shall be metered throughout the test. The burner design shall allow switching from 40 kW to 150 kW within 10 sec. Burner controls shall be permitted to be provided for automatic shutoff of the gas supply if flameout occurs. Two typical arrangements for a gas supply are illustrated in Figures B-1(a) and B-1(b).

2-1.4 The burner shall be ignited by a pilot burner or a remotely controlled spark ignitor.

2-2 Compartment Geometry and Construction.

2-2.1* The interior dimensions of the floor of the fire room, when the specimens are in place, shall measure 8 ft ± 3.9 in. × 12 ft ± 3.9 in. (2.44 m ± 0.1 m × 3.66 m ± 0.1 m). The finished ceiling shall be 8 ft ± 3.9 in. (2.44 m ± 0.1 m) above the floor. There shall be four walls at right angles defining the compartment. (*See Figure 2-2.1.*)

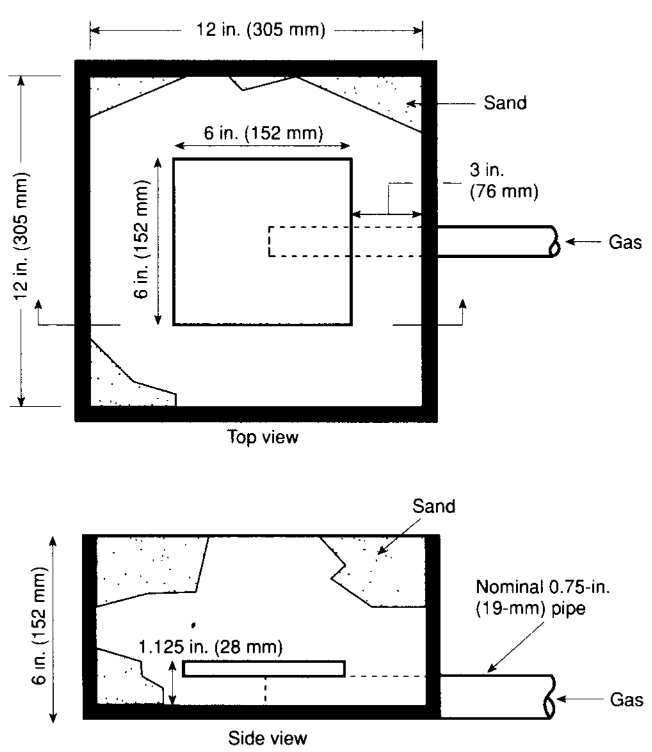

Figure 2-1.1 Gas burner.

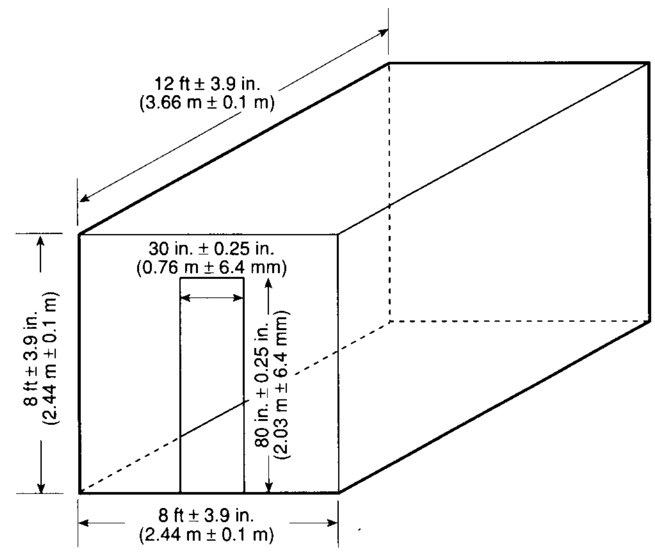

Figure 2-2.1 Interior room dimensions and interior doorway dimensions.

2-2.2 There shall be a 30 in. ± 0.25 in. × 80 in. ± 0.25 in. (0.76 m ± 6.4 mm × 2.03 m ± 6.4 mm) doorway in the center of one of the 8 ft × 8 ft (2.44 m × 2.44 m) walls, and no other wall, floor, or ceiling openings that allow ventilation.

2-2.3 The inside surface of the wall containing the door shall be of calcium silicate board of 46 lb/ft^3 (736 kg/m^3) density and 0.5 in. (12 mm) in nominal thickness or 0.5 in. (12 mm) gypsum wallboard. The door frame shall be constructed to remain unchanged during the test period to a tolerance of ± 1 percent in height and width.

2-2.4 The test compartment shall be permitted to be a framed or a concrete block structure. If self-supporting panels are tested, a separate exterior frame or block compartment might not be required.

2-2.5 The floor, ceiling, and walls of the test compartment shall be covered by calcium silicate board or by gypsum wallboard.

Chapter 3 Specimen Mounting

3-1 Specimen Mounting.

