National Fire Protection Association
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ROC MEETING AGENDA

Technical Committee on Smoke Management Systems
NFPA 92, 92A, 92B and 204 ROC MEETING
November 16-17, 2010
The Luxor Hotel/Casino
3900 Las Vegas Boulevard South
Las Vegas, Nevada 89110

1. **Call to Order**.
   Call meeting to order by Randy Tucker at 9:30AM on November 16, 2010.

2. **Introduction of Attendees.**
   For a current committee roster. **See page 2.**
   Update/changes to committee membership.

3. **Approval of Minutes of January 28-29, 2010 ROP meeting. See page 6.**

4. **NFPA Staff Update.** Process Overview/Update.

5. **NFPA 204 ROC Preparations.**
   For public comments - **See Pages 11-39.**

6. **NFPA 3, Commissioning Systems.**

7. **NFPA 1124, Pyrotechnics Committee Draft Proposals. See Pages 40-48.**

8. **NFPA 92 ROC Preparations.**
   Current draft. We will send the latest draft separately before the meeting. For public comments - **See Pages 58-60.**

9. **NFPA 92A ROC Preparations.**
   For public comments – NO COMMENTS RECEIVED.

10. **NFPA 92B ROC Preparations.**
    For public comments – NO COMMENTS RECEIVED.

11. **New Business.**

12. **Date and Location of Next Meeting.**

13. **Adjournment.** By 2:00 PM, November 17, 2010.

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ROP MEETING MINUTES
NFPA Technical Committee on Smoke Management Systems

Thursday-Friday January 28-29, 2010
Rosen Shingle Creek, Orlando FL

1. Call to Order.
The meeting of the Technical Committee on Smoke Management Systems at Rosen Shingle creek was called to order by Chair Randy Tucker at 8:45 AM. The meeting included attendance by members at Rosen Shingle Creek and on-line via Microsoft Live Meeting.

2. Introduction of Committee Members and Guests.

Self introductions of members and guests were completed. Those present included:
TECHNICAL COMMITTEE MEMBERS PRESENT

NAME	REPRESENTING
Tucker, Randolph, Chair	The RJA Group, Inc.
Avidor, Elyahu, Principal	Rep. Standards Institution of Israel
Compton, Paul, Principal	Colt International, Ltd.
Davis, Richard, Principal	FM Global
Dittrich, Robert, Principal	Honeywell, Inc. – Rep. National Electrical Manufacturers Association
Evans, Douglas, Principal	Clark County Building Department
Ferreira, Michael, Principal	Hughes Associates, Inc.
Harris, Geoffrey	ISO TC On Smoke and Heat Control
Kampmeyer, John, Principal	Triad Fire Protection Engineering Corporation – Rep. National Society of Professional Engineers
Koffel, William, Principal	Koffel Associates, Inc. – Rep. AAMA Smoke Vent Task Group
Lougheed, Gary, Principal	National Research Council of Canada
Milke, James, Principal	University of Maryland
Militello, Anthony, Principal	US Department of the Navy
Orris, Timothy, Principal	AMCA International, Inc. – Rep. Air Movement & Control Association
Shudak, Lawrence, Principal	Underwriters Laboratories Inc.
Thornberry, Richard (Alt. to W. Koffel)	The Code Consortium, Inc. – Rep. AAMA Smoke Vent Task Group
Turnbull, Paul, Principal	Siemens Building Technology, Inc.
Van Becelaere, Robert, Principal	Ruskin Manufacturing – Rep. American Society of Mechanical Engineers
Willse, Peter, Principal	XL Global Asset Protection Services
Wolin, Steven	Code Consultants, Inc.

Xin, Yibing, (Alternate to R. Davis)	FM Global
Golinveaux, Tracy, Staff Liaison	NFPA

GUESTS

NAME	REPRESENTING
Killian, David	Disney Parks and Resorts
Solomon, Robert,	NFPA

TECHNICAL COMMITTEE MEMBERS NOT PRESENT

NAME	REPRESENTING
Dillon, Michael, Principal	Dillon Consulting Engineers, Inc.
Simony, Paul, Principal	Acralight International
Tubbs, Jeffrey, Principal	Arup Fire
Welch, Stacy, Principal	Marriott International, Inc.

3. Announcements:

NFPA Staff briefly reviewed the purpose of the meeting and NFPAs procedures. Tracy Golinveaux was introduced as the new Staff Liaison for the committee. By the end of the meeting, an action would be completed for each of the public proposals that were received. The committee would also have the opportunity to develop any committee proposals to address any topics or issues related to the draft standard. . Staff reviewed the timelines for processing the 2012 editions of 92:

- Proposals closed November 24; ROP meetings in January 2010; balloting completed in May 2010
- Comment Closing Date is September 3, 2010
- ROC meetings Fall 2010, ballots mailed
- NITMAM Closing Date April 2011
- NFPA Annual Meeting: June 2011
- Standards Council Issuance August 2011 for 2012 document

4. Approval of Minutes

The minutes of the October 7, 2009 ROC meeting were approved as submitted.

*R. Thornberry requested to discuss item #7 on the agenda before getting into the proposals.

5. NFPA 1124- Smoke-Heat Venting Criteria Update

R. Thornberry discussed the latest updates to NFPA 1124. No further progress has been made since the last update. A pyrotechnic meeting will held February 2nd in Salt Lake City. The committee is proposing to extend their cycle for one additional year and is waiting on approval from the Standards Council.

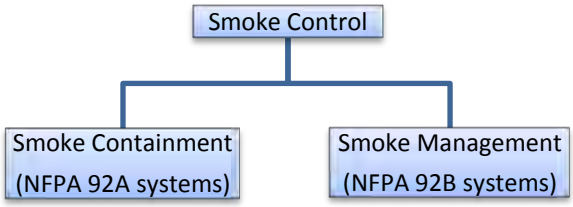
6. NFPA 3 Commissioning

An update on NFPA 3 was presented by John Kampmeyer. Their committee is in the ROP cycle and will have pre-ROP meeting at the end of March 2010.

7. NFPA 92A/92B Merger Discussion

The committee reviewed the draft chapters for the merged version of the two standards. Editorial changes were made where necessary. These changes included reorganizing paragraphs, deleting repetitious sections, and changing the terms smoke control, smoke management, and smoke containment as needed. The committee agreed by a straw poll to the following uses of terms:

Smoke Control – primarily used as the "umbrella term"
Smoke Containment – refers to 92A systems
Smoke Management – refers to 92B systems



The final organization of the final merged document is summarized in the table below:

Merged Document Chapter	Chapter in 92A	Chapter in 92B
1	1	1
2	2	2
3	3	3
4	4, 5	4
5	-	5, 6
6	6	7
7	7	9
8	8	8

It was agreed that the primary proposal for the new NFPA 92 standard would simply be a melding of NFPA 92A and NFPA 92B with editorial changes being made only to make the text fit editorially. Any substantive changes being considered would be handled as separate public or committee proposals.

8. NFPA 92A Proposals

The committee reviewed the public proposals that had been received on NFPA 92A. A motion passed to submit the meeting actions to a letter ballot. See the ROP letter ballot for committee actions.

9. NFPA 92B Proposals

The committee reviewed the public proposals that had been received on NFPA 92B. A motion passed to submit the meeting actions to a letter ballot. See the ROP letter ballot for committee actions.

10. Other Business

The status of NFPA 204 was reviewed. Balloting has been completed and the deadline for NITMAMs is in April. One possible NITMAM was discussed on a comment in chapter 11.

11. Schedule Next Meeting

The next meeting will be tentatively scheduled for November 16th and 17th in the West Coast region of the US (preferably Las Vegas) to prepare the Report on Comments.

12. Adjournment

The meeting was adjourned at 11:30 a.m. on January 29, 2010.

Minutes Prepared by: Tracy Golinveaux, Staff Liaison

204- Log #5 Final Action: Accept in Principle
(Entire Document)

Submitter: Robert C. Sampson, Acralight International
Comment on Proposal No: 204-1
Recommendation: We request that the committee allow the 204 revisions to slip a cycle to allow the 204 Study Group to complete their review and bring a comprehensive revision back to the full committee for consideration. This would allow us more time for the revisions and should not have any major impact on the document schedule.

Substantiation: The NFPA 204 Study Group is making good progress and needs more time to incorporate the full benefit of it's research and the application of state of the art smoke vent technology into the upcoming version in it's most useful and comprehensive form.

Committee Meeting Action: Accept in Principle
An additional 6 months was provided to work on this issue.
Committee Statement: At the April 2009 meeting held in Tampa, FL, the committee did agree to offer more time to study the specific issues surrounding the interaction between sprinklers and vents. The revision cycle was held off for 6 months and the committee held a second ROC meeting in October 2009. The revision cycle was changed from the original F-2009 meeting to the A-2010 meeting. An action was taken on all of the public comments that were submitted including the issue of dealing with sprinklers and vents. See Committee Comment 204-8 (Log #CC1).

204- Log #CC2 Final Action: Accept
(Chapter 2)

Submitter: Technical Committee on Smoke Management Systems,
Comment on Proposal No: 204-1
Recommendation: Update the referenced documents to recognize the latest editions.
2.2 NFPA Publications.
National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.
NFPA 72®, National Fire Alarm and Signaling Code®, 2010~~07~~ edition.
NFPA 220, Standard on Types of Building Construction, 2009~~06~~ edition.
~~NFPA 255, Standard Method of Test of Surface Burning Characteristics of Building Materials, 2006 edition.~~
NFPA 259, Standard Test Method for Potential Heat of Building Materials, 2008~~03~~ 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, 2007 ~~04~~.
ASTM E 136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C, 2004~~1996~~.
2.3.2 FM Publications.
FM Global Technologies LLC, 1301 Atwood Avenue, P.O. Box 7500, Johnston, RI 02919.
FM 4430, Approval Standard for Heat and Smoke Vents, 2007 ~~1980~~.
2.3.3 NIST Publications.
National Institute of Standards and Technology, 100 Bureau Drive, Gaithersburg, MD 20899-1070.
DETACT-QS (Detector Actuation — quasi-steady) software.
DETACT-T2 (Detector Actuation — time squared) software.
GRAPH graphics code.
LAVENT (Link-Actuated VENTS) software.
2.3.4 UL Publications.
Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.
ANSI/UL 723, Test for Surface Burning Characteristics of Building Materials, 2008
ANSI/UL 793, Standard for Automatically Operated Roof Vents for Smoke and Heat, 2008 ~~1997~~.
2.3.5 Other Publications.
Merriam-Webster's Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003
Substantiation: This comment updates the referenced documents to recognize the latest editions. NFPA 255 is being deleted from the list as it is being withdrawn by the NFPA Technical Committee on Fire Tests. See related comment on 204-3 (Log #7).

Committee Meeting Action: Accept

204- Log #7 Final Action: Accept
(2.3.4)

Submitter: Bob Eugene, Underwriters Laboratories Inc.
Comment on Proposal No: 204-2
Recommendation: Revise as follows:

2.3.4 UL Publications.

Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

ANSI/UL 723, Test for Surface Burning Characteristics of Building Materials, ~~2003, Revised 2005~~ 2008.

ANSI/UL 793, Standard for Automatically Operated Roof Vents for Smoke and Heat, ~~2003, Revised 2004~~ 2008.

Substantiation: Update UL 723 and UL 793 to the most recent editions. Add ANSI designation to UL 793. 3.3.14.1 will be updated to include reference to UL 723 based on extraction policies. The definition of limited combustible would be updated to read as follows in NFPA 220-2009 Section 3.3.3:

3.3.14.1 Limited-Combustible Material. Refers to a building construction material not complying with the definition of noncombustible that, in the form in which it is used, has a potential heat value not exceeding 8141 kJ/kg (3500 Btu/lb), where tested in accordance with NFPA 259 and includes either (1) materials having a structural base of noncombustible material, with a surfacing not exceedign a thickness of 3.2 mm (1/8 in.) that has a flame spread index not greater than 50, or (2) materials, in the form and thickness used having neither a flame spread index greater than 25 nor evidence of continued progressive combustion, and of such composition that surfaces that would be exposed by cutting through the material on any plane would have neither a flame spread index greater than 25 nor evidence of continued progressive combustion, when tested in accordance with UL 723 or ASTM E 84. [220, 2009]

The ANSI designation should be editorially added wherever UL 723 or UL 793 are referenced.

