# Code Technology Committee
# 2010 Final Action Agenda
# BFP: Vertical Openings & Roof Vents

The following are code changes and public comments to be considered at the 2010 Dallas Final Action Hearings that are related to the CTC Area of Study noted above.



## FS56-09/10

**702.1, 708, 708.1, 708.2, 712.4, 711.4.1 (NEW), 715.5,712.1.1 (NEW), 712.1.4, through 712.1.18, 713 (New), 713.1 (NEW), 713.3, 713.4, 713.4.1, 713.4.1.2,713.4.1.3,713.4.1.4, 713.4.2, 713.4.2.1, 713.4.2.2, 713.5, 714.6**

***Proposed Change as Submitted***

**Proponent:** Paul K. Heilstedt, PE, FAIA, Chair, representing ICC Code Technology Committee (CTC)

**Revise as follows:**

**SECTION 702**
**DEFINITIONS**

**702.1 Definitions.** The following words and terms shall, for the purposes of this chapter, and as used elsewhere in this code, have the meanings shown herein.

**JOINT.** The linear opening in or between adjacent ~~fire resistance rated~~ assemblies that is designed to allow independent movement of the building in any plane caused by thermal, seismic, wind or any other loading.

**L RATING.** The air leakage rating of a through penetration firestop system or a fire-resistant joint system when tested in accordance with UL 1479 or UL 2079, respectively.

**MEMBRANE PENETRATION.** ~~An opening made through one side (wall, floor or ceiling membrane) of an assembly.~~ . A breach in one side of a floor-ceiling, roof-ceiling or wall assembly to accommodate an item installed into or passing through the breach.

**MEMBRANE-PENETRATION FIRESTOP.** A material, device or construction installed to resist for a prescribed time period the passage of flame and heat through openings in a protective membrane in order to accommodate cables, cable trays, conduit, tubing, pipes or similar items.

**MEMBRANE-PENETRATION FIRESTOP SYSTEM.** An assemblage consisting of a fire-resistance-rated floor-ceiling, roof-ceiling or wall assembly, one or more penetrating items installed into or passing through the breach in one side of the assembly and the materials or devices, or both, installed to resist the spread of fire into the assembly for a prescribed period of time.

**PENETRATION FIRESTOP.** A through-penetration firestop or a membrane-penetration firestop.

**THROUGH PENETRATION.** ~~An opening that passes through an entire assembly.~~ A breach in both sides of a floor, floor-ceiling or wall assembly to accommodate an item passing through the breaches.

**THROUGH-PENETRATION FIRESTOP SYSTEM.** ~~An assemblage of specific materials or products that are designed, tested and fire-resistance rated to resist for a prescribed period of time the spread of fire through penetrations. The F and T rating criteria for penetration fire stop systems shall be in accordance with ASTM E814 or UL 1479. See definition of "F" rating and "T" rating".~~ An assemblage consisting of a fire-resistance-rated floor, floor-ceiling, or wall assembly, one or more penetrating items passing through the breaches in both sides of the assembly and the materials or devices, or both, installed to resist the spread of fire through the assembly for a prescribed period of time.

*(Relocate Section 708 to Section 712 and 713. Renumber subsequent sections)*

**SECTION ~~709~~ 708**
**FIRE PARTITIONS**

**SECTION ~~710~~ 709**
**SMOKE BARRIERS**

**SECTION ~~711~~ 710**
**SMOKE PARTITIONS**

**SECTION ~~712~~ 711**
**HORIZONTAL ASSEMBLIES**

**~~712.4~~ 711.4 Continuity.** Assemblies shall be continuous without openings, penetrations or joints except as permitted by this section and Sections ~~708.2~~ 712.1, ~~713.4~~ 714.4, ~~714~~ 715 and 1022.1. Skylights and other penetrations through a fire-resistance-rated roof deck or slab are permitted to be unprotected, provided that the structural integrity of the fire-resistance-rated roof construction is maintained. Unprotected skylights shall not be permitted in roof assemblies required to be fire-resistance rated in accordance with Section 704.10. The supporting construction shall be protected to afford the required fire-resistance rating of the horizontal assembly supported.

**Exception:** In buildings of Type IIB, IIIB or VB construction, the construction supporting the *horizontal assembly* is not required to be fire-resistance-rated at the following:

1. Horizontal assemblies at the separations of incidental uses as specified by Table 508.2.5, provided the required *fire-resistance rating* does not exceed 1 hour.
2. Horizontal assemblies at the separations of *dwelling units* and *sleeping units* as required by Section 420.3.
3. Horizontal assemblies at *smoke barriers* constructed in accordance with Section ~~710~~ 709.