3-1.1 Test specimens shall be mounted on a framing or support system comparable to that intended for their actual use using substrates, backing materials, insulation, or air gaps as appropriate to the intended application and representing a typical value of thermal resistance for the wall system. Where a manufacturer specifies use of an adhesive, specimens shall be mounted using an adhesive and application rate specified by the manufacturer and comparable to actual field installations.

NOTE: It has been shown that the specific adhesive used to secure a specimen might significantly affect the performance of a textile wall covering, and, therefore, the adhesive utilized should be the same as that intended for actual use.

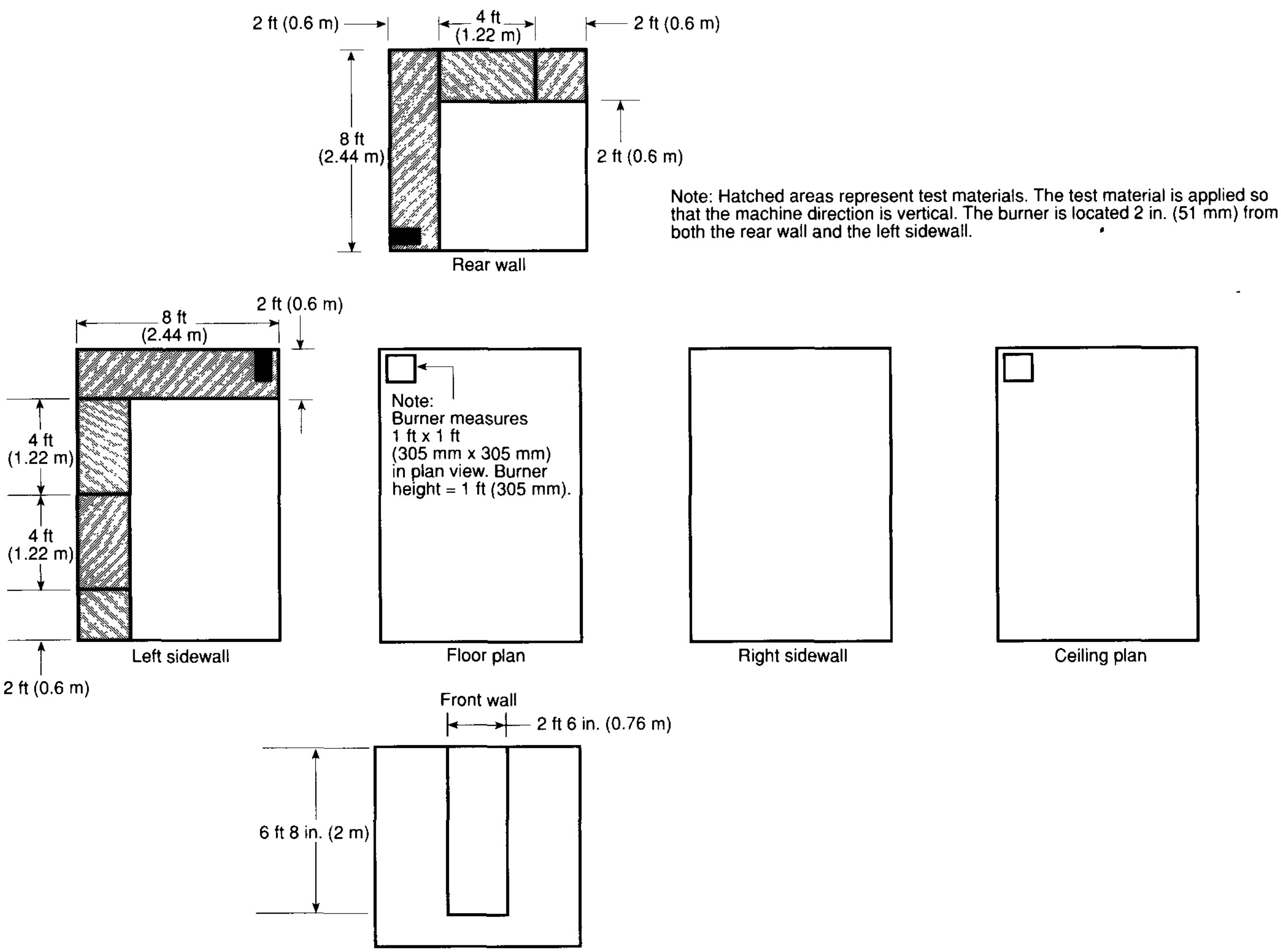

Figure 3-1.3 Specimen mounting for Method A test protocol.

3-1.2 Where a textile wall covering exhibits a distinct direction, the sample shall be mounted such that the machine direction is vertical, unless the manufacturer indicates that a different method of mounting will be used in actual installations.

