NFPA® 705

Recommended Practice for a Field Flame Test for Textiles and Films

2013 Edition

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

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NFPA® 705

Recommended Practice for a

Field Flame Test for Textiles and Films

2013 Edition

This edition of NFPA 705, *Recommended Practice for a Field Flame Test for Textiles and Films,* was prepared by the Technical Committee on Fire Tests. It was issued by the Standards Council on November 27, 2012, with an effective date of December 17, 2012, and supersedes all previous editions.

This edition of NFPA 705 was approved as an American National Standard on December 17, 2012.

Origin and Development of NFPA 705

The 1993 edition of NFPA 705 was a complete revision of what was Chapter 10, Field Test: Match Flame Test, in the 1989 edition of NFPA 701, *Standard Methods of Fire Tests for Flame-Resistant Textiles and Films.* Due to the lack of data demonstrating a relationship between the field match test and NFPA 701 small- or large-scale testing, the Committee determined it would be appropriate to create this document so as not to perpetuate any application of a correlation. The field match test does not incorporate the more rigorous laboratory testing methods incorporated into the small- and large-scale testing such as conditioning of specimen, reproducibility, and repeatability. The revisions to NFPA 705 incorporated an increase in safety precautions during the testing procedure, type of ignition source, and removal of sample prior to testing.

The 1997 edition of NFPA 705 was a reconfirmation of the earlier edition.

For the 2003 edition, the chapter layout of NFPA 705 was reorganized to meet the *Manual of Style for NFPA Technical Committee Documents.*

The 2009 edition added references to ASTM E 84 and NFPA 265 for testing interior finish materials.

The 2013 edition includes updates to referenced standards, and terminology. A new section and annex note have been added to clarify that NFPA 705 should not be used for textile coverings.

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

Changes other than editorial are indicated by a vertical rule beside the paragraph, table, or figure in which the change occurred. These rules are included as an aid to the user in identifying changes from the previous edition. Where one or more complete paragraphs have been deleted, the deletion is indicated by a bullet (•) between the paragraphs that remain.

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

Chapter 1 Administration

1.1 Scope.

1.1.1 This recommended practice provides guidance to enforcement officials for the field application of an open flame to textiles and films that have been in use in the field or for which reliable laboratory data are not available.

1.1.2 There is no known correlation between this recommended practice and NFPA 701, *Standard Methods of Fire Tests for Flame Propagation of Textiles and Films*, or full-scale fire behavior.

1.2 Purpose.

1.2.1 The purpose of this recommended practice is to provide authorities having jurisdiction with a field means of determining the tendency of textiles and films to sustain burning subsequent to the application of a relatively small open flame.

1.2.2 The methods described herein and the results do not correlate with any known test method, and factors relating to reproducibility and correlation have not been determined; therefore, they should not be relied upon when more definitive test data are available.

1.3 Application.

1.3.1 These recommendations apply to materials used in the interior of buildings, for protective outdoor coverings such as tarpaulins and tents, and for plastic films (with or without reinforcing or backing) used for decorative or other purposes inside buildings or as temporary or permanent enclosures for buildings under construction.

1.3.1.1* The field test method can be useful to regulatory officials as an indicator of whether a material being used or installed burns very easily or can be flame resistant as indicated by the following:

(1) Cessation of burning when the igniting flame is removed
(2) Failure to burn at all
(3) Continuing to burn nonaggressively after the igniting flame is removed

1.3.1.2 The field test method has utility only when the authority having jurisdiction has no reliable data and, therefore, is forced to rely solely on the field test findings.

1.3.1.3 There are only two types of materials for which the field test method can be deemed to provide foolproof and totally adequate results: those made entirely of noncombustible inorganic material and those that ignite and burn readily on exposure to a small flame. For example, with only limited experience, an inspector will have no difficulty in identifying an all-mineral fiber fabric by employing a small open flame, and no other procedure is necessary. The only effect a small fire exposure has on a mineral fiber fabric is to burn off the surface coloring, if any, leaving the threads themselves virtually undamaged. This result is not obtained with any other type of decorative fabric and, therefore, is readily recognized. At the other extreme, if a material ignites and burns readily from the application of a small open flame from a source such as a kitchen match, showing no semblance of flame resistance, no other procedure is necessary, since the material obviously is not acceptable.