ANSI/UL 723 includes the following revisions:

- Updated to current brick specification in 3.1.
- Removed the requirement for a chart recorder in 3.7, 5.10 and 5.11.
- Clarified sample conditioning in 4.2.
- Added 4.3, preparation and mounting of test specimens in accordance with ASTM practices, and deleted redundant requirements in Appendix A.
- Clarified percent obscuration on the red oak smoke density figure, Figure 5.4.
- Added the moisture meter as an alternate means of determining red oak moisture content in 5.9.
- Added 5.12 and 5.13 to provide details for calibration frequency.
- Clarified the photocell output recording in 6.4.
- Removed the requirements for a chart recorder and the plotting of a temperature in 6.7.
- Removed the requirements for a chart recorder and allowance for accumulation on the photocell in 7.1.6.

ANSI/UL 793 was issued to incorporate the revision of paragraph 7.2 to provide for higher temperature fusible links.

Committee Meeting Action: Accept

204- Log #CC4 Final Action: Accept
(3.3.14.1 Limited Combustible)

Submitter: Technical Committee on Smoke Management Systems,
Comment on Proposal No: 204-3
Recommendation: Revise the definition of Limited Combustible as shown in ROP Proposal 204-3.
3.3.3 Limited-Combustible Material. Refers to a building construction material not complying with the definition of noncombustible that, in the form in which it is used, has a potential heat value not exceeding 8141 kJ/kg (3500 Btu/lb), where tested in accordance with NFPA 259 and includes either (1) materials having a structural base of noncombustible material, with a surfacing not exceeding a thickness of 3.2 mm (in.) that has a flame spread index not greater than 50, or (2) materials, in the form and thickness used having neither a flame spread index greater than 25 nor evidence of continued progressive combustion, and of such composition that surfaces that would be exposed by cutting through the material on any plane would have neither a flame spread index greater than 25 nor evidence of continued progressive combustion, when tested in accordance with ~~NFPA 255 or~~ ASTM E 84 or ANSI/UL 723.
Substantiation: The 2009 edition of NFPA 220 was not available when the ROP meeting for NFPA 204 was held in July of 2008. The committee noted they would look at any additional changes needed for the definition of limited combustible construction. NFPA 220, the source document for this definition, has removed the reference to NFPA 255 and added the reference to ANSI/UL 723. NFPA 255 is being withdrawn by the NFPA Technical Committee on Fire Tests.
Committee Meeting Action: Accept

204- Log #CC3 Final Action: Accept
(3.3.22 Vent System)

Submitter: Technical Committee on Smoke Management Systems,
Comment on Proposal No: 204-5
Recommendation: Revise 3.3.22 to read as follows:
3.3.22 Vent System. A system used for the removal of smoke and heat from a fire that utilizes manually or automatically operated heat and smoke vents at roof level and that exhausts smoke from a reservoir bounded by exterior walls, interior walls, or draft curtains to achieve the design rate of smoke mass flow through the vents, and that includes provision for make up air.
Substantiation: The changes that have been proposed for Chapter 11 use this terminology. Consistency between the definition of a vent system and the use of that term throughout NFPA 204 is important.
Committee Meeting Action: Accept

204- Log #1 Final Action: Reject
(Chapter 11)

Submitter: Kenneth E. Isman, National Fire Sprinkler Association, Inc.
Comment on Proposal No: 204-5
Recommendation: Continue to reject the concept of placing design criteria for vents in sprinklered buildings in NFPA 204.
Substantiation: We have seen extremely knowledgeable and experienced users of FDS be completely incapable of correctly predicting the number of sprinklers that would open and the opening time of these sprinklers in dry-pipe systems prior to arrival of water. If experienced users of FDS can't predict the situation correctly with no water flowing, how can we rely on data generated after water flow has arrived?

Even if Dr. Beyler is capable of making sufficient adjustments to the FDS program to correctly predict sprinkler response times and locations, we have concerns about the average user of FDS being able to make this technological leap. According to the proposed section 11.3.2, the FDS model (or something equivalent) needs to be used to make section 11.2 work. We question whether the state-of-the-art in fire protection is ready for this step.
Committee Meeting Action: Reject
Committee Statement: As noted in Proposal 204-5, the technical committee cannot ignore the fact that some building designs incorporate automatic or manually operated smoke and heat vents in conjunction with automatic sprinklers as a part of the protection package for the building. The committee developed Committee Comment 204-8 to provide some of the most fundamental and basic considerations that need to be studied when evaluating the possible impact of smoke and heat vents on the performance of the automatic sprinkler system. This information is fairly basic, it does not rely on or defer to FDS or other models for predicting these times but rather it offers a range of topics that need to be evaluated and it is based on the currently available information.

204- Log #6 Final Action: Reject
(Chapter 11)

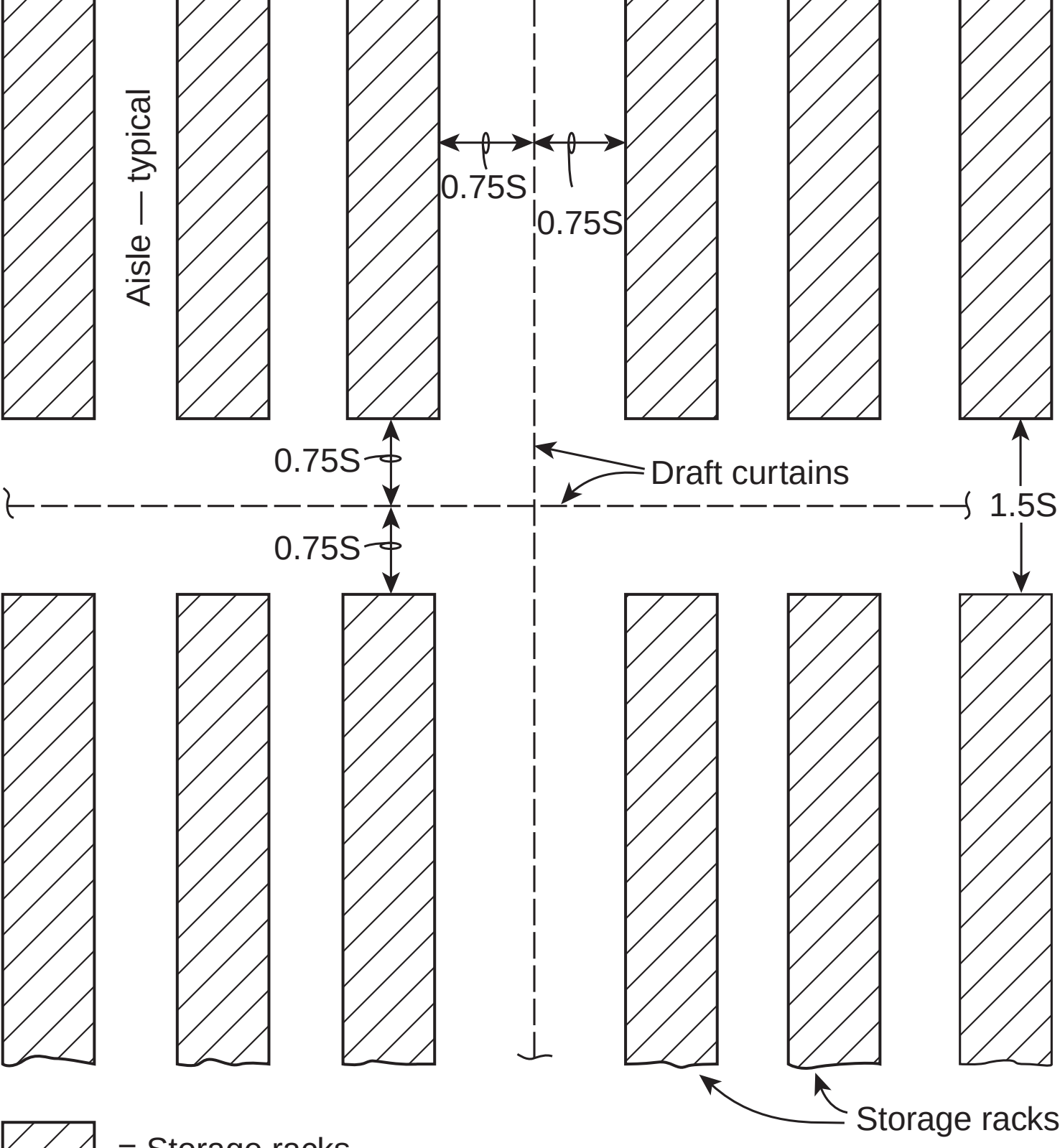
Submitter: Milosh T. Puchovsky, WPI Dept. of Fire Protection
Comment on Proposal No: 204-5
Recommendation: Maintain the text of Proposal 204-5 (Log #CP2) as new Annex text to NFPA 204.
Substantiation: While the information presented in Proposal 204-5 as new text for chapter 11 is not fully developed, much of what has been proposed is relevant and necessary when considering the interaction of smoke and heat vents in sprinklered buildings. Such advisory information should be included in NFPA 204 as certain building and fire regulations require smoke and heat vents in sprinklered buildings but provide no information on the interaction of vents and sprinklers, and other specific design concerns that need to be addressed.
Committee Meeting Action: Reject
Committee Statement: The technical committee has developed alternative language for Chapter 11. Although it has maintained some of the original content and ideas of the proposal, much of the material has been relegated to the Annex of NFPA 204. See Committee Comment 204-8 (Log #CC1).

204- Log #CC1 Final Action: Accept
(Chapter 11)

Submitter: Technical Committee on Smoke Management Systems,
Comment on Proposal No: 204-5
Recommendation: Revise the contents of Chapter 11 to retains the basic information that needs to be considered when smoke/heat vents are provided in buildings with an automatic sprinkler system.
Chapter 11 Venting in Sprinklered Buildings
11.1 Scope. This chapter provides requirements for the design of smoke and heat venting systems in buildings protected by automatic sprinkler systems.
11.2* Design Basis. The design of smoke and heat venting systems shall be based on a performance analysis acceptable to the AHJ. (See Section F.3.)
A.11.2 Design objectives for a vent system can include one or more of the following goals:
(1) To provide occupants with a safe path of travel to a safe area
(2) To facilitate manual fire fighting
(3) To reduce the damage to buildings and contents due to smoke and hot gases
11.3* Automatic Sprinkler Systems. The automatic sprinkler systems shall be designed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*.
A.11.3 Smoke and heat vents should not adversely impact the performance of the automatic sprinkler system. See NFPA 13, Section 12.1.1
11.4* Buildings Protected by Control Mode Sprinklers.
A.11.4 ESFR Sprinklers – Testing and computer modeling studies conducted to date that have addressed the interaction of smoke and heat vents have utilized control mode sprinklers. Since ESFR sprinklers have not been considered in any such studies, use of the guidance in this document is not applicable to ESFR sprinklers. The response time index (RTI) is considerably lower and the required water discharge per sprinkler is considerably higher than that of control mode sprinklers. There is concern that early operation of a smoke and heat venting system may adversely affect the performance of the fire suppression provided by ESFR sprinklers.
11.4.1* Draft curtains provided in storage areas shall be placed at the longitudinal center of an aisle space. The aisle space shall not be less than 1.5 times the spacing of ceiling sprinklers in the direction perpendicular to the draft curtain. Sprinklers shall be located on both sides of the curtain per NFPA 13 requirements for sprinkler placement with respect to walls. If a full-height partition is used in lieu of a draft curtain, normal aisle spacing shall be permitted.
A.11.4.1. Figure A.11.4.1 shows the recommended spacing of sprinklers with respect to the draft curtain locations.

****INSERT FIG A.11.4.1******

11.4.2* Vents shall not operate until after sprinklers have been determined to establish control of the fire.
A.11.4.2. Ganged vent operation is designed to simultaneously open all vents within the affected smoke zone. The smoke zone is bounded on four sides by draft curtains and/or walls. It requires the use of pop-up type vents, as thermoplastic drop-out vents are designed to only operate individually. It also requires that an activation system be connected to release mechanisms for each individual vent. The benefit is that it may allow for enough vent area to remove the equivalent volume of smoke calculated for the design fire, whereas, the vent area from one or two individually activated vents would generally not be adequate. In some cases, this may require a significant roof area within the boundaries of a smoke zone to provide a sufficient area of vents. In some cases, the minimum vent area required by local code may not meet the above design criteria.
Ganged vents within the smoke zone of fire origin should not open before sprinklers that will help control the fire have operated. For storage areas, this means that a sufficient time delay should be provided between the time of the first



= Storage racks

— — — = Draft curtains

S = Sprinkler spacing in same direction

Example: Sprinkler spacing is 10 ft (3 m) in both directions. Minimum spacing between face of storage and draft curtain is 7.5 ft (2.3 m) so minimum aisle space at draft curtain > 15 ft (4.6 m).

sprinkler actuation and the time the vents within that smoke zone are opened to allow sufficient time for both the first and second ring of sprinklers around the fire origin to operate. While the first ring of operating sprinklers is important in putting water on the fire, the second ring of operating sprinklers is important to cause pre-wetting of unburned product to thus slow or halt the advancement of the fire. This time delay will vary considerably, depending on the specific details of the stored commodities and sprinkler protection. It takes time for the fire department to respond, deploy hoses and assess the control of the fire. therefore reliance on remote manual operation of such ganged vents may be an alternative to trying to estimate the specific required time delay.