3-1.3 For the Method A test protocol, specimens shall be mounted on the left sidewall and the rear walls (as viewed from the room door) and as illustrated in Figure 3-1.3. Vertically mounted portions of test specimens shall extend 2 ft (0.6 m) from the ceiling and shall be installed for the full 8 ft (2.44 m) width of the rear wall and the full 12 ft (3.66 m) length of the left sidewall.

3-1.4 For the Method B test protocol, specimens shall be mounted to cover fully both 8 ft × 12 ft (2.44 m × 3.66 m) walls, and the 8 ft × 8 ft (2.44 m × 2.44 m) wall not having the door.

3-1.5 Prior to testing, mounted specimens shall be conditioned until the sample reaches a rate of weight change of less than 0.1 percent per day at a temperature of 70°F ± 5°F (49°C ± 2.8°C) and a relative humidity of 50 percent ± 5 percent.

Chapter 4 Environmental Conditions

4-1 Fire Room Environment.

4-1.1 The test building in which the fire room is located shall have vents for the discharge of combustion products and have provisions for fresh air intake, so that no oxygen-deficient air shall be introduced into the fire room during the test. Prior to the start of the test, the ambient air at the mid-height entrance to the compartment shall have a velocity of less than 100 ft/min (0.5 m/sec) in any direction. The building shall be of adequate size so that there shall be no smoke accumulation in the building below the level of the top of the fire compartment.

4-1.2 The ambient temperature in the test building at locations around the fire compartment shall be above 40°F (4°C), and the relative humidity shall be less than 75 percent for the duration of the test.

4-1.3 If test samples are installed within the test room for two or more hours prior to test, the following ambient conditions shall be maintained:

(a) The ambient temperature in the fire room measured by one of the thermocouples in 5-1.3.2 shall be 65°F to 75°F (18°C to 24°C).

(b) The ambient relative humidity in the fire room shall be 50 percent ± 5 percent.

Chapter 5 Instrumentation

5-1 Instrumentation.

5-1.1 The following instrumentation shall be provided for this test.

5-1.2 A total heat flux gauge shall be mounted a maximum of 2 in. (51 mm) above the floor surface, facing upward in the geometric center of the test room. (*See Figure 5-1.2.*)

5-1.2.1 The gauge shall be of the Gardon or Schmidt-Boetler type, with a circular flat black surface of 1/2 in. (13 mm) diameter and a 180° view angle. In operation, it shall be maintained at a constant temperature [within ± 5 percent °F (2.8°C)] above the dewpoint by water supplies at a temperature of 120°F to 150°F (50°C to 65°C). This will normally require a flow rate of at least 0.1 gal/min (.38 L/min). The full-scale output range shall be 50 kW/m^2 for the gauge.

5-1.3 Bare Type K thermocouples, 20 mil (0.5 mm) in diameter, shall be used at each required location. The thermocouple wire within 0.5 in. (13 mm) of the bead shall be run along expected isotherms to minimize conduction errors. The insulation between the chromel and alumel wires shall be stable to at least 2000°F (1100°C), or the wires shall be separated.

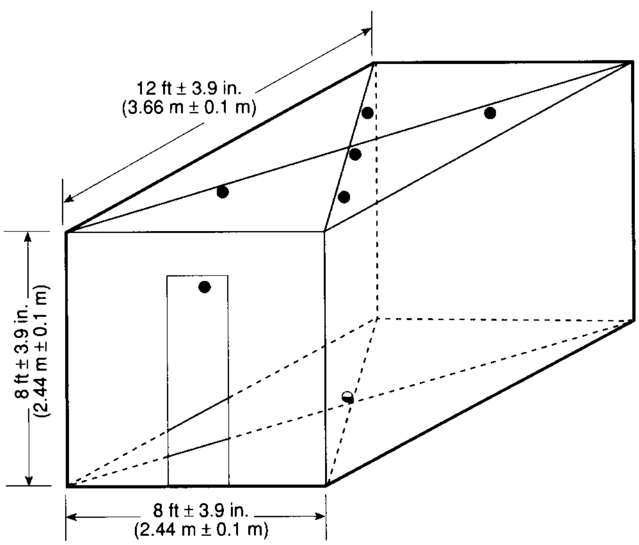

Figure 5-1.2 Thermocouple and calorimeter placement.

5-1.3.1 A thermocouple shall be located in the interior plane of the door opening on the door centerline, 4 in. (100 mm) from the top. (*See Figure 5-1.2.*)

5-1.3.2 Thermocouples shall be located 4 in. (100 mm) below the ceiling, at the center of the ceiling, at the center of each of the four ceiling quadrants, and directly over the center of the ignition burner. The thermocouples shall be mounted on supports or penetrate through the ceiling with their junctions 4 in. (100 mm) away from a solid surface (*see Figure 5-1.2*). Any ceiling penetration shall be just large enough to permit passage of the thermocouples. Spackling compound or ceramic fiber insulation shall be used to backfill the holes around the thermocouple wire.