1.3.1.4 Between these two extremes, the field test method has a limited and varying degree of reliability. Within this large group, which comprises the great majority of materials the enforcement official is likely to encounter in the field, the most reliable results are obtained in the testing of cellulose-based materials (cotton, rayon, and paper) that are flame retardant–treated with the common inorganic salt formulations. These materials retain their shape reasonably during testing, and the results are not greatly affected by differences in sample size or severity of fire exposure. However, the least-reliable results are obtained with chemically treated fabrics of synthetic fibers or flexible plastic films and laminates. These materials are subject to a variety of physical changes when exposed to fire, such as shrinking, curling, melting, elongating, and similar distortions, making the examination of small samples quite difficult and the results ambiguous. Furthermore, some of these thermoplastic materials are apt to appear flame resistant with small flame exposures but ignite and burn fiercely with longer exposures to larger ignition sources.

1.3.2* This recommended practice should not be used to determine that a textile material or a film is flame retardant.

1.3.3* This recommended practice does not apply to textile wall coverings or to textile ceiling coverings.

1.3.4 Materials applied to surfaces of buildings or backing materials as interior finishes in buildings should be tested and classified in accordance with ASTM E 84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, or NFPA 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*. In the case of textile wall coverings, the use of NFPA 265, *Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile or Expanded Vinyl Wall Coverings on Full Height Panels and Walls*, is also appropriate.

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this recommended practice and should be considered part of the recommendations of this document.

2.2 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 265, *Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile or Expanded Vinyl Wall Coverings on Full Height Panels and Walls,* 2011 edition.

NFPA 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth,* 2011 edition.

NFPA 701, *Standard Methods of Fire Tests for Flame Propagation of Textiles and Films,* 2010 edition.

2.3 Other Publications.

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

ASTM E 84, *Standard Test Method for Surface Burning Characteristics of Building Materials,* 2010b.

2.3.2 Other Publications.

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

2.4 References for Extracts in Recommendations Sections. (Reserved)

Chapter 3 Definitions

3.1 General. The definitions contained in this chapter apply to the terms used in this recommended practice. Where terms are not defined in this chapter or within another chapter, they should be defined using their ordinarily accepted meanings within the context in which they are used. *Merriam-Webster's Collegiate Dictionary,* 11th edition, is the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.

3.2.1* Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

3.2.2 Recommended Practice. A document that is similar in content and structure to a code or standard but that contains only nonmandatory provisions using the word "should" to indicate recommendations in the body of the text.

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

3.2.4 Standard. A document, the main text of which contains only mandatory provisions using the word "shall" to indicate requirements and which is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions are not to be considered a part of the requirements of a standard and shall be located in an appendix, annex, footnote, informational note, or other means as permitted in the *Manual of Style for NFPA Technical Committee Documents.*

3.3 General Definitions.

3.3.1 Film. A flat section of a thermoplastic resin, a regenerated cellulose derivative, or other material that is extremely thin in comparison to its length and breadth and has a nominal maximum thickness of 0.25 mm (0.01 in.).

3.3.2 Kitchen Match. A piece of wood with a combustible mixture at its tip that bursts into flame through friction, with an approximate length of 61.9 mm (2$\frac{7}{16}$ in.) and an approximate weight of 29 g (1 oz) per hundred.

3.3.3 Textile. A material made of natural or man-made fibers and used for the manufacture of items such as curtains, clothing, and furniture fittings.

Chapter 4 Procedure

4.1* Materials.

4.1.1 Specimens should be samples removed from the existing material.

4.1.2 Specimens should be dry and should be a minimum of 12.7 mm × 101.6 mm (½ in. × 4 in.).

4.2 Open Flame. The fire exposure should be from a common wood kitchen match or source with equivalent flame properties.

4.2.1 The flame should be applied for 12 seconds.

4.3* Method.

4.3.1 The test should be performed in a draft-free and safe location free of other combustibles.

4.3.2 The sample should be suspended (preferably by means of a spring clip, tongs, or similar device) with the long axis vertical, the flame supplied to the center of the bottom edge, and the bottom edge 12.7 mm (½ in.) above the bottom of the flame.

4.3.3 After 12 seconds of exposure, the match is to be removed gently away from the sample.

4.4 Requirements. During the exposure, flaming should not spread over the complete length of the sample or, in the case of larger samples, in excess of 101.6 mm (4 in.) from the bottom of the sample.

4.4.1 There should be not more than 2 seconds of afterflame.

4.4.2 Materials that break or drip flaming particles should be rejected if the materials continue to burn after they reach the floor.

Chapter 5 Summary

5.1 Limitations. The deficiencies and limitations of the field test method can lead to misleading or erroneous results, and the error can be in both directions. It is quite possible to have a too-small sample show several seconds of afterflaming, causing the material to be rejected. It is equally possible for improper or inadequate field procedures to incorrectly indicate satisfactory flame resistance. This can result in dangerous errors.