**711.4.1 Nonfire-resistance-rated assemblies.** ~~Linear openings~~ Joints in or between floors assemblies without a required fire-resistance rating shall comply with one of the following:

1. The linear opening shall be concealed within the cavity of a wall.
2. The linear opening shall be located above a ceiling.
3. The linear opening shall be sealed, treated or covered with an approved material or system to resist the free passage of flame and the products of combustion.

**Exception:** Joints meeting one of the joint exceptions listed in 715.1

**~~712.5~~ 711.5 Penetrations.** Penetrations of horizontal assemblies, whether concealed or unconcealed, shall comply with Section ~~713~~ 714.

**SECTION ~~708~~ 712**
**~~SHAFT ENCLOSURES~~ VERTICAL OPENINGS**

**~~708.1~~ 712.1 General.** The provisions of this section shall apply to the vertical opening applications listed in Sections 712.1.1 through 712.1.18. ~~shafts required to protect openings and penetrations through floor/ceiling and roof/ceiling assemblies. Shaft enclosures shall be constructed as fire barriers in accordance with Section 707 or horizontal assemblies in accordance with Section 712, or both.~~

~~**708.2 Shaft enclosure required.** Openings through a floor/ceiling assembly shall be protected by a shaft enclosure complying with this Section.~~

~~**Exceptions:**~~

**712.1.1 Smoke compartments.** Vertical openings contained entirely within a shaft enclosure complying with Section 709 shall be permitted.

~~**1.**~~ **712.1.2 Individual dwelling unit.** ~~A shaft enclosure is not required for~~ Unconcealed vertical openings totally within an individual residential dwelling unit and connecting four stories or less shall be permitted.

~~**2.**~~ **712.1.3 Escalator and Stairway Openings.** ~~A shaft enclosure is not required in~~ Where a building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1, ~~for~~ an escalator opening or stairway that is not a portion of the means of egress shall be protected according to Item ~~2.1 or 2.2~~ 712.1.3.1 or 712.1.3.2:

~~2.1~~ **712.1.3.1 Opening size.** Where the area of the ~~floor~~ vertical opening between stories does not exceed twice the horizontal projected area of the escalator or stairway and the opening is protected by a draft curtain and closely spaced sprinklers in accordance with NFPA 13. In other than Groups B and M, this application is limited to openings that do not connect more than four stories.

~~2.2~~ **712.1.3.2 Automatic shutters**. Where the vertical opening is protected by approved power-operated automatic shutters at every penetrated floor. The shutters shall be of noncombustible construction and have a fire-resistance rating of not less than 1.5 hours. The shutter shall be so constructed as to close immediately upon the actuation of a smoke detector installed in accordance with Section 907.11 and shall completely shut off the well opening. Escalators shall cease operation when the shutter begins to close. The shutter shall operate at a speed of not more than 30 feet per minute (152.4 mm/s) and shall be equipped with a sensitive leading edge to arrest its progress where in contact with any obstacle, and to continue its progress on release there from.

~~3.~~ **712.1.4 Penetrations.** ~~A shaft enclosure is not required for~~ Penetrations by pipe, tube, conduit, wire, cable and vents shall be protected in accordance with Section ~~713.4~~ 712.4.

~~4.~~ **712.1.5 Ducts.** ~~A shaft enclosure is not required for~~ Penetrations by ducts shall be protected in accordance with Section 716.6. Grease ducts shall be protected in accordance with the *International Mechanical Code*.

~~5.~~ **712.1.6 Atriums.** In other than Group H occupancies, ~~a shaft enclosure is not required for floor openings complying with the provisions for~~ atriums ~~in~~ complying with Section 404 shall be permitted.

~~6.~~ **712.1.7 Masonry chimney.** ~~A shaft enclosure is not required for~~ Approved masonry chimneys shall be permitted where the annular space is fireblocked at each floor level in accordance with Section 717.2.5.

~~7.~~ **712.1.8 Two story openings**. In other than Groups I-2 and I-3~~, a shaft enclosure is not required for~~ a floor opening that is not used as one of the applications listed in this section shall be permitted if it complies with all the items below ~~or an air transfer opening that complies with the following:~~

~~7.1~~ 1. Does not connect more than two stories.
~~7.2~~ 2. Does not contain a stairway or ramp required by Chapter 10. ~~Is not part of the required means of egress system~~.
3. Does not penetrate a horizontal assembly that separates fire areas or smoke barriers that separate smoke compartments.
~~7.3~~ 4. Is not concealed within the construction of a wall or a floor/ceiling assembly.
~~7.4~~ 5. Is not open to a corridor in Group I and R occupancies.
~~7.5~~ 6. Is not open to a corridor on nonsprinklered floors ~~in any occupancy~~.
~~7.6~~ 7. Is separated from floor openings and air transfer openings serving other floors by construction conforming to required shaft enclosures.
~~7.7.~~ ~~Is limited to the same smoke compartment~~.