5-1.3.3 One pair of thermocouples shall be placed 11 ft (3.4 m) downstream of the entrance to the horizontal duct. The pair of thermocouples shall straddle the center of the duct and be separated 2 in. (50 mm) from each other. (*See Figure 5-1.3.3.*)

5-1.4 A hood shall be installed immediately adjacent to the door of the fire room. The bottom of the hood shall be level with the top surface of the room. The face dimensions of the hood shall be at least 8 ft × 8 ft (2.44 m × 2.44 m), and the depth shall be 3.5 ft (1.1 m). The hood shall feed into a plenum having a 3 ft × 3 ft (0.92 m × 0.92 m) cross section. The plenum shall have a minimum height of 3 ft (0.92 m). This height shall be permitted to be increased to a maximum of 6 ft (1.8 m) to satisfy building constraints. The exhaust duct connected to the plenum shall be at least 16 in. (0.4 m) in diameter, horizontal, and shall be permitted to have a circular aperture of at least 12 in. (0.3 m) at its entrance or mixing vanes in the duct. (*See Figures 5-1.3.3 and 5-1.4.*)

5-1.4.1 The hood shall have sufficient draft to collect all of the combustion products leaving the room. [This draft shall be capable of moving up to 7000 standard ft^3/min (3.4 m^3/sec) equivalent to 16,100 cfm at 750°F (399°C) during the test]. Provision shall be made so that the draft can operate at 1000 to 7000 standard ft^3/min (0.47 to 3.4 m^3/sec). Mixing vanes shall be required in the duct if concentration gradients are found to exist.

5-1.4.2 An alternative exhaust system design shall be permitted to be used if it meets the requirements outlined in Chapter 6.

5-1.5 A bidirectional probe or an equivalent measuring system shall be used to measure gas velocity in the duct. A typical probe is shown in Figure 5-1.5, and it consists of a short, stainless steel cylinder 1.75 in. (44 mm) long and of 0.875 in. (22 mm) inside diameter with a solid diaphragm in the center. The pressure taps on either side of the diaphragm support the probe. The axis of the probe shall run along the centerline of the duct 11 ft (3.35 m) downstream from the entrance. The taps shall be connected to a pressure transfuser that shall be able to resolve pressure differences of 0.001 in. H_2O (0.25 Pa).

NOTE: Capacitance transducers have been found to be most stable for this application.