There has been no testing of ganged vent operation to verify its effectiveness.

Because of the additional equipment required, the cost may be significantly higher for ganged venting than that of individually operated smoke vents.

Substantiation: When the Committee Proposal 204-5 (Log #CP2)was developed, the committee recognized there are philosophical differences and view points on the efficacy of having smoke and heat vents in buildings with automatic sprinklers. While some believe the two systems should not be used together, the reality is that some model and state codes and standards require the use of smoke/heat vents in sprinklered buildings. The revised text for Chapter 11 does not require or even suggest that two systems be used together, it simply provides a range of factors that need to be considered, evaluated and built into the design analysis. The committee has drawn on the information previously discussed in Proposal 204-5, information provided in the public comments received and the information contained in the 2010 edition of NFPA 13 concerning smoke and heat vents.

Committee Meeting Action: Accept

204- Log #12 Final Action:
(Chapter 11)

Submitter: Daniel J. O'Connor, Schirmer Engineering Corp.
Comment on Proposal No: 204-5
Recommendation: Add new text to read as follows:
11.1 Scope: This chapter provides requirements for the design of smoke and heat venting systems in buildings protected by automatic sprinkler systems.
11.2. Buildings with Sprinklers: Smoke and heat vents shall not be installed in building areas protected with ESFR sprinklers. In building areas having automatic sprinklers that use control mode sprinklers the installation of smoke and heat vents shall not be required and shall only be permitted in accordance with the provisions of Section 11.2.2.

A11.2 Testing and computer modeling studies conducted to date that have addressed the interaction of smoke and heat vents have utilized control mode sprinklers. Since ESFR sprinklers have not been considered in any such studies, use of the guidance in this document is not applicable to ESFR sprinklers. The response time index (RTI) is considerably lower and the required water discharge per sprinkler is considerably higher than that of control mode sprinklers. There is concern that early operation of a smoke and heat venting system may adversely affect the performance of the fire suppression provided by ESFR sprinklers.
11.2.2 Sprinklers with Supplemental Venting Features. Where automatic sprinklers are used as the primary fire control system with smoke and heat vents installed as a supplemental fire protection feature, the automatic sprinkler systems and smoke/heat vents shall be installed in accordance with Sections 11.2.2.1, 11.2.2.2, and 11.2.2.3. Where automatic sprinklers and automatic smoke/heat vents are used in a performance-based design, the requirements of Sections 11.2.2.1, and 11.2.2.4 shall apply.
11.2.2.1 Automatic Sprinkler Systems. The automatic sprinkler systems shall be designed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*.
A11.2.2.1 Smoke and heat vents should not adversely impact the performance of the automatic sprinkler system. See NFPA 13, Section 12.1.1
11.2.2.2 Storage/Warehouse Area. Draft curtains provided in storage areas shall be placed at the longitudinal center of an aisle space. The aisle space shall not be less than 1.5 times the spacing of ceiling sprinklers in the direction perpendicular to the draft curtain. Sprinklers shall be located on both sides of the curtain per NFPA 13 requirements for sprinkler placement with respect to walls. If a full-height partition is used in lieu of a draft curtain, normal aisle spacing shall be permitted.

****Insert Figure Use Figure A.11.4.1 from the 2010 Annual Revision Cycle ROC which shows the recommended spacing of sprinklers with respect to the draft curtain locations****

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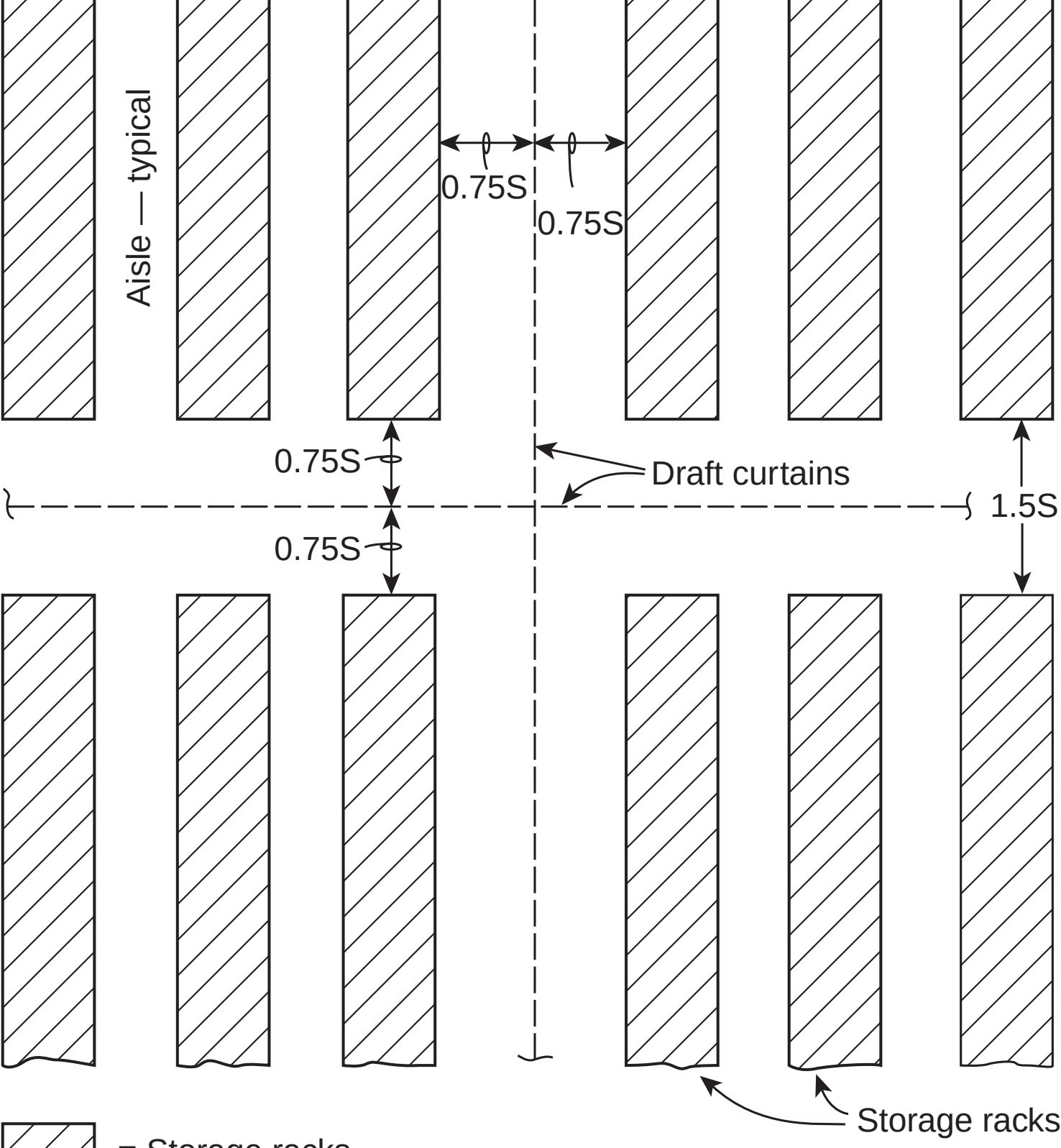
11.2.2.3 Sprinkler/Vent Arrangement. Where smoke/heat vents are installed with automatic sprinkler systems, the installation shall be in accordance with one of the following, Section 12.2.2.3.1, 12.2.2.3.2, 12.2.2.3.3, or 12.2.2.3.4.
11.2.2.3.1 Install vents that are listed for occupancies protected by quick-response storage sprinklers, or
11.2.2.3.2 Install vents equipped with a standard-response 360°F (182°C) nominal thermal activating devices, or
11.2.2.3.3 Install quick-response sprinklers directly under the vent opening on a maximum 4 ft. (1.2m) linear and 16 ft² (1.5 m²) area spacing. [See Figure 11.2.2.3.3 for a diagram of this arrangement.] Ensure these sprinklers have, at a minimum, the same K-factor and orientation as the adjacent ceiling-level sprinklers and are fed by sprinkler piping no smaller than the ceiling level branchlines. Sprinklers located under the ceiling vent and installed as outlined above do not need to be added to the hydraulic design of the ceiling sprinkler system; or

****Insert Artwork Figure 11.2.2.3.3 Here****



= Storage racks

— — — = Draft curtains

S = Sprinkler spacing in same direction

Example: Sprinkler spacing is 10 ft (3 m) in both directions. Minimum spacing between face of storage and draft curtain is 7.5 ft (2.3 m) so minimum aisle space at draft curtain > 15 ft (4.6 m).

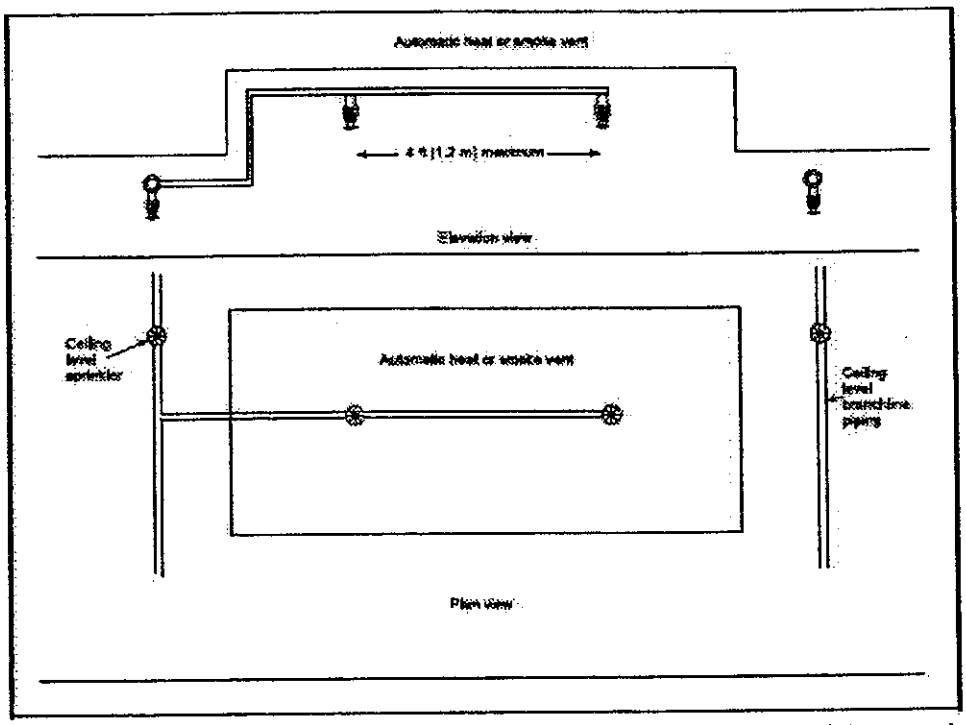


Figure 11.2.2.3.3 (Source: FM Data Sheets)

11.2.2.3.4 Install vents that are only manually operated smoke and heat vents.

11.2.2.4 Performance Design Basis. Building designs that incorporate both automatic sprinklers and automatic smoke/heat vents shall be permitted to be used based on a performance analysis approved by the AHJ.

Substantiation: The proposed wording for Chapter 11 intends to resolve the long standing disagreement on the value of vents by not requiring the use of automatic vents in a sprinklered building situation(Option 1), but rather only permitting vents use in a sprinklered building if specific conditions are met(Option 2). The specific conditions are one of the items described in proposed Sections 11.2.2.3.1, 11.2.2.3.2, 11.2.2.3.3 for automatic vents or 11.2.2.3.4 for manual vents. A third option allows for the use of smoke heat/vents based on a performance analysis approved by the AHJ.

204- Log #13 Final Action:
(Chapter 11)

Submitter: Carl F. Baldassarra, The RJA Group
Comment on Proposal No: 204-5
Recommendation: This comment is submitted to Proposal 204-5 and is a further comment to the original comment ROC 204-8 Log #CC1 published in the 2010 Annual Revision Cycle ROC.

Chapter 11 Venting in Sprinklered Buildings

11.1 Scope. This chapter provides requirements for the design of smoke and heat venting systems in buildings protected by automatic sprinklers.

11.2* Design. The design of smoke and heat venting systems shall be approved by the authority having jurisdiction.