~~8.~~ **712.1.9 Parking garages**. ~~A shaft enclosure is not required for~~ Automobile ramps in open and enclosed parking garages shall be permitted where constructed in accordance with Sections 406.3 and 406.4, respectively.

~~9.~~ **712.1.10 Mezzanine.** ~~A shaft enclosure is not required for~~ Vertical ~~floor~~ openings between a mezzanine complying with Section 505 and the floor below shall be permitted. ~~and the floor below.~~

~~10.~~ **712.1.11 Joints.** ~~A shaft enclosure is not required for~~ Joints shall be permitted where complying ~~protected by a fire-resistant joint system in accordance~~ with Section ~~714~~ 715.

~~11.~~ **712.1.12 Unenclosed stairs and ramps.** A ~~shaft enclosure shall not be required for~~ vertical floor openings created by unenclosed stairs or ramps in accordance with Exception 3 or 4 in Section 1016.1 shall be permitted.

~~12.~~ **712.1.13 Floor Fire Doors.** ~~Floor~~ Vertical openings shall be permitted where protected by floor fire doors in accordance with Section ~~712.8~~ 711.8.

~~13.~~ **712. 1.14. Group I-3.** In Group I-3 occupancies, ~~a shaft enclosure is not required for floor~~ vertical openings shall be permitted in accordance with Section 408.5.

~~14.~~ **712.1.15 Elevators in parking garages.** ~~A shaft enclosure is not required for e~~ vertical openings for elevator hoistways in open or enclosed parking garages that serve only the parking garage, and complying with 406.3 and 406.4 respectively, shall be permitted..

~~15.~~ **712.1.16 Duct systems in parking garages.** Vertical openings for mechanical exhaust or supply duct systems in open or enclosed parking garages ~~a shaft enclosure is not required to enclose mechanical exhaust or supply duct~~

~~systems~~ complying with 406.3 and 406.4 respectively, shall be permitted to be unenclosed where ~~when~~ such duct system is contained within and serves only the parking garage.

**712.1.17 Nonfire-resistance-rated joints.** Joints in or between floors without a required fire-resistance rating shall be permitted in accordance with section 711.4.1.
~~**16.**~~ **712.1.18 Openings otherwise permitted.** Vertical openings shall be ~~Where~~ permitted where allowed by other sections of this code.

## SECTION 713
## SHAFT ENCLOSURES

**713.1 General.** The provisions of this section shall apply to shafts required to protect openings and penetrations through floor/ceiling and roof/ceiling assemblies. Shaft enclosures shall be constructed as fire barriers in accordance with Section 707 or horizontal assemblies in accordance with Section 711, or both.

~~**708.3**~~ **713.2 Materials.** *(No change to text)*

~~**708.4**~~ **713.3 Fire-resistance rating.** *(No change to text)*

~~**708.5**~~ **713.4 Continuity.** *(No change to text)*

~~**708.6**~~ **713.5 Exterior Walls.** *(No change to text)*

~~**708.7**~~ **713.6 Openings.** *(No change to text)*

~~**708.7.1**~~ **713.6.1 Prohibited openings.** *(No change to text)*

~~**708.8**~~ **713.7 Penetrations.** *(No change to text)*

~~**708.8.1**~~ **713.7.1 Prohibited penetrations.** *(No change to text)*

~~**708.9**~~ **713.8 Joints.** *(No change to text)*

~~**708.10**~~ **713.9 Duct and air transfer openings.** *(No change to text)*

~~**708.11**~~ **713.10 Enclosure at the bottom.** *(No change to text)*

~~**708.12**~~ **713.11 Enclosure at top.** *(No change to text)*

~~**708.13**~~ **713.12 Refuse and laundry chutes.** *(No change to text)*

~~**708.13.1**~~ **713.12.1Refuse and laundry chute enclosures.** *(No change to text)*

~~**708.13.2**~~ **713.12.2 Materials.** *(No change to text)*

~~**708.13.3**~~ **713.12.3 Refuse and laundry chute access rooms.** *(No change to text)*