5.2 Precautions. Field procedures are useful, but they must be used with good judgment and their limitations should be recognized. Field tests should not be relied on as the sole means for ensuring adequate flame resistance of decorative materials. They are, however, useful in augmenting a comprehensive regulatory program.

Annex A Explanatory Material

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

A.1.3.1.1 By far, the greatest benefit can be derived from the field test method when the inspector has had the opportunity to practice and experiment on a variety of decorative materials and particularly to make comparisons between the results of laboratory tests performed in accordance with NFPA 701, *Standard Methods of Fire Tests for Flame Propagation of Textiles and Films*, and the less-precise field test method. Experience is the best teacher, and it is strongly recommended that inspectors who may be involved in this activity familiarize themselves with a wide variety of treated and inherently flame-resistant fabrics and the typical behavior of those fabrics under a variety of test conditions. With this background, the inspector possesses a greater capability for properly interpreting field test results.

A.1.3.2 For many years, codes have used the statement that "materials shall be flame retardant." When that statement applies to textiles or films, it is intended to mean that the textile or film meets the flame propagation performance criteria contained in NFPA 701, *Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.*

A.1.3.3 The fire performance of textile wall coverings and that of ceiling wall coverings is affected to a significant extent by the types of backing (or substrate) and adhesive used. The most appropriate fire tests for textile and ceiling wall coverings are room-corner tests, including NFPA 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.*

A.3.2.1 Authority Having Jurisdiction (AHJ). The phrase "authority having jurisdiction," or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A.4.1 A difficult and controversial question concerns the minimum number of specimens that should be tested. The answer can be dictated by a number of factors. A good general rule is the more specimens, the better; but, in all cases, the inspector should exercise good judgment. The variety of circumstances that can be encountered can be illustrated by some specific examples:

(1) A dance in a school gymnasium, decorated by students with a profusion of paper banners, crepe paper streamers, figures made of pieces of tissue paper stuffed in chicken-wire molds, hay and straw, painted fabrics, dry palm fronds, and similar products, all alleged to be flame resistant: In this situation, the inspector has neither reason nor excuse to be inhibited in taking samples for tests. The materials are inexpensive and are unlikely to be reused. Taking samples for tests will cause little if any change to the decorative effect.
(2) A large assembly tent made of supposedly treated canvas but with no identifying marks and no confirming evidence of such treatment: The life hazard is acute, tent canvas can readily be patched, and, therefore, the situation warrants nothing less than sufficient samples from all sections of canvas for the inspector to be satisfied that the quality and uniformity of the treatment are acceptable.
(3) A nightclub with very expensive draperies known to be adequately flame retardant–treated when installed two years previously: The only way to be certain that the quality of flame resistance remains acceptable is to take a sample, but in the interest of maintaining good public relations, the inspector should be diplomatic and persuasive. Usually, a place can be found where a small but adequate sample can be extracted without causing any visible damage. Often this is the most the inspector can expect to get.

A.4.3 There can be complications of a technical nature. Decorative fabrics sometimes are installed overhead, in or near a horizontal position. Some plastic films or fabrics woven of thermoplastic synthetic fibers will successfully resist continued burning in the normal vertical position of test, but will exhibit continued burning if exposed in a horizontal position. Fabrics or films installed horizontally may be a serious threat to safety in a fire situation, and, therefore, the inspector is justified in testing the material in a horizontal position.

A somewhat similar problem can exist with some of the new and increasingly popular decorative fabrics with one or more types of fibers in the threads along the length (warp) and different fibers in the threads along the width (fill). This can result in a different burning behavior in the two directions of the fabric. In some fabrics where a flame-retardant treatment has been applied, tests for flame resistance in one direction may be acceptable, but the fabric could show continued burning in the other direction. Where visual examination of the fabric indicates this condition might exist, the inspector should test samples cut with the long dimension paralleling both the length and width of the fabric.

Annex B Informational References

B.1 Referenced Publications. The documents or portions thereof listed in this annex are referenced within the informational sections of this recommended practice and are not part of the recommendations of this document unless also listed in Chapter 2 for other reasons.

B.1.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*, 2011 edition.

NFPA 701, *Standard Methods of Fire Tests for Flame Propagation of Textiles and Films*, 2010 edition.

B.1.2 Other Publications. (Reserved)

B.2 Informational References. (Reserved)

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

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Sequence of Events Leading to Issuance of This NFPA Committee Document

Step 1: Call for Proposals

- Proposed new Document or new edition of an existing Document is entered into one of two yearly revision cycles, and a Call for Proposals is published.