A11.2 Chapters 4 through 10 represent the state of the technology of vent and draft curtain board design in the absence of sprinklers. A broadly accepted equivalent design basis for using sprinklers, vents and curtain boards together for hazard control (e.g., life safety, property protection, water usage, obscuration) is currently not available. Designers are strongly cautioned that the use of venting with automatic sprinklers is an area of ongoing research to determine its benefit and effect in conjunction with automatic suppression. See Annex F3 for more information.

11.3* Automatic Sprinkler Systems. The automatic sprinkler system shall be designed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems.*

A11.3 Smoke and heat vents should not adversely impact the performance of the automatic sprinkler system. See NFPA 13, Section 12.1.1.

11.4* Buildings Protected by ESFR Sprinklers. Smoke and heat vents shall not be installed in building areas protected by ESFR sprinklers.

A11.4 Testing and computer modeling studies conducted to date that have addressed the interaction of smoke and heat vents have utilized control mode sprinklers. Since ESFR sprinklers have not been considered in any such studies, use of the guidance in this document is not applicable to ESFR sprinklers. The response time index (RTI) is considerably lower and the required water discharge per sprinkler is considerably higher than that of control mode sprinklers. There is concern that early operation of a smoke and heat venting system may adversely affect the performance of the fire suppression provided by ESFR sprinklers.

11.5* Buildings Protected by Control Mode Sprinklers. Draft curtains provided in storage areas shall be placed at the longitudinal center of an aisle space. The aisle space shall be not less than 1.5 times the spacing of ceiling sprinklers perpendicular to the draft curtain. Sprinklers shall be located on both sides of the curtain per NFPA 13 requirements for sprinkler placement with respect to walls. If a full-height partition is used in lieu of a draft curtain, normal aisle spacing shall be permitted.

A11.5 Figure A11.5 shows the recommended spacing of sprinklers with respect to the draft curtain locations.

[Note to editor: Please include as Figure A11.5 the Figure A11.4.1 from Page 204-4 of the ROC A2010 which is associated with Comment 204-8 (Log #CC1).]

Proposed amendment to Annex F, moving a portion of F3 to Annex A11.2 and deleting it from F3:

F3 Objectives of the vent system…. (No change to remainder of this paragraph, including subparagraphs 1, 2 and 3).

~~Chapters 4 through 10 represent the state of the technology of vent and draft curtain board design in the absence of sprinklers. A broadly accepted equivalent design basis for using sprinklers, vents and curtain boards together for hazard control (e.g., life safety, property protection, water usage, obscuration) is currently not available. Designers are strongly cautioned that the use of venting with automatic sprinklers is an area of ongoing research to determine its benefit and effect in conjunction with automatic suppression.~~

This annex section provides design...". (No change to balance of section F3).

Substantiation: ROC Comment 204-8 published in the 2010 Annual Revision Cycle ROC was an attempt to include criteria to design vent systems in sprinklered buildings. However, the criteria were vague, unenforceable and not of significant use to the design community. The Comment implied that a “design solution” for vent systems in sprinklered buildings had been achieved when, in fact, the technology is no further along than in 1975 when I first began working on this topic. Furthermore, as per the public testimony at the Annual Meeting, certain criteria in the Comment were noted as not being technically feasible by the design profession.

This comment includes a proposal largely based on ROC Comment 204-8, but is limited to what is currently known about the technology for designing vent systems in sprinklered buildings and does not imply anything else. The annex material for A11.2 includes relocated portions of what is already published in Annex Section F3. This guidance is vital for designers and AHJs approving smoke and heat venting systems in sprinklered buildings.

This is not original material; its reference/source is as follows:
NFPA ROC for the 2010 Annual Revision Cycle; NFPA 204-2007.

204- Log #14 Final Action:
(Chapter 11)

Submitter: Richard C. Schulte, Schulte & Associates
Comment on Proposal No: 204-5
Recommendation: This comment addresses Comment 204-5.

Chapter 11 and the Annex commentary for Chapter 11 should be deleted in its entirety.

Substantiation: The 2010 edition of NFPA 13 now includes provisions which address the use of smoke/heat vents in buildings protected by a sprinkler system. These provisions specifically intend to prevent the automatic operation of smoke/heat vents where the sprinkler system successfully operates. This is accomplished by only permitting vents to be manually-operated, or, if automatically-operated vents are provided, requiring that the vent activating mechanism to be at least one temperature classification higher than the temperature classification of the sprinklers.

The substantiation provided by the NFPA 13 sub-committee which developed the provisions addressing the use of smoke/heat vents in buildings protected by a sprinkler system clearly states the intent of the NFPA 13 provisions. The substantiation statement for the vent provisions reads as follows:

"The intent of the standard is that roof vents and draft curtains should not be used in conjunction with storage protection."

Given this intent statement, it would seem that providing design criteria or design recommendations for the installation of smoke/heat vents in sprinklered buildings infers that the NFPA 13 substantiation statement is incorrect and that providing smoke/heat vents in buildings protected by a sprinkler system is acceptable engineering practice. Based upon the substantiation statement above, it seems clear that providing smoke/heat vents in buildings protected by a sprinkler system would be considered to be poor engineering practice. It is my opinion that NFPA standards should not provide design criteria or design recommendations for what would be considered to be poor engineering practice.

It has been stated that the principal reason why design criteria/recommendations need to be included in NFPA 204 is that the International Building Code and International Fire Code contain provisions which require the installation of smoke/heat vents in buildings protected by a sprinkler system. Simply because another building/fire code mandates poor engineering practice is no excuse for facilitating poor engineering practice. The deletion of any and all of the design criteria/recommendations for the use of smoke/heat vents in buildings protected by a sprinkler system in NFPA 204 would send a signal to the International Code Council (ICC) that there is no technical basis for the installation of smoke/heat vents in sprinklered buildings.

The NFPA 13 committee has sent a signal to the NFPA 204 committee that the installation of smoke/heat vents in sprinklered buildings is considered to be poor engineering practice. It's time for the NFPA 204 committee to follow the NFPA 13 committee's lead and send a signal to the ICC.

It should be noted that a code change proposal, Proposal F144-09/10, which would delete the requirement for the installation of smoke/heat vents in buildings protected by a sprinkler system was submitted in the ICC's last code change cycle. (This proposal would mandate the installation of a mechanical smoke removal system in lieu of smoke/heat vents.) The proponent of this code change proposal was the ICC Code Technology Committee.

While proposal F144-09/10 was not approved, it should be noted that the (unamended) proposal received the support of the Joint Fire Service Review Committee (JFSRC). While the JFSRC does not represent the viewpoint of the entire fire service, the JFSRC's recommendation is a significant step in removing the requirement for smoke/heat vents in sprinkler buildings from the International Codes. It is expected that in the next code change cycle, the requirement for smoke/heat vents in sprinklered buildings will be removed from the International Building Code and the International Fire Code.

With respect to the design criteria/recommendations for the installation of smoke/heat vents in sprinklered buildings presently included in NFPA 204, the NFPA 13 provisions regarding vents make these recommendations obsolete.

We have been told by a consultant to the Smoke Vent Task Group, Dr. Craig Beyler, that in order for smoke/heat vents to function effectively, the vents must be opened early in the fire. Given this, Dr. Craig Beyler submitted a proposal for the "ganged" operation of roof vents with the vents being opened 60 seconds after the sprinkler system water flow detector is activated. This proposal was rejected by the committee due to concerns regarding the impact of the "ganged" operation of the vents on the capability of sprinklers to control the fire. This does not mean that Dr. Beyler's concern about the effective operation of vents is irrelevant. In fact, Dr. Beyler is correct. If the smoke/heat vents are not opened early in the fire, the vents system may not accomplish the design objective.

Given the provisions in NFPA 13, and fire department response times of at least 5 minutes at best, and 20 to 30 minutes for buildings served by volunteer fire departments, the smoke/heat vent system will likely have failed by the time the fire department arrives on the scene (assuming the design fire scenario occurs). Given the delays in opening of the

vent system due to compliance with NFPA 13, it is likely that no vent system design will be able to be provided that will accomplish the design goals included in NFPA 204 (assuming the design fire scenario occurs). If this is the case, then why provide design criteria/recommendations for such a system?

For the reasons stated above, Mr. Isman's recommendation that the committee "continue to reject the concept of placing design criteria for vents in sprinklered buildings in NFPA 204" is an excellent recommendation and Mr. Isman's recommendation should be adopted by the Smoke Management Committee.

204- Log #11 Final Action: Reject
(11.1.2)

Submitter: Richard C. Schulte, Schulte & Associates
Comment on Proposal No: 204-5
Recommendation: Delete text as follows:

~~11.1.2 Design Objectives: Design objectives shall include one or more of the following:~~
(1) ~~To provide occupants with a safe path of travel to a safe area~~
(2) ~~To facilitate manual fire fighting operations~~
(3) ~~To reduce the damage to buildings and contents due to smoke and hot gases~~

Substantiation: Item (1) in the proposed section 11.1.2 suggests that there is a relationship between smoke/heat venting and safe occupant egress. The travel distances permitted by the Life Safety Code (NFPA 101) are not dependent upon venting and there are no prescriptive provisions contained in the Life Safety Code which permit travel distances to be extended when smoke/heat vents are provided.

Typically, smoke/heat vents are only provided in one-story storage and industrial occupancies. The life safety hazard of one-story storage and industrial occupancies protected by a sprinkler system is minimal and the increase in the level of safety provided for occupants by vents is essentially nil. The International Building Code recently deleted a provision which permitted an increase in travel distance in one-story industrial and storage buildings provided with roof vents. This provision was removed from the code because the increase in the level of occupant fire safety in one-story industrial and storage buildings when roof vents has never been documented and cannot be justified logically.

Item (2) in section 11.1.2 suggests that manual interior firefighting operations in large one-story buildings protected by a sprinkler system are necessary. These buildings are typically constructed with non-rated roof construction. NIOSH 2005-132, "Preventing Injuries and Deaths of Fire Fighters due to Truss System Failures" , recommends that fire fighters not enter buildings with unprotected (non-rated) roof construction (unless adequate sprinkler protection is provided to protect the roof construction). Even if a "ganged" roof vent system is provided in a sprinklered building, it may not be possible to determine if the sprinkler system protecting the building is operating effectively and is adequate for the hazard protected for quite some time after the fire department arrives at the building, perhaps for as long as 30 minutes. Based upon this, suggesting that smoke/heat vents can assist manual fire fighting operations is an open invitation for fire fighters to ignore the NIOSH recommendations regarding fire fighter safety.

It should also be noted that very few fire departments in the United States have the capability of safely conducting interior manual fire fighting operations. This lack of capability was clearly demonstrated in the fires at the Cook County Administration Building in downtown Chicago on October 18, 2003 and the Sofa Superstore Building in Charleston, South Carolina on June 18, 2007.

In the fire at the Cook County Administration Building, the Chicago Fire Department was unable to control a fire which was confined to an office space which was approximately 3,000 square feet in floor area on the 12th floor of the building using interior manual fire fighting operations. The Chicago Fire Department had to utilize an exterior attack to extinguish the fire.

In the fire at the Sofa Superstore, nine fire fighters died as a result of ignoring the NIOSH recommendations not to conduct interior manual fire fighting operations in an unsprinklered single-story building with non-rated roof construction. While the fire fighter fatalities were not caused by a roof collapse, the fire fighters were unable to find their way out of the building due to smoke conditions within the building and ran out air. The investigation into this incident commissioned by City of Charleston indicated that the 30 minute self-contained breathing apparatus (SCBA) used only allowed the fire fighters between 12 and 13 minutes of air inside the building. Thirteen minutes of breathing air is not sufficient to enter a building, find the fire in smoke conditions, perform a task and leave the building.

It should be noted that both the Chicago Fire Department and the Charleston Fire Department employ full-time paid professional fire fighters. If these two paid fire departments cannot safely conduct interior manual fire fighting operations, then it can be concluded that most fire departments in the United States cannot safely perform interior manual fire fighting operations.

Further in regard to interior manual fire fighting operations, it should be noted that NFPA 13 states the following:

"Sprinkler protection installed as required in this standard is expected to protect the building occupancy without supplemental fire department activity."

"During the testing program, the installed automatic extinguishing system was capable of controlling the fire and reducing all temperatures to ambient within 30 minutes of ignition."

In other words, interior manual fire fighting operations are not necessary in buildings protected by a sprinkler system if the sprinkler system is adequate for the hazard protected and is operational. If the sprinkler system is not operational,

or is failing to control the fire, the NIOSH recommendation to refrain from conducting interior manual fire fighting operations is applicable.

Item (3) in Section 11.1.2 suggests that the installation of smoke/heat vent systems in buildings protected by a sprinkler system may reduce property losses to a building and its contents in a fire. There have been no studies to confirm this theory and, to my knowledge, there are no property insurers who offer insurance rate reductions for the installation of smoke/heat vents in buildings protected by a sprinkler system. Given this, the credibility of the theory that smoke/heat vents reduce property damage in sprinklered buildings should, at least, be questioned.