~~**708.13.4**~~ **713.12.4 Termination room.** *(No change to text)*

~~**708.13.5**~~ **713.12.5 Incinerator room.** *(No change to text)*

~~**708.13.6**~~ **713.12.6 Automatic sprinkler system.** *(No change to text)*

~~**708.14**~~ **713.13 Elevator, dumbwaiter and other hoistways.** *(No change to text)*

~~**708.14.1**~~ **713.13.1 Elevator lobby.** *(No change to text)*

~~**708.14.1.1**~~ **713.13.1.1 Areas of refuge.** *(No change to text)*

~~**708.14.2**~~ **713.13.2 Enclosed elevator lobby.** *(No change to text)*

~~**708.14.2.1**~~ **713.13.2.1 Pressurization requirements.** *(No change to text)*

~~**708.14.2.2**~~ **713.13.2.2 Rational analysis.** *(No change to text)*

~~**708.14.2.3**~~ **713.13.2.3 Ducts for system.** *(No change to text)*

~~708.14.2.4~~ **713.13.2.4 Fan system.** *(No change to text)*

~~708.14.2.4.1~~ **713.13.2.4.1 Fire resistance.** *(No change to text)*

~~708.14.2.4.2~~ **713.13.2.4.2 Smoke detection.** *(No change to text)*

~~708.14.2.4.3~~ **713.13.2.4.3 Separate systems.** *(No change to text)*

.

~~708.14.2.4.4~~ **713.13.2.4.4 Fan capacity.** *(No change to text)*

~~708.14.2.5~~ **713.13.2.5 Standby power.** *(No change to text)*

~~708.14.2.6~~ **713.13.2.6 Activation of pressurization system.** *(No change to text)*

~~708.14.2.7~~ **713.13.2.7 Special inspection.** *(No change to text)*

~~708.14.2.8~~ **713.13.2.8 Marking and identification.** *(No change to text)*

~~708.14.2.9~~ **713.13.2.9 Control diagrams.** *(No change to text)*

~~708.14.2.10~~ **713.13.2.10 Control panel.** *(No change to text)*

~~708.14.2.11~~ **713.13.2.11 System response time.** *(No change to text)*

## SECTION ~~713~~ 714
## PENETRATIONS

~~713.3~~ **714.3 Fire-resistance-rated walls.** Penetrations into or through fire walls, fire-barrier walls, smoke-barrier walls and fire partitions shall comply with Sections ~~713.3.1~~ 714.3.1 through ~~713.3.4~~ 714.3.4. Penetrations in smoke barrier walls shall also comply with Section ~~713.5~~ 714.5.

~~713.3.1~~ **714.3.1 Through penetrations.** *(No change to text)*

~~713.3.1.1~~ **714.3.1.1 Fire resistance rated assemblies.** *(No change to text)*

~~713.3.1.2~~ **714.3.1.2 Through penetration firestop system.** *(No change to text)*

~~713.3.2~~ **714.3.2 Membrane penetrations.** *(No change to text)*

~~713.3.3~~ **714.3.3 Dissimilar materials.** *(No change to text)*

~~713.4~~ **714.4 Horizontal assemblies.** Penetrations of a floor, floor/ceiling assembly or the ceiling membrane of a roof/ceiling assembly not required to be enclosed in a shaft by Section 708.2 shall be protected in accordance with Sections ~~713.4.1~~ 714.4.1 through ~~713.4.2.2~~ 714.4.2.2.

~~713.4.1~~ **714.4.1 Fire-resistance rated assemblies.** Penetrations of the fire-resistance rated floor, floor/ceiling assembly or the ceiling membrane of a roof/ceiling assembly shall comply with Sections ~~714.4.1.1~~ 713.4.1.1 through ~~713.4.1.4~~ 714.4.1.4. Penetrations in horizontal smoke barriers shall also comply with ~~713.5~~ 714.5.

~~713.4.1.1~~ **714.4.1.1 Through penetrations.** *(No change to text)*

~~713.4.1.1.1~~ **714.4.1.1.1 Installation.** *(No change to text)*

~~713.4.1.1.2~~ **714.4.1.1.2 Through penetration firestop system.** *(No change to text)*

~~713.4.1.2~~ **714.4.1.2 Membrane penetrations.** Penetrations of membranes that are part of a horizontal assembly shall comply with Section ~~713.4.1.1.1~~ 714.4.1.1.1 or ~~713.4.1.1.2~~ 714.4.1.1.2. Where floor/ceiling assemblies are required to have a fire-resistance rating, recessed fixtures shall be installed such that the required fire resistance will not be reduced.