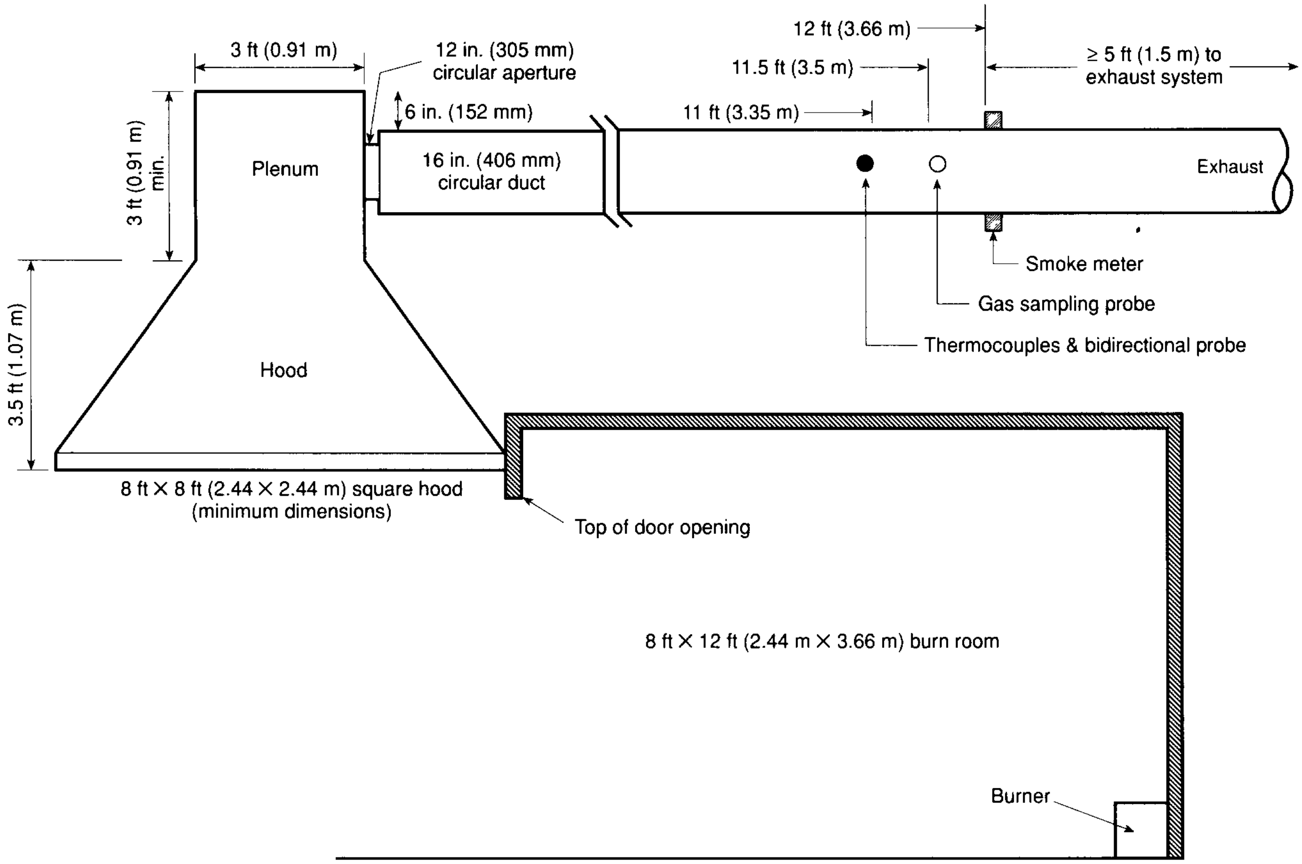

Figure 5-1.3.3 Canopy hood and exhaust duct.

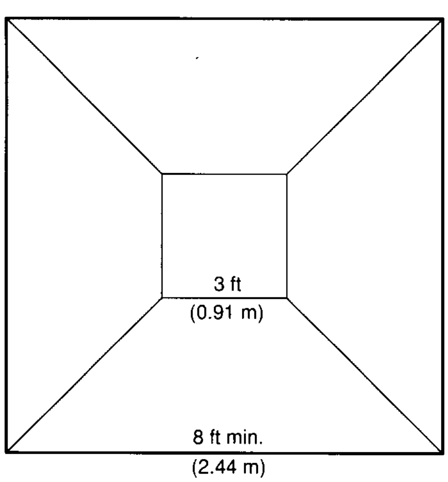

Figure 5-1.4 Plan view of canopy head.

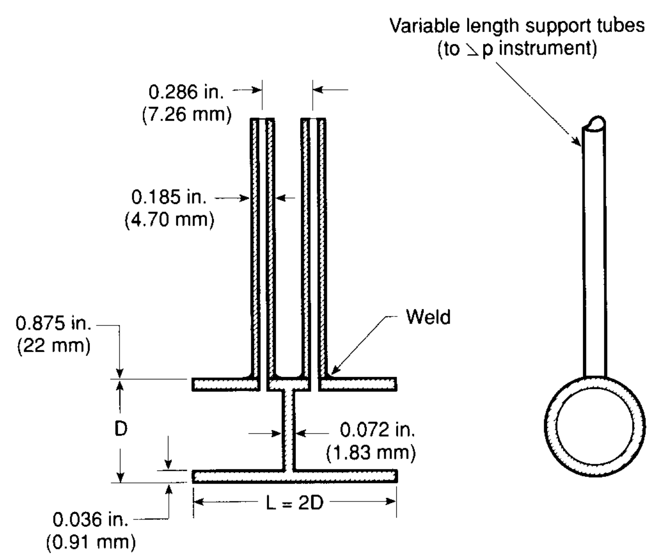

Figure 5-1.5 Bidirectional probe.

5-1.6 A stainless steel gas sampling tube shall be located 13 ft (4.0 m) downstream from the entrance to the duct at the geometric center of the duct, ± 1/2 in. (± 13 mm), 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 the line ahead of the analyzer to remove particulates and water. The oxygen analyzer shall be of the paramagnetic or polarographic type and shall be capable of measuring oxygen concentration in a range of 21 percent to 15 percent, with a relative accuracy of 50 ppm in this concentration range. The signal from the oxygen analyzer shall be within 5 percent of its final value and occur within 30 sec of introducing a step change in composition of the gas stream flowing past the inlet to the sampling tube. See NFPA 264, *Standard Method of Test for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter.*

5-1.7 The gas sampling tube described in 5-1.6 shall be used to provide a continuous sample for the measurement of the carbon dioxide concentration using an analyzer with a range of 0 to 20 percent, with a maximum relative error of 2 percent of full scale. The total system-response time between the sampling inlet and the meter shall be no longer than 30 sec.

5-1.8 The gas sampling tube defined in 5-1.6 shall be used to provide a continuous sample for the measurement of the carbon monoxide concentration using an analyzer with a range of 0 to 10 percent, with a maximum relative error of 2 percent of full scale. The signal from the analyzer shall be within 5 percent of its final value and occur within 30 sec after introducing a step change in composition of the gas stream flowing past the inlet to the sampling tube.

5-1.9 Two paper target flashover indicators shall be placed on the floor of the test room (*see Figure 5-1.9*). The targets shall consist of a single piece of newsprint crumpled into an approximate 6 in. (152 mm) diameter ball.