An example of where smoke/heat vents failed to protect the contents of a sprinklered building from damage by smoke was a fire at a Home Depot store in Tempe, Arizona on March 19, 1998. In this fire, the sprinkler system provided was apparently inadequate for the hazard protected and smoke/ heat vents provided failed to perform their intended function. When the Phoenix Fire Department arrived at the building, the building was filled with smoke from floor to the ceiling. (It should be noted that the smoke/heat vents provided at the Home Depot store in Tempe where individually-activated vents, not a "ganged" vent system.)

In theory, the use of the "ganged" roof vent concept could assist in limiting property damage, however the capability to perform this function will depend upon the activating time of the "ganged" vent system. If the "ganged" vent system operates too soon, in order to facilitate the minimization of smoke damage, the vent system could cause the failure of the sprinkler system. Failure of the sprinkler system caused by the "ganged" vent system would likely cause an increase in property damage, not a decrease in damage. Increasing the delay of the operation of the "ganged" vent system will allow additional smoke damage to occur. Hence, in effect, the design of the "ganged" vent system for purposes of limiting smoke damage is competing with the capability of the sprinkler system to control the fire.

At this point in time, it is my opinion that the body of research on the impact of the operation of a "ganged" roof vent system on the capability of the sprinkler system to function properly is insufficient to conclude with any degree of confidence that the early opening of multiple roof vents will not have a significant adverse impact on the sprinkler system.

Since it is my opinion that Items (1), (2) and (3) should be deleted from Section 11.1.2, it can be concluded that it is my opinion that there are no benefits to the installation of either individually-activated or "ganged" operated roof vent systems in buildings protected by a sprinkler system, other than the use of these systems in fire department "mop-up" operations. Given that there are other more cost-effective means of providing assistance for "mop-up" operations, such as mechanical exhaust and/or exterior wall openings, roof vent systems are essentially an ineffective means of providing fire protection in buildings protected by a sprinkler system.

It should be noted that the International Code Council Code Technology Committee (CTC) Study Group on Roof Vents has reviewed the provisions which require individually-activated roof vents in sprinklered buildings presently contained in the International Building Code/International Fire Code and is presently in the process of developing a code change proposal to delete the requirements for roof vents in sprinklered buildings. (The work on this code change will be completed by April 24, 2009.) The rationale for the proposal to delete the existing code provisions for roof vents in sprinklered buildings is that the research sponsored by the National Fire Protection Research Foundation conducted at Underwriters Laboratories in 1997/1998 demonstrated that individually-activated smoke/heat vents do not function properly in buildings protected by standard spray sprinklers.

In addition it should be noted that the CTC Study Group on Roof Vents is in the process of developing a code change proposal which will prohibit the use of the "ganged' roof vent concept in buildings protected by a sprinkler system. The rationale for this code change proposal is that insufficient research has been done to demonstrate that the use of this concept will not have a significant adverse impact on the capability of the sprinkler system to perform its intended function.

Committee Meeting Action: Reject

Committee Statement: The Technical Committee determined that it needed to maintain the option to include some of the design objectives. When the revisions to Chapter 11 were being made, the design objectives were relegated to the Annex of Chapter 11 (See A.11.2). It is important for the designer to keep the purpose of the system in mind when looking to incorporate smoke/heat vents in the building. The text of Section A.11.2 is consistent with and reinforces the text of Section A.4.1. Comment 204-8 (Log #CC1) contains the revised language for Chapter 11 and the associated annex.

204- Log #9 Final Action: Reject
(11.1.6.1, 11.1.6.2, and A.11.1.6.2)

Submitter: Richard C. Schulte, Schulte & Associates
Comment on Proposal No: 204-5
Recommendation: Revise text to read as follows:

11.1.6.1 Smoke and heat vents shall not delay the operation of sprinklers.

11.1.6.2* Vents shall be operated after sprinklers have been determined to establish control of the fire.

A.11.1.6.2 Adequate time is needed before smoke and heat vents are operated to allow control of the fire by the sprinkler system. ~~Sprinklers within a radius of 1-1/2 times the sprinkler spacing may be needed to operate to allow adequate fire control and pre-wetting. The elapsed time between the first sprinkler operation and the last sprinkler that is needed to operate to allow fire control will vary depending on the details of the occupancy and the sprinkler system design.~~ One method of assuring this has occurred is to arrange the smoke and heat venting system to be remotely operated by the fire department after they have established that the fire is being controlled by the sprinkler system.

Substantiation: Sections 11.1.6.1 and 11.1.6.2 outline a performance standard for the interaction between sprinklers and the venting system, but the explanatory material does not provide sufficient information regarding how a building designer is to design the "ganged" roof vent system so that the intent of these sections is accomplished.

The research outlined in the paper "*Analysis of the Performance of Ganged Operation of Smoke and Heat Vents with Sprinklers and Draft Curtains*" utilizes the Fire Dynamics Simulator (FDS) to predict the activating times of multiple sprinklers and the number of sprinklers which will activate to formulate the conclusion that the operation of multiple roof vents 60 seconds after the first sprinkler activates will not have a significant adverse impact on the capabilities of the sprinkler system to control the fire. The research reaches this conclusion based upon a total of only 16 fire simulations. Each simulation assumes that a wet pipe sprinkler system and only ceiling sprinklers will be provided.

The research does not address the use of dry pipe systems commonly used in storage occupancies in northern parts of the United States, nor does the research address sprinkler systems which utilize in-rack sprinkler protection, although the conclusion does not state any limitations on the use of the "ganged" roof vent concept with respect to particular types of system designs. The research also does not address the issue of sprinklers which are "plugged" by gravel or other debris in the system either upon initial activation or at sometime during operation of the system.

Given the above, it is Schulte & Associates' opinion that the research on the "ganged" roof vent concept is incomplete and is inadequate to draw any conclusions (assuming that the FDS is capable of accurately predicting the activation times of multiple sprinklers and the number of sprinklers which will activate).

The capabilities of the Fire Dynamics Simulator to accurately predict the activation times of multiple sprinklers and the number of sprinklers which will activate is certainly questionable at best. At this point in time, it appears that the only "expert" who contends that these capabilities of the FDS have been "totally" validated (validation without any limitations) is Dr. Craig Beyler of Hughes Associates. To my knowledge, no other researcher or user of the FDS, including other employees of Hughes Associates, such as Dr. Jason Floyd, have come forward to support Dr. Beyler's assertions regarding the validation of these capabilities of the Fire Dynamics Simulator since late May, 2008 (when the question regarding validation of the FDS for the purpose used in the research first surfaced).

With respect to the issue of validation of the FDS to accurately predict the activation times of multiple sprinklers and the number of sprinkler activations, Dr. Kevin McGrattan of the Building and Fire Research Laboratories (BFRL) at NIST responded to questions regarding the validation of the FDS for these purposes on the FDS Bulletin Board on February 17, 2009 as follows:

"*The purpose of the FDS Validation Guide is to present comparisons of FDS predictions against full-scale measurements. We work very hard to present the data in a form that enables those who use FDS, or those who are thinking of using it, to decide for themselves if the model is appropriate for a given application. We do not believe that our role is to say whether or not the model is appropriate because we cannot be sure about what the application could potentially be or what the required level of accuracy should be. We prefer that people use their own judgment to decide what is the best tool for the job. That is essentially what you are doing. You are making an argument that the model is not sufficiently accurate to predict multiple sprinkler activation. We do not want to make such a statement because we don't know exactly what you intend to use the model for, and furthermore,* ***there is no consensus metric in fire protection engineering by which a model is considered validated or not for a particular application.*** [Emphasis added.] *We prefer to do the technical work in developing the model and quantifying its accuracy as we have done in the Validation Guide. We prefer to leave the decision about validation up to you. We even provide you with this forum by which you and others can discuss the merits of the model for this and other applications. We make the source code*

available for those who want to check the model themselves, or publish their results in the open literature. We feel that an open discussion of model strengths and weaknesses is healthy, and we do everything we can to promote it.

In that spirit, let me point out the second plot in Figure 6.2. Throughout the Validation Guide, there are scatterplots similar to those shown here, except all the other scatterplots have off-diagonal lines that represent the estimated experimental uncertainty. ***All large scale fire experiments have a considerable amount of uncertainty in the reported heat release rate, environmental conditions, sprinkler characteristics (like droplet size, RTI, etc), and various other parameters that are input into the fire model. Because of the complexity of the experiments and simulations of fires in large warehouse-type facilities, especially those involving multiple sprinkler activations, we do not have a good way (yet) of quantifying the experimental uncertainty. It might be as hard to do that as to predict the experimental results themselves*** . [Emphasis added.] *So rather than try to quantify the experimental uncertainty, we have added the second plot in Figure 6.2. In the UL/NFPRF test series, Phase I, there were 22 experiments, all involving a heptane spray burner and a heat release rate of approximately 4.4 MW. Of those 22 tests, there were three replicate tests (Tests 1 and 8, Tests 4 and 7, and Tests 9 and 10). These were not designed as replicates, but in each case, a vent was either closed for the duration or did not activate, making the two tests essentially the same. The second plot in Fig. 6.2 compares the measured activation times for the sprinklers in one test against the measured activation times in the other (replicate) test.* ***This is only comparing one experiment against another. This has nothing to do with FDS. For example, in Test 8, four sprinklers activated at about 4.5 min after ignition whereas in Test 1, these same four sprinklers activated after about 2 min. There was even a sprinkler that activated after 6 min in Test 8 and after about 2.25 min in Test 1.*** [Emphasis added.]

This information tells us something about the reproducibility of large scale sprinkler experiments. [Emphasis added.] *It is not an indictment of the testing lab, UL, because this sort of behavior is not surprising for those who do this sort of testing. I observed these experiments, and I noted that following the first activation, there was a considerable effect on the fire because these sprinklers release about 1 gallon of water per second. The burner was placed exactly between four sprinklers* [in] *each test, and* ***because there is some variability in the activation temperature of a real sprinkler, there was usually one sprinkler that activated a few seconds before the others, which caused the fire, the plume, and the subsequent activations to trend in a particular direction.*** [Emphasis added.] *FDS has no such bias – the sprinklers in these calculations were programmed to activate at exactly 74 C (165 F). I suppose that we could build in a random component to the activation temperature to mimic reality, but we worry that this would simply add an additional uncertainty to an already complicated problem. We prefer that the model produce a result that, on average, compares favorably with a number of replicate tests. The fact that FDS sometimes over-predicts and sometimes under-predicts the number of activations is a good thing. Our goal is to predict the total number of activations and the average activation time of each "ring" of sprinklers. We are less concerned about one or two outliers because we know that there is a randomness to this kind of experiment that simply cannot be predicted.*

This kind of information is part of what goes into deciding if the model is appropriate for your purpose. It is my job to provide you with as much information as I can so that you can make an informed judgment. But it is not my place to tell you that the model is right for you. You decide. Ask me questions about the data if something is not clear. ***But I hope you understand that I simply cannot make a blanket statement like "FDS is validated for predicting multiple sprinkler activations."*** [Emphasis added.] *You have made an argument above that it is not, and you have every right to that opinion."*

Clearly Dr. McGrattan's response as to whether or not the FDS is validated for the purposes of predicting the activation times of multiple sprinklers and the number of sprinkler activations is radically different from Dr. Beyler's "blanket" statement on the validation of the FDS for these purposes. Most certainly, the section of the report included in the research on the "ganged" operation of roof vents in building protected by a sprinkler does not discuss the validation of the FDS in the detailed way in which Dr. McGrattan discussed this issue in his February 17, 2009 post to the FDS bulletin board.

Given that questions regarding the validation of the capabilities of the FDS to predict sprinkler activation times and number of sprinkler activations have not been resolved in more than a year since the report on the "ganged" operation of roof vents was issued, it would seem that the NFPA 204 committee's continued work on a revision of Chapter 11 of NFPA 204 should wait until further research on the "ganged" roof vent operation concept is performed. At best, the existing research into this concept is inadequate at present. Hence, it is my opinion that the proposed revision of Chapter 11 in NFPA 204 is premature.

Once again, it should be noted that the ICC Code Technology Committee Study Group on roof vents is presently developing a code change proposal to prohibit the use of the "ganged" roof vent operation concept based upon a lack of research into this concept.