**Exceptions:**

1. *Membrane penetrations* by steel, ferrous or copper conduits, pipes, tubes or vents, or concrete or masonry items where the *annular space* is protected either in accordance with Section 713.4.1.1 or to prevent the free passage of flame and the products of combustion. The aggregate area of the openings through the

membrane shall not exceed 100 square inches (64 500 mm2) in any 100 square feet (9.3 m2) of ceiling area in assemblies tested without penetrations.

2. Ceiling membrane penetrations of maximum 2-hour *horizontal assemblies* by steel electrical boxes that do not exceed 16 square inches (10 323 mm2) in area, provided the aggregate area of such penetrations does not exceed 100 square inches (44 500 mm2) in any 100 square feet (9.29 m2) of ceiling area, and the annular space between the ceiling membrane and the box does not exceed 1/8 inch (3.2 mm).
3. Membrane penetrations by electrical boxes of any size or type, which have been *listed* as part of an opening protective material system for use in *horizontal assemblies* and are installed in accordance with the instructions included in the listing.
4. *Membrane penetrations* by *listed* electrical boxes of any material, provided such boxes have been tested for use in fire-resistance-rated assemblies and are installed in accordance with the instructions included in the listing. The *annular space* between the ceiling membrane and the box shall not exceed 1/8 inch (3.2 mm) unless *listed* otherwise.
5. The *annular space* created by the penetration of a fire sprinkler, provided it is covered by a metal eschutcheon plate.
6. Noncombustible items that are cast into concrete building elements and that do not penetrate both top and bottom surfaces of the element.

~~**713.4.1.3 Ducts and air transfer openings.** Penetrations of horizontal assemblies by ducts and air transfer openings shall comply with Section 716.~~

~~**713.4.1.4**~~ **714.4.1.4 Disimilar materials.** *(No change to text)*

~~**713.4.2**~~ **714.4.2 Nonfire-resistance-rated assemblies.** Penetrations of nonfire-resistance rated floor or floor/ceiling assemblies or the ceiling membrane of a nonfire-resistance rated roof/ceiling assembly shall meet the requirements of Section 708 or shall comply with Section ~~713.4.2.1~~ 714.4.2.1 or ~~713.4.2.2~~. 714.4.2.2

~~**713.4.2.1**~~ **714.4.2.1 Noncombustible penetrating items.** Noncombustible penetrating items that connect not more than ~~three~~ five stories are permitted, provided that the annular space is filled to resist the free passage of flame and the products of combustion with an approved noncombustible material or with a fill, void or cavity material that is tested and classified for use in through-penetration firestop systems.

~~**713.4.2.2**~~ **714.4.2.2 Penetrating items.** Penetrating items that connect not more than two stories are permitted, provided that the annular space is filled with an approved material to resist the free passage of flame and the products of combustion.

~~**713.5**~~ **714.5 Penetrations in smoke barriers.** Through-penetration firestop systems in *smoke barriers* shall be tested in accordance with the requirements of UL 1479 for air leakage. The ~~air leakage rate~~ L rating of the system measured at 0.30 inch (7.47 Pa) of water in both the ambient temperature and elevated temperature tests, shall not exceed:
5.0 cfm per square foot ($0.025 m^3/ s\ m^2$) of penetration opening for each *through-penetration firestop system*; or
A total cumulative leakage of 50 cfm ($0.024 m^3/s$) for any 100 square feet ($9.3 m^2$) of wall area, or floor area.

## Section ~~714~~ 715
## FIRE RESISTANT JOINT SYSTEMS

~~**714.6**~~ **715.6 Fire-resistant joint systems in smoke barriers.** Fire-resistant joint systems in smoke barriers, and joints at the intersection of a horizontal *smoke barrier* and an exterior curtainwall, shall be tested in accordance with the requirements of UL 2079 for air leakage. The ~~air leakage rate~~ L rating of the joint system shall not exceed 5 cfm per lineal foot ($0.00775 m^3/s\ m$) of joint at 0.30 inch (7.47 Pa) of water for both the ambient temperature and elevated temperature test.

**Reason:** The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: http://www.iccsafe.org/cs/cc/ctc/index.html <http://www.iccsafe.org/cs/cc/ctc/index.html> . Since its inception in April/2005, the CTC has held seventeen meetings - all open to the public.