5-1.10 Photographic or video equipment shall be used to record the firespread in the room and the fire projection from the door of the room. The location of the camera shall avoid interference with airflow. The interior wall surfaces of the test room adjacent to the corner in which the burner is located shall be clearly marked. A clock shall appear in all photographic records, showing the time to at least the nearest 1 sec from the start of the test. This clock shall be accurately synchronized with all other measurements, or other provision shall be made to correlate the photo record with time. Color slides or photographs shall be taken at intervals for the duration of the test, and a continuous video recording shall be made.

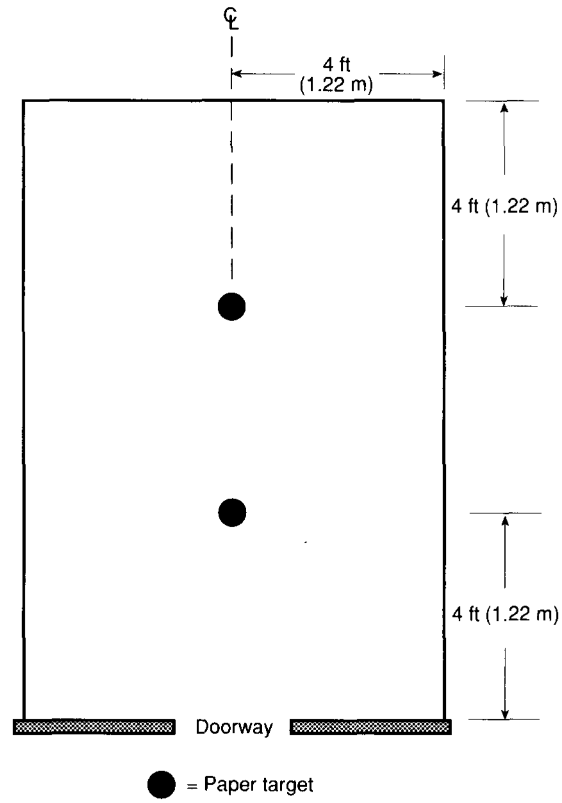

Figure 5-1.9 Paper target arrangement — plan view.

Chapter 6 Calibration

6-1 Calibration and Documentation of Ignition Source and Test Equipment.

6-1.1 A calibration test shall have been performed prior to and within 30 days of any fire test. The calibration test, which shall last for 15 min, shall use the standard ignition source with inert wall and ceiling materials [calcium silicate board of 56 lb/ft^3 (736 kg/m^3) density, 0.50 in. (13 mm) thickness, or gypsum wallboard].

6-1.2 The data resulting from a calibration test shall provide:

(a) The output as a function of time, after the burner is activated, of all instruments normally used for the standard fire test.

(b) The maximum extension of the burner flame, as recorded by still photographs taken at 30-sec intervals or continuous video recording.

(c) The temperature and velocity profiles across the duct cross section at the location of the bidirectional probe. These profiles shall be used to determine the factor, k, in the following equation:

$$V_S = 0.926\ kA \left(\frac{2\Delta p T_0}{\rho_0 T}\right)^{1/2} = 20.1\ kA \sqrt{(\Delta p/T)}$$

where:

0.926 = Suitable calibration factor for air velocities in excess of 10 ft/s (3.0 m/s) in a 16 in. (0.4 m) duct

k = Ratio of the average duct gas mass flow per unit area, as determined by measuring the velocity and temperature profiles across the stack, and the velocity and temperature at the centerline where the bidirectional probe is located during the test,

A = Cross-sectional area of the duct at the location of the probe, m^2

Δp = Differential pressure measured with the probe, Pa

ρ_0 = Density of air, kg/m^3, at the reference temperature T_0, K

T = Duct gas temperature, K.

(d) The total rate of heat production as determined by the oxygen consumption calculation, independent measurement of the volumetric flow rate, and weight loss of propane supply shall agree to within 5 percent. The net heat of combustion is 2280 Btu/ft^3 (85 MJ/m^3) for propane at 68°F (20°C) and 14.70 psia (100 kPa). This value shall be used for this calculation.

Chapter 7 Test Procedure

7-1 Procedure.

7-1.1 Method A protocol and Method B protocol shall follow the same test procedure, except for specimen mounting. Either test method shall be used.

7-1.2 The test procedure shall be as follows:

(a) Establish an initial volumetric flow rate of at least 1000 ft^3/min (0.47 m^3/sec) through the duct and increase the volume flow rate to 7000 ft^3/min (3.4 m^3/sec) as required to keep the oxygen content above 14 percent and to capture all effluents from the burn room.

(b) Turn on all sampling and recording devices, and establish steady-state baseline readings for at least 3 min.

(c) Ignite the gas burner and simultaneously start the clock and increase flow rate to provide a rate of heat release of 40 kW ± 1 kW by the burner. Continue the exposure at the 40 kW ± 1 kW level for 5 min. Within 10 sec following the 5-min exposure, increase the gas flow to provide a rate of heat release by the burner of 150 kW ± 5 kW exposure for 10 min.