This is not original material; its reference/source is as follows:

e-mail note from Dr. Kevin McGrattan, Building and Fire Research Laboratory (BFRL), National Institute of Standards and Technolcoy (NIST) dated February 17, 2009 at 5:03:49 P.M. Central Standard Time [fds-smv post:6638] Re: Validation of FDS Sprinkler Activation Times Predictions

Committee Meeting Action: Reject

Committee Statement: The language that is being suggested to be deleted is in the Annex. The Committee continues to believe that the information is important to maintain

The submitter does not indicate that the performance criteria is inadequate. The substantiation does not indicate that the information is incorrect-rather that the analytical tools used to measure the performance might be called into question. The text that is being included in Annex Section A. 11.4.2 explains and expounds on the intended design result from the operation of the two sprinkler rings-direct control of the fire and pre-wetting of adjacent combustible materials.

204- Log #2 Final Action: Accept
(11.1.11)

Submitter: Kenneth E. Isman, National Fire Sprinkler Association, Inc.
Comment on Proposal No: 204-5
Recommendation: Assuming that the committee moves forward with some version of Chapter 11, delete proposed section 11.1.11.
Substantiation: This proposal is submitted assuming that the committee will adopt some version of Chapter 11. If so, section 11.1.11 needs to be better justified, or dropped from the document. In many situation, the vent creates a ceiling pocket that is required to have sprinkler protection in accordance with NFPA 13. Vent pockets greater than 32 sq ft and more than 3 ft deep would be required to have sprinkler protection within the plan view of the vent according to NFPA 13.

If section 11.1.11 can be justified, then a proposal, with technical substantiation, needs to be sent to NFPA 13 so that the appropriate changes can be made to leave sprinklers out of these vent areas.
Committee Meeting Action: Accept
Committee Statement: That statement was not retained in the action on Comment 204-8 (Log #CC1).

204- Log #3 Final Action: Reject
(11.1.12.1)

Submitter: Kenneth E. Isman, National Fire Sprinkler Association, Inc.
Comment on Proposal No: 204-5
Recommendation: Assuming that the committee moves forward with some form of Chapter 11, insert a new section 11.1.12.1 as follows:
"11.1.12.1 The building owner shall sign a document agreeing that they will maintain the aisles under the draft curtains and that they will not put storage of combustibles in these aisles. This document shall also be given to all tenants and shall be transferred tot he next owner upon sale of the building."
Substantiation: Much of the research mentioned in Annex F agrees that draft curtains are a serious problem for sprinkler systems when a fire starts under the draft curtain. In may full-scale fire tests, fires starting under draft curtains have opened approximately twice the number of sprinklers and over-run the design area of the sprinkler system. Maintenance of aisles below draft curtains is a key assumption and needs to be conveyed to everyone in a position to make decisions about where products will go in the building. It's not enough for the engineer to make this assumption. This information needs to be transmitted all the way down the chain of people in the building.
Of course, it is still possible to have a fire under a draft curtain, even if the aisle is in the correct location. Fires have occurred when forklift trucks have dropped the loads that they are carrying. Having the aisle is not a guarantee that the sprinklers will not be effected by the draft curtain, it just helps reduce the probability that the sprinkler system will not control the fire.
Committee Meeting Action: Reject

Committee Statement: The committee believes this item is related more closely to a fire prevention code issue thus it is more appropriate to be governed by NFPA 1 , Fire Code. The subject is important for on going inspection however, it can be difficult to enforce. The information should be consistent with Section 34.4.3.2 of NFPA 1.

204- Log #4 Final Action: Accept in Principle
(A.11.1.1)

Submitter: Kenneth E. Isman, National Fire Sprinkler Association, Inc.
Comment on Proposal No: 204-5
Recommendation: Assuming that the committee moves ahead with some version of Chapter 11, insert a new annex note A.11.1.1 as follows:

"A.11.1.1 The only full-scale fire tests that have been conducted to investigate the interaction of vents and fire sprinklers have been conducted with standard spray control mode sprinklers, so this chapter is limited to these kinds of sprinklers. Full-scale fire tests have been conducted with Early Suppression Fast Response (ESFR) sprinklers in buildings without vents and the sprinklers have successfully suppressed those fires in a short period of time with minimal smoke discharge, minimizing the need for venting.

ESFR sprinklers are much more sensitive to heat than typical standard spray sprinklers and it is theorized that vents operating before the ESFR sprinkler has suppressed of the fire might cause additional ESFR sprinklers to activate remote from the fire and interrupt the suppression capabilities of the sprinklers. Until more information is known about the interaction of vents and ESFR sprinklers, the provisions of this chapter should not be applied to buildings that have ESFR sprinkler systems."

Substantiation: The committee appeared to be struggling with what to do with ESFR sprinklers. This proposed annex text is a fair representation of where we are in our understanding of the interaction between vents and ESFR sprinklers. We understand why the committee rejected Proposal 204-6, but we feel that some statement is necessary in NFPA 204 that warns the user of potential problems.
Committee Meeting Action: Accept in Principle
Retain information concerning ESFR sprinklers and smoke/heat vents.
Committee Statement: The committee did include additional discussion on the tests that were done with control mode sprinklers. The annex text proposed in Section A.11.4 notes the limits on the tests that were done and makes reference to NFPA 13, Standard for the Installation of Sprinkler Systems, where additional information can be found.

204- Log #8 Final Action: Accept
(A.11.1.5)

Submitter: Richard C. Schulte, Schulte & Associates
Comment on Proposal No: 204-5
Recommendation: Delete the following text:

~~A.11.1.5 This specification of the design fire assures that the vent system will be effective under the most challenging fire conditions consistent with successful sprinkler system operation. Note that smoke vents will not be effective in removing fully cooled gases that have no residual buoyancy. This has no impact on smoke vent system design.~~

Substantiation: The first two sentences of this section appear to conflict with one another. The first sentence in this section states that the venting system should be designed for the most challenging fire assuming successful sprinkler operation, while the second sentence notes that venting systems will not be effective in removing fully cooled gases. Based upon the second sentence, it appears that the most challenging fire from the standpoint of the design of a venting system could be a smaller fire which is quickly and effectively controlled by the operation of the sprinkler system, for example by the operation of only in-rack sprinklers.

The above is a concise statement of the problem with the use of a venting system in buildings protected by a sprinkler system. The more successful the sprinkler system is in controlling a fire, the less efficient the venting system becomes due to the fact that the efficient operation of the venting system depends upon the buoyancy of the fire gases. There is a potential for significant smoke damage to occur in a building where the sprinkler system is highly effective. Statistics on sprinkler operation indicate that highly effective operation is more probable than less effective operation. Hence, the probability that the venting system will be ineffective is greater than the probability that the venting system will be effective in a sprinklered building.

It would be the “worst-of-worlds” if a building owner elected to install a venting system to limit smoke damage per the recommendations of NFPA 204 and significant smoke damage occurred due to the fact that the sprinkler system was highly effective in controlling the fire.

Committee Meeting Action: Accept
Committee Statement: Those statements were not retained in the revised text. See committee action on comment 204-8 (Log #CC1).

204- Log #10 Final Action: Reject
(A.11.1.6.2)

Submitter: Richard C. Schulte, Schulte & Associates
Comment on Proposal No: 204-5
Recommendation: A.11.1.6.2 Adequate time is needed before smoke and heat vents are operated to allow control of the fire by the sprinkler system. ~~Sprinklers within a radius of 1-1/2 times the sprinkler spacing may be needed to operate to allow adequate fire control and pre-wetting. The elapsed time between the first sprinkler operation and the last sprinkler that is needed to operate to allow fire control will vary depending on the details of the occupancy and the sprinkler system design. One method of assuring this has occurred is to arrange the smoke and heat venting system to be remotely operated by the fire department after they have established that the fire is being controlled by the sprinkler system.~~ Based upon explanatory material on sprinkler design and operation for high-challenge fires contained in NFPA 13, the "ganged" operation of smoke and heat vents should not occur until at least 30 minutes after the activation of the sprinkler system water flow indicator.

Substantiation: The statement that "sprinklers within a radius of 1-1/2 times the sprinkler spacing" should operate to allow for "pre-wetting" prior to the opening of the vent system is inadequate to allow for the proper operation of the sprinkler system. This "rule of thumb" does not apply where sprinklers do not operate either due to sprinkler "skipping" or due to an obstruction of the sprinkler orifice by gravel or other debris.

Assuming a sprinkler spacing of 10 feet on-centers and a fire occurring directly under one of the sprinklers, the application of the "rule of thumb" would mean that opening of the venting system would be appropriate after sprinklers protecting a square of 900 SF in area operate. While this may be acceptable under normal or typical sprinkler system operations, in cases where individual sprinklers fail to discharge water (due to sprinkler skipping or sprinkler orifice obstructions), assuming that sprinklers operating over 900 SF of floor area prior to vent system opening is an adequate length of time for the sprinkler system to control the fire is a poor assumption.

Since the failure to activate due to sprinkler "skipping" may be transient or permanent and the failure to discharge water due to gravel obstructions could occur at any time after a sprinkler activates, the conservative design of a "ganged" venting system should allow the sprinkler system to discharge water for at least a 30 minute period. The 30 minute time period is based upon the following statements included in NFPA 13:

"Sprinkler protection installed as required in this standard is expected to protect the building occupancy without supplemental fire department activity."

"During the testing program, the installed automatic extinguishing system was capable of controlling the fire and reducing all temperatures to ambient within 30 minutes of ignition."

It should be noted that the "ganged" venting system design suggested in the last sentence of Section A.11.6.2 will likely allow significant smoke damage to occur, as will a delay of 30 minutes before the venting system is opened. Allowing a 30 minute delay in the activation of the venting system essentially makes the venting system useless, but a useless venting system is better than a venting system which causes the failure of the sprinkler system and subsequent destruction of a building.

The ICC Code Technology Committee's Study Group on roof vents approach to the issue is to require that a manually activated smoke removal system designed to be used for "mop up" purposes (after the fire has been controlled by the sprinkler system) be provided in lieu of a venting system. The design of the smoke removal system will be based upon the assumption that the smoke exhausted will be at ambient temperature.

This is not original material; its reference/source is as follows:
NFPA 13
Committee Meeting Action: Reject
Committee Statement: See Committee Action on 204-10 (Log # 9). The addition of the second sentence would seem to take away the option of allowing the FD to open the vents at their discretion. As submitted, they would have to wait 30 minutes before taking any action with regard to the vents. The committee believes that is an excessive period.

204- Log #CC5 Final Action: Accept
(Annex G)

Submitter: Technical Committee on Smoke Management Systems,
Comment on Proposal No: 204-1
Recommendation: Update the referenced documents to recognize the latest editions.
G.1.1 NFPA Publications.
National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.
NFPA 13, Standard for the Installation of Sprinkler Systems, 2010~~07~~ edition
NFPA 68, Standard on Explosion Protection by Deflagration Venting, 2007 edition
NFPA 72®, National Fire Alarm and Signaling Code, 2010~~07~~ edition.
NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems, 2009~~02~~ edition.
NFPA 92B, Standard for Smoke Management Systems in Malls, Atria, and Large Spaces, 2009~~07~~ edition.
NFPA 96, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations, 2008~~04~~ Edition
NFPA 287, Standard Test Methods for Measurement of Flammability of Materials in Cleanrooms Using a Fire Propagation Apparatus (FPA), 2007 edition
G.1.2 Other Publications.
G.1.2.1 ASTM Publications.
ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.
ASTM D 635, Test Method for Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position, 2006 ~~1991~~.
ASTM E 1321, Standard Test Method for Determining Material Ignition and Flame Spread Properties, 2009 ~~1993~~.
ASTM E 1354, Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter, 2009 ~~1994~~.
ASTM E 2058, Standard Test Methods for Measurement of Synthetic Polymer Material Flammability Using a Fire Propagation Apparatus (FPA), 2009~~01~~.
Substantiation: This comment updates the referenced documents to recognize the latest editions. See related comment on 204- .
Committee Meeting Action: Accept

National Fire Protection Association
1 Batterymarch Park, Quincy, MA 02169-7471
Phone: 617-770-3000 • Fax: 617-770-0700 • www.nfpa.org

MEMORANDUM

To: Tracy Golinveaux, Staff Liaison for Smoke Management Systems Committee

From: G. Colonna, Staff Liaison for Pyrotechnics Committee

Date: July 16, 2010

Subject: Transmittal of Draft Proposals for NFPA 1124 (A12) for review and action by Smoke Management Systems Technical Committee (SMO-AAA)

Attached are Draft Proposals (pre-ROP) CP#6, CP#7 and CP#8, and the letter ballot results for proposed changes to Chapter 7 of NFPA 1124, *Code for Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles*. This material was developed by the Committee on Pyrotechnics at its February 1 – 2, 2010 meeting in Salt Lake City.