This proposed change is a result of the CTC's investigation of vertical openings through the Vertical Opening Study Group, which is part of the area of study, entitled "Balanced Fire Protection." The scope of the activity is noted as:

*"To investigate what constitutes an acceptable balance between active fire protection and passive fire protection measures with respect to meeting the fire and life safety objectives of the IBC."*

The ICC Vertical Opening Study Group re-grouped after the last ICC code development cycle and again looked at the problems and inconsistencies with Chapter 7 of the 2009 IBC. This statement provides a comprehensive explanation of the code proposals drafted and supported by the study group.

Rather than scrap the affected sections and re-write new text, the study group approached this task using mainly surgical fixes. After careful review we felt that the current content in Chapter 7 is fundamentally sound and familiar to all. We believe the inconsistencies that have developed in Chapter 7are mainly due to the initial drafting of the IBC, where language from each of the three legacy code was used, as is. As concepts in the

IBC changed, some of these sections became in conflict with one another, obsolete or created “do loops” where the user never finds the correct requirement.

Most of the changes proposed by the study group are editorial in nature and will not change how the code is applied or used. However, as you will see, the study group has also proposed changes separately that are technical in nature. During the review, we felt there are areas in code that, based on fire statistics, should be improved. The study group was very focused on getting a basic proposal in front of the committee and membership that fixes the code editorially. Our main proposal includes only amendments that this group feels are editorial or very minor changes. In addition to the main proposal, we are also proposing technical changes. The study group is in support of both of these; however we did not want to jeopardize the entire effort because of the technical change debate.

Several of the definitions in Section 702 containing specific terms used in Chapter 7 were modified. Mainly the group wanted to emphasize the difference between openings, penetrations and membrane penetrations, although they are all defined globally as vertical openings. The definitions include the term breach to describe the entry into an assembly. This term was currently used in one of the existing definitions and we expanded its use. Our focus was to properly define the terms so that they can be dealt with in a prescriptive manner regarding vertical openings. In addition, the definition of joints was expanded to include linear openings in both rated or non-rated horizontal assemblies. This amendment was needed to be able to guide the code user to what is needed for non-rated assemblies. Other terms were discussed but the term “joint” was already defined in a way that familiar to all. The term L rating was also defined in a manner consistent with the existing standards and listings.

Section 711.4.1 was added to provide the user with guidance for non-rated assemblies in terms of what to do with open joints between the floor assemblies that allow for independent movement of the building in any plane caused by thermal, seismic, wind or any other loading. Basically, if the joint is not concealed within a cavity of a wall or not covered by a floor topping, then it must be sealed or treated with an approved material. Typically, they are covered by a decorative metal or something similar. This proposal will still allow for that method plus many other methods of sealing the vertical opening that this creates.

Section 711.5 was amended to clarify it applies to concealed and unconcealed penetrations. The study group felt that all penetrations needed to be sealed in some fashion, to reduce accelerated structural damage due to a breach in the assembly. Vertical openings should be protected in some way, whether the assembly is rated or non-rated. The added exception provides for joints that meet the exceptions in 715.1 and do not required additional measures.

Section 708 was changed to Section 712 to come after Horizontal Assemblies. The 2009 currently states that all vertical openings require a shaft and then give 17 exceptions to providing that shaft. Realizing that in today’s built environment a shaft enclosure is only one of many ways to deal with a vertical opening, we re-named Section 712 (previously Section 708) to Vertical Openings and re-wrote the exceptions to become available options for dealing with the multitude of various vertical openings encountered within a building. Additionally, we felt that the code should be specific on where to go to find the requirements for each application. And finally we felt users should not be able to use sections that are out of context, such as the example of using current Exception 7 for penetrations.

Section 712.1.8 was further modified to clarify the meaning “required means of egress” and to remind the user that smoke and fire barriers cannot be penetrated with an unprotected vertical opening. Additionally “limited to the same smoke compartment” was removed because the charging statement eliminates I-2 and I-3 occupancies from consideration.

A new sections were added under Section 712.1.17 that provides guidance for joints in non-rated assemblies, previously discussed.
The term “vertical” was added where the current 2009 Code section 708 used just the term “opening”. We felt this clarification is consistent with our overall goal to emphasize the difference between vertical openings used for convenience and those vertical openings which are used as penetrations, joint and other applications where the vertical opening is breached by an object and intended to be sealed.

An exception was added to Section 714.4.1.2 Membrane Penetrations that exempts membrane penetrations by non-combustible items in concrete floors. Membrane penetration requirements were not intended to address embedded or cast non-combustible items within concrete floors. This condition has never been shown to be a problem. Reports from fires show that this application performs very well in real fire conditions without compromising the integrity of the structure or allowing fire spread.