(d) Take 35-mm color photographs at 30-sec intervals, or provide a continuous video recording to document the growth of the fire.

(e) Provide a voice or written record of the fire, which will provide the times of all significant events, such as times of ignition, escape of flames through the doorway, flashover, etc.

(f) The ignition burner shall be shut off 15 min after start of the test and the test terminated at that time, unless safety considerations dictate an earlier termination.

(g) Document damage after the test, using words, pictures, and drawings.

Chapter 8 Calculations

8-1 Calculations.

8-1.1 The calculation methods used to determine the total rate of heat release shall be as described in 10-1.1, *Fire Technology*, "Measuring Rate of Heat Release by Oxygen Consumption."

Chapter 9 Report

9-1 Report. The report shall include the data and information specified in 9-1.1 through 9-1.7.

9-1.1 Materials. Materials shall include the following:

(a) Name, thickness, density, and size of the test material, along with other identifying characteristics or labels

(b) Mounting and conditioning of materials

(c) Layout of specimens and attachments in test room (include appropriate drawings)

(d) Relative humidity and temperature of the room and the test building prior to and during the test.

9-1.2 Burner Gas Flow. The burner gas flow is the fuel gas flow to the ignition burner and its calculated rate of heat output.

9-1.3 Time History of the Total Heat Flux to Floor. The time history of the total heat flux to floor is the total incident heat flux at the center of the floor for the heat flux gauge as a function of time starting 3 min prior to the test.

9-1.4 Time History of the Gas Temperature. The time history of the gas temperature is the temperature of gases in the room, in the doorway, and in the exhaust duct for each thermocouple as a function of time starting 3 min prior to the test.

9-1.5 Time History of the Total Rate of Heat Production of the Fire. The total rate of heat production is calculated from the measured oxygen and carbon monoxide concentrations or measured oxygen, carbon monoxide, and carbon dioxide concentrations and the temperature and volumetric flow rate of the gas in the duct.

9-1.6 Time History of the Fire Growth. The time history of the fire growth is a transcription of the visual, photographic, audio, and written records of the fire test. The records shall indicate the time of ignition of the wall finish, the approximate location of the flame front most distant from the ignition source at intervals not exceeding 15 sec during the fire test, the time of flashover, and the time at which flames extend outside the doorway. In addition, still photographs taken at intervals not exceeding 30 sec or continuous video recording shall be supplied. Drawings and photographs or video recording showing the extent of the damage of the materials after the test also shall be supplied.

9-1.7 Discussion of Performance. A complete discussion of sample performances shall be conducted and shall include:

(a) Flame spread to ceiling during 40 kW exposure.

(b) Burning to outer extremities of 2 ft (0.6 m) wide samples mounted vertically in the corner of the room with testing under Method A protocol.

(c) Presence of burning droplets on the floor that persist in burning 30 sec or more.

(d) Other pertinent details with respect to fire growth.

Chapter 10 Referenced Publications

10-1 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.

10-1.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

Janssens, M. L., "Measuring Rate of Heat Release by Oxygen Consumption," *Fire Technology*, pp. 234-249, August 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-2-2.1 A study by R. D. Peakcock and J. N. Breese (NBSIR 82-2516, *Computer Fire Modeling for the Prediction of Flashover*, Natl. Bur. Stand., 1982) examined the effect of geometric room changes on the minimum energy required to cause flashover. It showed that increased room height beyond 3.9 ft (2.4 m) changed the minimum needed flashover energy (expressed as percent):

$(\text{Percent} - 100 + 5.3\,\Delta H)$

Where Δ H is the increase in room height (expressed as meters.) Thus, for instance, if the height was changed by 0.2 m, the energy scaling would be changed by 1.06 percent. This is completely insignificant, since few fire measurements can be made to a repeatability or reproducibility of better than 10 percent. The effects of changing floor areas were similarly modest. Room dimensions having a tolerance of ±0.1 m should be entirely adequate for reproducibility.

Appendix B

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

B-1 The following acceptance criteria have been used by several of the model code organizations such as the International Conference of Building Officials (ICBO), Building Officials and Code Administration, Inc. (BOCA), and Southern Building Code Congress International (SBCCI) and are provided as a guide for the user of this test method.

B-1-1 Textile wall coverings should be considered as demonstrating satisfactory performance if, during the Method A test protocol, the following conditions are met:

(a) Flame should not spread to the ceiling during the 40 kW exposure.

(b) During the 150 kW exposure, the following criteria should be met:

1. Flame should not spread to the outer extremity of the sample on the 8 ft × 12 ft (2:44 m × 3.66 m) wall.

2. The specimen should not burn to the outer extremity of the 2 ft (0.6 m) wide samples mounted vertically in the corner of the room.