Step 2: Report on Proposals (ROP)

- Committee meets to act on Proposals, to develop its own Proposals, and to prepare its Report.
- Committee votes by written ballot on Proposals. If two-thirds approve, Report goes forward. Lacking two-thirds approval, Report returns to Committee.
- Report on Proposals (ROP) is published for public review and comment.

Step 3: Report on Comments (ROC)

- Committee meets to act on Public Comments to develop its own Comments, and to prepare its report.
- Committee votes by written ballot on Comments. If two-thirds approve, Report goes forward. Lacking two-thirds approval, Report returns to Committee.
- Report on Comments (ROC) is published for public review.

Step 4: Technical Report Session

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SE *Special Expert:* A person not representing any of the previous classifications, but who has a special expertise in the scope of the standard or portion thereof.

NOTES:
1. "Standard" connotes code, standard, recommended practice, or guide.
2. A representative includes an employee.
3. While these classifications will be used by the Standards Council to achieve a balance for Technical Committees, the Standards Council may determine that new classifications of members or unique interests need representation in order to foster the best possible committee deliberations on any project. In this connection, the Standards Council may make appointments as it deems appropriate in the public interest, such as the classification of "Utilities" in the National Electrical Code Committee.
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b. Under the Codes and Standards heading, Click on the Document Information pages (List of Codes & Standards), and then select your document from the list or use one of the search features in the upper right gray box.

OR

a. Go directly to your specific document page by typing the convenient short link of www.nfpa.org/document#, (Example: NFPA 921 would be www.nfpa.org/921) Click in the gray Sign In box on the upper left side of the page. Once signed in, you will see a red "Welcome" message in the top right corner.

To begin your Public Input, select the link The next edition of this standard is now open for Public Input (formally "proposals") located on the Document Information tab, the Next Edition tab, or the right-hand Navigation bar. Alternatively, the Next Edition tab includes a link to Submit Public Input online

At this point, the NFPA Standards Development Site will open showing details for the document you have selected. This "Document Home" page site includes an explanatory introduction, information on the current document phase and closing date, a left-hand navigation panel that includes useful links, a document Table of Contents, and icons at the top you can click for Help when using the site. The Help icons and navigation panel will be visible except when you are actually in the process of creating a Public Input.

Once the First Draft Report becomes available there is a Public comment period during which anyone may submit a Public Comment on the First Draft. Any objections or further related changes to the content of the First Draft must be submitted at the Comment stage.

To submit a Public Comment you may access the e-Submission System utilizing the same steps as previous explained for the submission of Public Input.

For further information on submitting public input and public comments, go to: http://www.nfpa.org/publicinput

Other Resources available on the Doc Info Pages

Document information tab: Research current and previous edition information on a Standard

Next edition tab: Follow the committee's progress in the processing of a Standard in its next revision cycle.

Technical committee tab: View current committee member rosters or apply to a committee

Technical questions tab: For members and Public Sector Officials/AHJs to submit questions about codes and standards to NFPA staff. Our Technical Questions Service provides a convenient way to receive timely and consistent technical assistance when you need to know more about NFPA codes and standards relevant to your work. Responses are provided by NFPA staff on an informal basis.

Products/training tab: List of NFPA's publications and training available for purchase.

Community tab: Information and discussions about a Standard

Information on the NFPA Standards Development Process

I. Applicable Regulations. The primary rules governing the processing of NFPA standards (codes, standards, recommended practices, and guides) are the NFPA *Regulations Governing the Development of NFPA Standards (Regs)*. Other applicable rules include NFPA *Bylaws*, NFPA *Technical Meeting Convention Rules*, NFPA *Guide for the Conduct of Participants in the NFPA Standards Development Process*, and the NFPA *Regulations Governing Petitions to the Board of Directors from Decisions of the Standards Council*. Most of these rules and regulations are contained in the *NFPA Standards Directory*. For copies of the *Directory*, contact Codes and Standards Administration at NFPA Headquarters; all these documents are also available on the NFPA website at "www.nfpa.org."

The following is general information on the NFPA process. All participants, however, should refer to the actual rules and regulations for a full understanding of this process and for the criteria that govern participation.