The study group believes that these amendments, explained so far are all very minor or editorial in nature and do reflect any new technical requirements.

Definitions: Reason for change

These terms were either added or modified based on previous and current VO study group work.

711.4.1: Reason for change

This section was proposed to address holes in unrated floor ceiling assemblies. After a conference call on 3/31, it was determined that the term “linear opening” needed a definition or change the term.
Further work to address the term is needed. To be completed by the CTC meeting.

712:Reason for changes

Section 708 was identified as being a problem.
This proposal removes the exceptions to providing a shaft a makes them options for vertical openings. No technical changes occurred.
Alternate code change 708.1.8 is a technical change that is being proposed for discussion.

714: Reason for change.

Indentified as a problem at the Balt. MD CTC meeting.
No guidance was given as to how the measurement is to be taken.
This proposal mandates the full height of the wall as one dimension when calculating the 100 sq. ft. This was determined to be the area most affected

A 10 ft. x 10 ft. square was chosen as an easy visual reference for inspectors in the field. This was determined to be area most affected.
An exception was added to stipulate that penetrations (membrane) in solid concrete floors was not considered a membrane penetration.

**Cost Impact:** The code change proposal will not increase the cost of construction.

ICCFILENAME: HEILSTEDT-FS1-702.1

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## ***Public Hearing Results***

### Committee Action: Approved as Submitted

**Committee Reason:** The committee agreed that the proposal was a good reorganization of the requirements for vertical openings. The committee did recognize that there were also some minor technical changes and felt that these were appropriate and reasonable.

**Note:** The following modification was considered editorial:

**712.1.4 Penetrations.** Penetrations by pipe, tube, conduit, wire, cable and vents shall be protected in accordance with Section 714 ~~712.4~~.

*(Portions of the proposal not shown remain unchanged)*

**Assembly Action:**
**None**

## *Individual Consideration Agenda*

**This item is on the agenda for individual consideration because public comments were submitted.**

*Public Comment 1:*

**Gregory R. Keith, Professional heuristic Development, representing the Boeing Company, requests Approval as Modified by Public Comment.**

**Modify the proposal as follows:**

~~**711.4.1 Nonfire-resistance-rated assemblies.** Joints in or between floors assemblies without a required fire-resistance rating shall comply with one of the following:~~

~~1. The linear opening shall be concealed within the cavity of a wall.~~
~~2. The linear opening shall be located above a ceiling.~~
~~3. The linear opening shall be sealed, treated or covered with an approved material or system to resist the free passage of flame and the products of combustion.~~

~~**Exception:** Joints meeting one of the joint exceptions listed in 715.1~~

**711.5 Penetrations.** Penetrations of horizontal assemblies~~, whether concealed or unconcealed,~~ shall comply with Section 714.

~~**712.1.17 Nonfire-resistance-rated joints.** Joints in or between floors without a required fire-resistance rating shall be permitted in accordance with section 711.4.1.~~

*(portions of the proposal not shown remain unchanged)*

**Commenter's Reason:** In its published reason statement, the proponent of FS56-09/10 stated, "Most of the changes proposed by the study group are editorial in nature and will not change how the code is applied or used. However, as you will see, the study group has also proposed changes separately that are technical in nature. During the review, we felt there are areas in code that, based on fire statistics, should be improved. The study group was very focused on getting a basic proposal in front of the committee and membership that fixes the code editorially. Our main proposal includes only amendments that this group feels are editorial or very minor changes. In addition to the main proposal, we are also proposing technical changes. The study group is in support of both of these; however we did not want to jeopardize the entire effort because of the technical change debate."

It is acknowledged that much of FS56-09/10 reorganizes existing Chapter 7 provisions. Although the proponent suggests that the proposal "includes only amendments that this group feels are editorial or very minor changes," certain more stringent technical requirements have been introduced that have not been debated in the code development process to this point. Specifically, the proposal creates requirements for the protection of joints in nonfire-resistance rated floor assemblies. Additionally, it expands the scope of penetration requirements in horizontal assemblies to include those concealed within the assembly. Although the proponent states that these changes are based on fire statistics, no such statistics or other technical substantiation was offered for the inclusion of either one of these more stringent requirements in the IBC.