3. Burning droplets should not be formed and dropped to the floor that are judged to be capable of igniting the textile wall covering or that persist in burning for 30 sec or more.

4. Flashover should not occur.

5. The maximum instantaneous net peak rate of heat release should not exceed 300 kW. The maximum instantaneous net peak rate of heat release is derived by subtracting the burner output from the measured maximum rate of heat release.

B-1-2 Textile wall coverings should be considered as demonstrating satisfactory performance if, during the Method B test protocol, the following conditions are met:

(a) Flame should not spread to the ceiling during the 40 kW exposure.

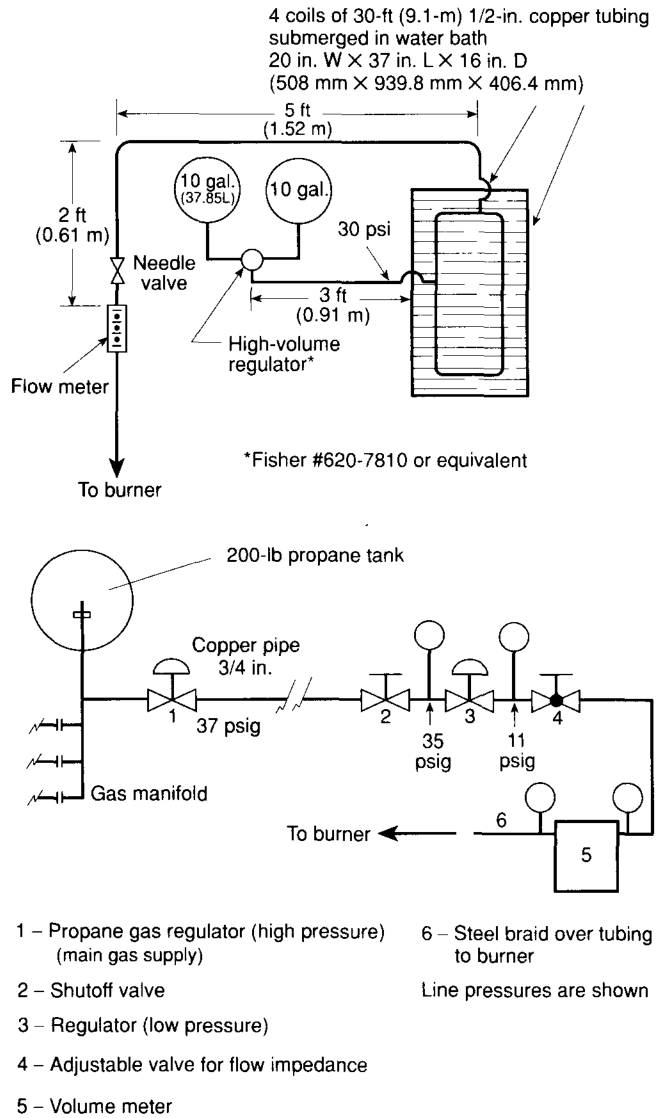

Figure B-1 Two typical gas flow regulation systems.

(b) During the 150 kW exposure, the following criteria should be met:

1. Flame should not spread to the outer extremities of the samples on the 8 ft × 12 ft (2.44 m × 3.66 m) walls.

2. Flashover should not occur.

Appendix C Referenced Publications

C-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.

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

NFPA 264, *Standard Method of Test for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter*, 1992 edition.

C-1.2 Other Publications.

C-1.2.1 NBSIR Publication. National Institute of Standards and Technology, U. S. Department of Commerce Fire Research Information Service Building and Fire Research Laboratory, Gaithersburg, MD 20899.

NBSIR 82-2516, *Computer Fire Modeling for the Prediction of Flashover*.

C-1.2.2 Other References.

Fisher, F. L., MacCracken, B., and Williamson, R. B., "*Room Fire Tests of Textile Wall Coverings*," ES-7853, Service to Industry Report No. 85-4, Fire Research Laboratory, University of California, Berkeley, CA, April 1986.

Gardon, R., "An Instrument for the Direct Measurement of Intense Thermal Radiation," *Review of Scientific Instruments*, Vol. 24, No. 5, pp. 366-370, May 1953.

McCaffrey B. J., and Heskestad, G., "A Robust Bidirectional Low-Velocity Probe for Flame and Fire Application," *Combustion and Flame*, Vol. 26, No. 1, 125-127, February 1976.

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 analogous form is used.

John B. Smith
Signature (Required)

PLEASE USE SEPARATE FORM FOR EACH PROPOSAL

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Date ____________ **Name** ______________________ **Tel. No.** ____________

Company ______________________________________

Street Address ______________________________________

Please Indicate Organization Represented (if any) ______________________

1. a) NFPA Document Title ______________________ **NFPA No. & Year** ____________

b) Section/Paragraph ______________________

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):

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.)

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.)

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Signature (Required)

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