In accordance with the direction in the Standards Council decision D#08-19 issued October 1, 2008, this material has been developed as Draft Proposals (pre-ROP) and has been letter balloted through the Committee on Pyrotechnics. In addition to the Draft Proposals, I have also attached the final ballot results indicating that the items achieved the required 2/3rd majority and simple majority with affirmative votes for DRAFT Committee Proposals (DRAFT CP#6, DRAFT CP#7, and DRAFT CP#8).

In accordance with the direction of the Council, I am providing you with this information as Staff Liaison to the Committee on Smoke Management Systems and requesting that you include this as an agenda item for future consideration by the Smoke Management Systems Technical Committee. The Task Group leader for the Pyrotechnics Committee for this activity is Jerry Farley. If the Committee has questions on any aspect as presented in the attached Draft Proposal, please contact me or Mr. Farley directly for clarification.

Thanks for your assistance in this process and thanks to the Smoke Management Systems Technical Committee in advance for their efforts to assist with this revision of NFPA 1124. If you have any questions, please contact me.

Enclosures: Draft Committee Proposals (3 items, Draft CP#6, Draft CP#7, and Draft CP#8)
Letter Ballot on Draft Committee Proposals, final results

cc: Linda Fuller, Standards Administration
J. Moreau, Project Administrative Supervisor

NFPA 1124-2006
Draft Committee Proposals
Approved for letter ballot at Committee Meeting, February 1 – 2, 2010, Salt Lake City, UT
These actions relate to item 5 in the Standards Council Decision, D#08-19 and are to be coordinated with the Smoke Management Systems Committee in accordance with Standards Council direction following the completion of the letter ballot by the Committee on Pyrotechnics.

Log# **DRAFT CP#6**

Submitter: Technical Committee on Pyrotechnics

Recommendation: It is proposed that paragraph 6.5.3 be amended to read as follows:

6.5.3 Smoke and Heat Vents. Smoke and heat vents designed and installed in accordance with the ICC International Fire Code ~~NFPA 204, Standard for Smoke and Heat Venting,~~ shall be provided in consumer fireworks storage buildings exceeding 50,000 ft^2 (4644 m^2) in undivided area.

6.5.3.1 The design shall be based on the requirements for a Group S-1 occupancy classification.

6.5.3.1.1 Where the storage height of the consumer fireworks is such that the storage is classified as high-piled combustible storage, the design shall be based on the requirements for high-piled combustible storage.

6.5.3.1.2 The smoke and heat vents shall be designed to operate automatically by actuation of a heat-responsive device having a temperature classification higher than the temperature classification of the automatic sprinklers.

6.5.3.1.2.1 Where smoke and heat vents are installed in areas of the building protected by early suppression fast-response (ESFR) sprinklers, the heat-responsive device used to automatically activate the smoke and heat vents shall have a high temperature classification.

6.5.3.2 Smoke and heat vents shall not be required to be automatically activated in areas of the building where early suppression fast-response (ESFR) sprinklers are provided.

Add a new Section 2.3.4 as follows:

2.3.4 ICC Publication. International Code Council, 500 New Jersey Avenue, NW, 6th Floor, Washington, DC 20001-2070.

ICC International Fire Code, 2009 edition.

Renumber the remaining Sections accordingly.

Substantiation:

The NFPA Pyrotechnics Technical Committee (TC) has determined that the requirement for smoke and heat vents for storage facilities storing consumer fireworks, 1.4G should be continued to be required in accordance with Section 6.5.3 when the building exceeds 50,000 sq ft in undivided area. This requirement is based on Section 910.2.1 Group F-1 or S-1 of the 2009 ICC International Fire Code (IFC). Although the storage of consumer fireworks, 1.4G is classified as a Group H-3 occupancy, rather than a Group S-1 occupancy, by the IFC, the TC believes that triggering the requirement for smoke and heat vents based on a Group S-1 occupancy per the IFC provides for improved fire protection to the building, its contents, and its occupants in terms of the ability to remove large quantities of smoke either automatically or manually. It should be noted that prior to the 2006 edition of the IFC, Group H-3 occupancies greater than 15,000 sq ft in area were also required to be provided with smoke and heat vents. And at least one of the legacy codes, the 1997 ICBO Uniform Building Code (UBC), also required smoke and heat vents for Group S-1 occupancies greater than 50,000 sq ft in undivided area, as well as for Group H-3 occupancies greater than 15,000 sq ft in area.

The main concern the Pyrotechnics TC has for the need for smoke and heat vents in these larger storage buildings is the large quantities of smoke that can be generated by consumer fireworks, 1.4G once they become involved in a fire. By their very nature, consumer fireworks are, in many cases, designed to produce smoke or their discharge creates additional smoke beyond that which could normally be expected from the packaging in which the consumer fireworks are contained while in storage. Since the smoke and heat vents are required to be both manually and automatically operated, the fire department can take advantage of the smoke and heat vents in assisting them in evacuating these excessive quantities of smoke from the building. This will enable the fire fighters to have better visibility and access to the seat of the fire, as well as to remove the smoke after the fire is controlled and extinguished. This will minimize the risk to the responding fire fighters from having to go onto the roof

and manually cut holes in the roof to facilitate the evacuation of smoke and hot gases during their firefighting efforts.

Thus, the TC is proposing to add a new Subsection 6.5.3.1 to indicate that the design of the smoke and heat vents is to be based on the requirements for a Group S-1 occupancy classification since Table 910.3 Requirements for Draft Curtains and Smoke and Heat Vents in the IFC no longer contains design criteria for Group H-3 occupancies. Also, a new Subsection 6.5.3.1.1 is being added to indicate when the smoke and heat vents must comply with the requirements for high-piled combustible storage which involves a different set of design criteria in the same table. This provides the user of NFPA 1124 with adequate guidance to determine what design criteria to use given the height of storage in their building. If the storage height is such that it does not meet the criteria for high-piled combustible storage as defined in the IFC, then the smoke and heat vents would be designed in accordance with the criteria for a Group S-1 occupancy classification.

New Subsection 6.5.3.1.2 is being added to require the smoke and heat vents to be automatically operated by heat-responsive devices with a temperature classification higher than the temperature classification of the automatic sprinklers. This is based on the requirement in Section 12.1.1.1 of NFPA 13-2010 in order to allow for the installation of smoke and heat vents in sprinklered buildings. Since these buildings will be greater than 50,000 sq ft in area, they will be required to be protected with automatic sprinklers in accordance with Section 6.5.1 of NFPA 1124. Also, proposed new Subsection 6.5.3.1.2.1 mandates that smoke and heats vents installed in areas of the building that are protected with early suppression fast-response (ESFR) sprinklers have heat-responsive devices with a high temperature classification. This is also a requirement in NFPA 13-2010 in Section 12.1.1.2. And a new Subsection 6.5.3.2 is being added to allow the smoke and heat vents installed in areas of the building protected with early suppression fast-response (ESFR) sprinklers to be provided with manual activation only. This is consistent with Exception 2 to Section 910.1 General of the 2009 IFC.

It should also be noted that Section 6.5.3 Smoke and Heat Vents is proposed to be modified to delete the reference to NFPA 204, Standard for Smoke and Heat Venting, and substitute the reference to the ICC International Fire Code. This is being done because there is inadequate fire test data available, including rate of heat release data, for the storage of consumer fireworks, 1.4G in order to engineer a smoke and heat vent system in accordance with NFPA 204. However, because the design criteria for

smoke and heat vents in the ICC International Fire Code are prescriptive, those criteria can be used without additional substantiation or test data.

And, of course, a new Section 2.3.4 ICC Publication is being added to include the referenced code the ICC International Fire Code, 2009 edition.

Committee Meeting Action: Accept

Log# **Draft CP#7**

Submitter: Technical Committee on Pyrotechnics

Recommendation: It is proposed that paragraph 7.3.10 be deleted in its entirety as shown:

Delete Section 7.3.10 in its entirety:

~~**7.3.10 Smoke Control.**~~

~~**7.3.10.1** Smoke and heat vents designed and installed in accordance with NFPA 204, Standard for Smoke and Heat Venting, shall be provided in the CFRS area of new permanent CFRS facilities or stores where the ceiling height is less than 10 ft (3.05 m) and the travel distance to reach an exit is greater than 25 ft (7.6 m).~~

~~**7.3.10.2** The smoke and heat vents required by 7.3.10.1 shall be automatically activated by a smoke detection system installed throughout the CFRS area in accordance with NFPA 72, National Fire Alarm Code.~~

Substantiation:

The NFPA Pyrotechnics Technical Committee (TC) agrees with the concerns raised by the Standards Council regarding Fire Safety Concern Issue #5: Smoke and Heat Venting as detailed in the Council Decision D#08-19 regarding the fact that there does not exist adequate technical justification nor test data to justify the requirements for the installation of smoke and heat venting that is gang activated by a smoke detection system in buildings used for the retail sales of consumer fireworks where the ceiling height is less than 10 feet and the travel distance to reach an exit is greater than 25 feet. Therefore, the TC is proposing to delete in its entirety Section 7.3.10 Smoke Control from NFPA 1124-2006.

However, the TC wishes to voice its concern about the Fire Protection Research Foundation (FPRF) Report upon which the Council relied in making its decision regarding the reference to the Battelle Fire Test as a part of the substantiation for their concern. It should be pointed out that the test was not a representation of a consumer fireworks retail sales facility in compliance with the current edition of NFPA 1124. Furthermore, much of the consumer fireworks were confiscated product not in original packaging material with fuses exposed and did not arrive in good condition after being transported to the test facility. Also the product was arranged on the display shelves in a random method that was inconsistent with the requirements of Chapter 7 of NFPA 1124. And, unfortunately, the funding was so

limited that only a single test could be conducted which does not provide any indication of ability to replicate the test results. In other words, one test does not provide any indication that it was truly representative of the fire condition that would be expected to be developed in that scenario rather than just a unique event. The TC's decision to delete Section 7.3.10 did not rely upon the fire test data developed from the Battelle Fire Test.

Committee Meeting Action: Accept

Log# **Draft CP#8**

Submitter: Technical Committee on Pyrotechnics

Recommendation: It is proposed that a new paragraph 7.3.10 be added to read as follows:

7.3.10 Minimum Ceiling Height.

7.3.10.1 The ceiling height in the CFRS area of new permanent CFRS facilities and stores shall not be less than 12 ft (3.6 m) above the finished floor surface.

7.3.10.1.1 Where the travel distance to reach an exit does not exceed 25 ft (7.6 m), the ceiling height shall be permitted to be less than 12 ft (3.6 m) but not less than 8 ft (2.4 m) above the finished floor surface.

Substantiation:

The NFPA Pyrotechnics Technical Committee (TC) proposes to add a new Section 7.3.10 Minimum Ceiling Height to require all CFRS areas of new permanent CFRS facilities and stores to have a minimum ceiling height of 12 feet. New Subsection 7.3.10.1 is being added as an exception to the 12 foot ceiling height minimum in small facilities where the travel distance does not exceed 25 feet, provided the ceiling height is not less than 8 feet.

Virtually all new permanent CFRS facilities and stores are being constructed with ceiling heights of at least 12 feet. But more importantly, the minimum 12 foot ceiling height provides for a very large reservoir in which smoke and heat can accumulate overhead before threatening the tenability of the egress paths used by the occupants to exit the building or fire area during a fire emergency. It is generally accepted that maintaining the hot smoke layer above 6 feet will provide for reasonably tenable conditions in which the occupants can safety evacuate. Requiring a minimum 12 foot ceiling height will achieve a minimum 4 foot deep reservoir in which the smoke and hot gases can accumulate before becoming life threatening to the escaping occupants.

In the case of the exception allowing a ceiling height as low as 8 feet, the travel distance limit of 25 feet will facilitate very quick evacuation of the building since the time required for most occupants to travel 25 feet should be less than 5 seconds. Refer to Section A.7.11.1 of NFPA 101-2009 which states: “Seventy-five feet (23 m) can be traversed in approximately 10 seconds to 15 seconds, even when allowing for a momentary delay to decide which way to go, during which it can be assumed that the

average individual can hold his or her breath." Obviously, the 25 foot travel distance is significantly less than the 75 foot travel distance allowed for high hazard contents occupancies by NFPA 101 Section 7.11 Special Provisions for Occupancies with High Hazard Contents. So this is a very conservative exception to the 12 foot minimum ceiling height requirement.