II. Technical Committee Report. The Technical Committee Report is defined as "the Report of the responsible Committee(s), in accordance with the Regulations, in preparation of a new or revised NFPA Standard." The Technical Committee Report is in two parts and consists of the First Draft Report and the Second Draft Report. (See *Regs* at 1.4)

III. Step 1: First Draft Report. The First Draft Report is defined as "Part one of the Technical Committee Report, which documents the Input Stage." The First Draft Report consists of the First Draft, Public Input, Committee Input, Committee and Correlating Committee Statements, Correlating Input, Correlating Notes, and Ballot Statements. (See *Regs* at 4.2.5.2 and Section 4.3) Any objection to an action in the First Draft Report must be raised through the filing of an appropriate Comment for consideration in the Second Draft Report or the objection will be considered resolved. [See *Regs* at 4.3.1(b)]

IV. Step 2: Second Draft Report. The Second Draft Report is defined as "Part two of the Technical Committee Report, which documents the Comment Stage." The Second Draft Report consists of the Second Draft, Public Comments with corresponding Committee Actions and Committee Statements, Correlating Notes and their respective Committee Statements, Committee Comments, Correlating Revisions, and Ballot Statements. (See *Regs* at Section 4.2.5.2 and 4.4) The First Draft Report and the Second Draft Report together constitute the Technical Committee Report. Any outstanding objection following the Second Draft Report must be raised through an appropriate Amending Motion at the Association Technical Meeting or the objection will be considered resolved. [See *Regs* at 4.4.1(b)]

V. Step 3a: Action at Association Technical Meeting. Following the publication of the Second Draft Report, there is a period during which those wishing to make proper Amending Motions on the Technical Committee Reports must signal their intention by submitting a Notice of Intent to Make a Motion. (See *Regs* at 4.5.2) Standards that receive notice of proper Amending Motions (Certified Amending Motions) will be presented for action at the annual June Association Technical Meeting. At the meeting, the NFPA membership can consider and act on these Certified Amending Motions as well as Follow-up Amending Motions, that is, motions that become necessary as a result of a previous successful Amending Motion. (See 4.5.3.2 through 4.5.3.6 and Table1, Columns 1-3 of *Regs* for a summary of the available Amending Motions and who may make them.) Any outstanding objection following action at an Association Technical Meeting (and any further Technical Committee consideration following successful Amending Motions, see *Regs* at 4.5.3.7 through 4.6.5.3) must be raised through an appeal to the Standards Council or it will be considered to be resolved.

VI. Step 3b: Documents Forwarded Directly to the Council. Where no Notice of Intent to Make a Motion (NITMAM) is received and certified in accordance with the Technical Meeting Convention Rules, the standard is forwarded directly to the Standards Council for action on issuance. Objections are deemed to be resolved for these documents. (See *Regs* at 4.5.2.5)

VII. Step 4a: Council Appeals. Anyone can appeal to the Standards Council concerning procedural or substantive matters related to the development, content, or issuance of any document of the Association or on matters within the purview of the authority of the Council, as established by the *Bylaws* and as determined by the Board of Directors. Such appeals must be in written form and filed with the Secretary of the Standards Council (See *Regs* at 1.6). Time constraints for filing an appeal must be in accordance with 1.6.2 of the *Regs*. Objections are deemed to be resolved if not pursued at this level.

VIII. Step 4b: Document Issuance. The Standards Council is the issuer of all documents (see Article 8 of *Bylaws*). The Council acts on the issuance of a document presented for action at an Association Technical Meeting within 75 days from the date of the recommendation from the Association Technical Meeting, unless this period is extended by the Council (See *Regs at* 4.7.2). For documents forwarded directly to the Standards Council, the Council acts on the issuance of the document at its next scheduled meeting, or at such other meeting as the Council may determine (See *Regs* at 4.5.2.5 and 4.7.4).

IX. Petitions to the Board of Directors. The Standards Council has been delegated the responsibility for the administration of the codes and standards development process and the issuance of documents. However, where extraordinary circumstances requiring the intervention of the Board of Directors exist, the Board of Directors may take any action necessary to fulfill its obligations to preserve the integrity of the codes and standards development process and to protect the interests of the Association. The rules for petitioning the Board of Directors can be found in the *Regulations Governing Petitions to the Board of Directors from Decisions of the Standards Council* and in 1.7 of the *Regs*.

X. For More Information. The program for the Association Technical Meeting (as well as the NFPA website as information becomes available) should be consulted for the date on which each report scheduled for consideration at the meeting will be presented. For copies of the First Draft Report and Second Draft Report as well as more information on NFPA rules and for up-to-date information on schedules and deadlines for processing NFPA documents, check the NFPA website (www.nfpa.org/aboutthecodes) or contact NFPA Codes & Standards Administration at (617) 984-7246.