Committee Meeting Action: Accept

SMO-AAA/1124 Conference Call Meeting Minutes
NFPA Technical Committee on Smoke Management Systems

Thursday, September 30, 2010
Microsoft Office Live Meeting/Conference Call

1. Call to Order.
The meeting was called to order by Chair Randy Tucker at 1:00 PM.

2. Introduction of Committee Members Present
Self introductions of members and guests were completed. Those present included:

TECHNICAL COMMITTEE MEMBERS PRESENT

NAME	REPRESENTING
Dillon, Michael, Principal	Dillon Consulting Engineers, Inc.
Dittrich, Robert, Principal	Honeywell, Inc.-Rep. National Electrical Manufacturers Association
Evans, Douglas, Principal	Clark County Building Department
Golinveaux, Tracy, Staff Liaison	NFPA
Lougheed, Gary, Principal	National Research Council of Canada
Solomon, Robert	NFPA
Thornberry, Richard (Alt. to W. Koffel)	The Code Consortium, Inc. – Rep. AAMA Smoke Vent Task Group
Tucker, Randolph, Chair	The RJA Group, Inc.
Turnbull, Paul, Principal	Siemens Building Technology, Inc.
Wolin, Steven	Code Consultants, Inc.

GUESTS

Farley, Jerald	PYR-AAA
Marmon, Darell	PYR-AAA
Robbins, Rachel	PYR-AAA

3. Background Information
Several "Approval Committees" were tasked to review proposed changes for the next edition of NFPA 1124. The TC on Smoke Management Systems was one of those dedicated for this task. The purpose of the meeting was to review three draft committee proposals from the Pyrotechnics Committee and provide feedback.

4. NFPA 1124 Draft CP#6
The committee reviewed NFPA 1124 Draft CP#6 and suggested revisions to PYR-AAA (Appendix A).

5. NFPA 1124 Draft CP#7
The committee reviewed NFPA 1124 Draft CP#7. The meeting action will be submitted to a letter ballot (See Appendix B).

6. NFPA 1124 Draft CP#8
The committee reviewed NFPA 1124 Draft CP#8 and suggested revisions to PYR-AAA (Appendix C).

7. Adjournment The committee adjourned the meeting at 2:45 PM on September 30, 2010.

APPENDIX A: CP#6

Committee Meeting Actions and Recommendation:

As the result to a straw poll, the committee agreed to Reject the changes in CP#6. The committee drafted the following recommendation to the PYR-AAA committee:

NFPA 1124 should reference an ANSI approved document such as 204. At this time the SMO-AAA committee does not believe there is specific scientific data to set forth the requirements for smoke and heat venting within a sprinklered storage facility such as being described. NFPA 1124 should provide data to SMO-AAA to substantiate any alternatives.

Log# **DRAFT CP#6**

Submitter: Technical Committee on Pyrotechnics

Recommendation: It is proposed that paragraph 6.5.3 be amended to read as follows:

6.5.3 Smoke and Heat Vents. Smoke and heat vents designed and installed in accordance with the ICC International Fire Code ~~NFPA 204, Standard for Smoke and Heat Venting,~~ shall be provided in consumer fireworks storage buildings exceeding 50,000 ft_2 (4644 m_2) in undivided area.

6.5.3.1 The design shall be based on the requirements for a Group S-1 occupancy classification.

6.5.3.1.1 Where the storage height of the consumer fireworks is such that the storage is classified as high-piled combustible storage, the design shall be based on the requirements for high-piled combustible storage.

6.5.3.1.2 The smoke and heat vents shall be designed to operate automatically by actuation of a heat-responsive device having a temperature classification higher than the temperature classification of the automatic sprinklers.

6.5.3.1.2.1 Where smoke and heat vents are installed in areas of the building protected by early suppression fast-response (ESFR) sprinklers, the heat-responsive device used to automatically activate the smoke and heat vents shall have a high temperature classification.

6.5.3.2 Smoke and heat vents shall not be required to be automatically activated in areas of the building where early suppression fast-response (ESFR) sprinklers are provided.

APPENDIX B: CP#7

Committee Meeting Actions and Recommendation:

As the result of a straw poll, the committee agreed to accept the removal of section 7.3.10 from NFPA 1124. There is no technical justification to support the need for vents within a building with 10' ceilings. A letter ballot will be sent to the SMO-AAA committee to approve this action.

Log# **Draft CP#7**

Submitter: Technical Committee on Pyrotechnics

Recommendation: It is proposed that paragraph 7.3.10 be deleted in its entirety as shown:

Delete Section 7.3.10 in its entirety:

~~**7.3.10 Smoke Control.**~~

~~**7.3.10.1** Smoke and heat vents designed and installed in accordance with NFPA 204, Standard for Smoke and Heat Venting, shall be provided in the CFRS area of new permanent CFRS facilities or stores where the ceiling height is less than 10 ft (3.05 m) and the travel distance to reach an exit is greater than 25 ft (7.6 m).~~

~~**7.3.10.2** The smoke and heat vents required by 7.3.10.1 shall be automatically activated by a smoke detection system installed throughout the CFRS area in accordance with NFPA 72, National Fire Alarm Code.~~

APPENDIX C: CP#8

Committee Meeting Actions and Recommendation:
As the result of a straw poll, the committee agreed with and drafted the following recommendation to the PYR-AAA committee:

There is nothing in this proposal that deals with active smoke control. The SMO-AAA committee addresses smoke filling within NFPA 92B, however the design requires the heat release rate of the combustibles which is not available and the entrainment equations included in NFPA 92B may not be adequate for this type of combustible.

NFPA 92B requires the ceiling height to be calculated by the designer, it does not provide recommended ceiling heights. This proposal does not provide technical justification as to why 12' was selected.

Log# **Draft CP#8**

Submitter: Technical Committee on Pyrotechnics
Recommendation: It is proposed that a new paragraph 7.3.10 be added to read as follows:
7.3.10 Minimum Ceiling Height.
7.3.10.1 The ceiling height in the CFRS area of new permanent CFRS facilities and stores shall not be less than 12 ft (3.6 m) above the finished floor surface.
7.3.10.1.1 Where the travel distance to reach an exit does not exceed 25 ft (7.6 m), the ceiling height shall be permitted to be less than 12 ft (3.6 m) but not less than 8 ft (2.4 m) above the finished floor surface.

Committee on NFPA 1124

M E M O R A N D U M

TO: NFPA Technical Committee on Pyrotechnics

FROM: Jeanne Moreau

DATE: June 14, 2010

SUBJECT: NFPA 1124 A11 Draft Ballot Final Results – **CP6, CP7, and CP8**

The Final Results of the NFPA 1124 Draft Ballot are as follows:

32 Members Eligible to Vote
3 Ballots Not Returned (P. Grucci, G. Hanson, R. Robbins)

29 Affirmative on All
0 Negatives
0 Abstentions

The number of affirmative votes need for the report to be published is 20.
(32 eligible to vote - 3 not returned - 0 abstentions = 29 × 0.66 = 19.14)

In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.
(32 of eligible voting members ÷ 2 = 16 (17)

Reasons for negative votes, etc. from alternate members are not included unless the ballot from the principal member was not received.

According to the final ballot results, all ballot items received the necessary 2/3 required affirmative votes to pass ballot.

National Fire Protection Association
1 Batterymarch Park, Quincy, MA 02169-7471
Phone: 617-770-3000 • Fax: 617-770-0700 • www.nfpa.org

M E M O R A N D U M

TO: NFPA Technical Committee on Smoke Management Systems (SMO-AAA)

FROM: Tracy Golinveaux, Staff Liaison

DATE: October 22, 2010

SUBJECT: Approval Committee Ballot **FINAL** Results (A2011)

The Final Results of the NFPA 1124 Approval Ballot – DRAFT #CP7 - *Accept the action and substantiation put forth by the Technical Committee on Pyrotechnics* are as follows:

25 Members Eligible to Vote
3 Not Returned (G. Harris, A. Militello, P. Willse)

There are two criteria necessary to pass ballot [(1) affirmative $^{2}/_{3}$ vote and (2) simple majority].

(1) The number of affirmative votes needed for the proposal to pass is **15.**
(25 eligible to vote - 3 not returned - 0 abstentions = 22 × 0.66 = 14.52)

(2) In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required. This is the calculation for simple majority:
[25 eligible ÷ 2 = 11.5 = **(12)**]

Reasons for negative votes, etc. from alternate members are not included unless the ballot from the principal member was not received.

According to the final ballot results, the ballot received the necessary 2/3 required affirmative votes to pass ballot.

Attachments: Negative and Abstention Comments

APPROVAL COMMITTEE BALLOT FOR NFPA 1124
Draft CP#7

With regard to the action on Draft CP #7 concerning the removal of section 7.3.10 Smoke Control from NFPA 1124 to "Accept the Removal of section 7.3.10 as proposed by the Technical Committee on Pyrotechnics,":

25 Members eligible to vote
3 Ballots not returned (G. Harris, A. Militello and P. Willse)
21 Agree
1 Disagree (R. Sampson)

(Comments attached)

RECEIVED OCT 6 2010

NFPA SMOKE MANAGEMENT SYSTEMS (SMO-AAA)

APPROVAL COMMITTEE BALLOT FOR NFPA 1124, CODE FOR THE MANUFACTURING, TRANSPORTATION, STORAGE AND RETAIL SALE OF FIREWORKS AND PYROTECHNIC ARTICLES

With regard to the action on Draft CP#7 concerning the removal of section **7.3.10 Smoke Control** from NFPA 1124 to "**Accept the removal of section 7.3.10 as proposed by The Technical Committee on Pyrotechnics,**":

☐ **Affirmative** ☑ **Negative*** ☐ **Abstain***

*Per NFPA Regulations comments must accompany any negative or abstaining vote.

COMMENTS:

SMOKE VENT GUIDELINES ARE MUCH BETTER DEFINED BY NFPA THAN BY ANY OTHER ORGANIZATION. THIS IS A VERY DRASTIC STEP BACKWARDS

Sign Name: Robert C Simpson

Print Name: ROBERT C. SIMPSON

Date: 10-6-10

Please complete and return this ballot by **Thursday, October 7, 2010** to Jill McGovern by fax or email:

Fax: +1-617-984-7110
Email: jmcgovern@nfpa.org

92- Log #1 Final Action:
(2.3.1)

Submitter: John F. Bender, Underwriters Laboratories Inc.
Comment on Proposal No: 92-1
Recommendation: Revise text to read as follows:

2.3.1 UL Publications. Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.
ANSI/UL 555, Standard for Fire Dampers, 2006, Revised 2010.
ANSI/UL 555S, Standard for Smoke Dampers, 1999, Revised ~~2009~~ 2010.
ANSI/UL 864, Standard for Control Units and Accessories for Fire Alarm Systems, 2003, Revised 2010.

Substantiation: Update referenced standard to include most recent revisions. Added ANSI/UL 555, which is referenced in 6.3.2. Add ANSI approval designation for ANSI/UL 555S and ANSI/UL 864.

92- Log #2 (6.3) Final Action:

Submitter: John F. Bender, Underwriters Laboratories Inc.
Comment on Proposal No: 92-1
Recommendation: Revise text to read as follows:

6.3 Smoke Dampers .

6.3.1 Smoke dampers used to protect openings in smoke barriers or used as safety-related dampers in engineered smoke control systems shall be listed and labeled in accordance with ANSI/UL 555S, Standard for Smoke Dampers.

6.3.2 Combination fire and smoke dampers shall be listed and labeled in accordance with ANSI/UL 555, Standard for Fire Dampers, and ANSI/UL 555S, Standard for Smoke Dampers.

Substantiation: Add ANSI approval designation to ANSI/UL 555 and ANSI/UL 555S.

92- Log #3 Final Action:
(M.1.2.5)

Submitter: John F. Bender, Underwriters Laboratories Inc.
Comment on Proposal No: 92-1
Recommendation: Revise text to read as follows:

M.1.2.5 UL Publications. Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.
ANSI/UL 555, Standard for Fire Dampers, 2006, Revised ~~2009~~ 2010.
ANSI/UL 555S, Standard for Smoke Dampers, 1999, Revised ~~2009~~ 2010.

Substantiation: Update referenced standard to include most recent revisions.

92- Log #4 Final Action:
(A.6.4.7)

Submitter: Lawrence J. Shudak, Underwriters Laboratories Inc.
Comment on Proposal No: 921-1
Recommendation: Items A.6.4.7(1) through A.6.4.7(3) describe multiple methods that can be used, either singly or combination, to verify that all portions of the controls and equipment are operational. For example, conventional (electrical) supervision might be used to verify the integrity of the conductors used to send an activation signal from a fire alarm system control unit to the ~~relay contact within 3 ft (1 m) of the~~ smoke control system input (see Clause 6.4.7.4 of this standard ~~NFPA 72, National Fire Alarm Code, Section 6.15~~), and end-to-end verification might be used to verify operation from the control system input to the desired end result. If different systems are used to verify different portions of the control circuit, controlled equipment, or both, then each system would be responsible for indicating off-normal conditions on its respective segment.
Substantiation: The annex material references an previous edition of NFPA 72 and the basic requirement has been imported into the body of this standard.