Section 711 (current Section 712) applies to "horizontal assemblies." The definition of horizontal assembly in Section 702.1 states, "A fire-resistance rated floor or roof assembly of materials designed to restrict the spread of fire in which continuity is maintained." 2009 Section 712.1 states, "Floor and roof assemblies required to have a fire-resistance rating shall comply with this section." Additionally, it states, "Nonfire-resistance-rated floor and roof assemblies shall comply with Section 713.4.2." Section 713.4.2 prescribes penetration protection in nonfire-resistance rated floor and roof assemblies under certain conditions. Although additional requirements have been created for non-fire resistance rated assemblies, they are not referenced in the section charging language (Section 711.1). As previously stated, there has been absolutely no technical justification or fire statistics that would demonstrate the need for additional joint protection in nonfire-resistance rated floor or roof assemblies. Additionally, the proposed requirements are more stringent in scope than the current penetration protection requirements for nonfire-resistance rated floor and roof assemblies based on the number of interconnected stories.

Also, Section 717 currently provides requirements for the protection of concealed spaces. Increasing the scope of Section 711.5 to include concealed spaces, is without precedence, without technical substantiation, without loss history and is entirely inappropriate.

These two provisions intended to increase protection requirements in nonfire-resistance rated construction are significant technical changes that deserve proper technical debate. To disguise these requirements as "editorial or very minor" is an insult to the objective code development process. The proponent indicated that technical changes were separately submitted. These questioned provisions that increase opening protection requirements for nonrated floor and roof assemblies should have been individually considered by the ICC Fire Safety Code Committee and the ICC membership. If the format provided by FS56-09/10 is preferred over current provisions, then it is recommended that the item be approved as modified by deleting the noted significant technical changes that were not even addressed during discussion of the proposal in Baltimore.

*Public Comment 2:*

**Sarah A. Rice, CBO, representing self, requests Approval as Modified by this Public Comment.**

**Modify the proposal as follows:**

**SECTION 711**
**HORIZONTAL ASSEMBLIES**

**711.4 Continuity.** Assemblies shall be continuous without openings, penetrations or joints except as permitted by this section~~ and Sections 712.1, 714.4, 715 and 1022.1.~~ Skylights and other penetrations through a fire-resistance-rated roof deck or slab are permitted to be unprotected, provided that the structural integrity of the fire-resistance-rated roof construction is maintained. Unprotected skylights shall not be permitted in roof assemblies required to be fire-resistance rated in accordance with Section 704.10. The supporting construction shall be protected to afford the required fire-resistance rating of the horizontal assembly supported.

**Exception:** In buildings of Type IIB, IIIB or VB construction, the construction supporting the *horizontal assembly* is not required to be fire-resistance-rated at the following:

1. Horizontal assemblies at the separations of incidental uses as specified by Table 508.2.5, provided the required *fire-resistance rating* does not exceed 1 hour.
2. Horizontal assemblies at the separations of *dwelling units* and *sleeping units* as required by Section 420.3.
3. Horizontal assemblies at *smoke barriers* constructed in accordance with Section 709.

**711.8 Vertical openings.** Vertical openings in horizontal assemblies shall be enclosed in a shaft constructed in accordance with Section 713 or comply with Section 712.

**711.9 Means of egress stairs and ramps.** Vertical openings in horizontal assemblies containing stairs or ramps required to comply with Chapter 10 shall comply with Section 1022.1.

*(Renumber subsequent sections)*

*(Portions of proposal not shown remain unchanged)*

**Commenter's Reason:**

- 711.4 – The modification eliminates the laundry list of section numbers as with the incorporation of new section 711.8, each is already referenced within the body of Section 711. Section 712 are addressed through references in new Sections 711.8 and 711.9, Section 714.4 is referenced in current 2009 IBC Section 712.6, Section 715 is referenced in current 2009 IBC 712.5
- 711.8 & 711.9 – The addition of these 2 sections brings consistency into the section. Currently all types of "holes" are addressed except for those that qualify as "vertical openings" and those that contain stairs or ramps required by Chapter 10. With the changes made through FS56-09/10 we now have a section on "vertical openings." The revisions add references to that new section and current 2009 IBC Section 1022.

## *Public Comment 3:*

### Sarah A. Rice, CBO, representing self, requests Approval as Modified by this Public Comment.

**Modify the proposal as follows:**

**SECTION 712**
**VERTICAL OPENINGS**

**712.1 General.** In accordance with Section 711.4, vertical openings through floor and roof assemblies shall comply with the provision of this section or be enclosed in a shaft constructed in accordance with Section 713 ~~The provisions of this section shall apply to the vertical opening applications listed in Sections 712.1.1 through 712.1.18.~~

**Exception:** Vertical openings that comply with Section 714.4, 715 or 1022.1.

**712.1.1 Smoke compartments.** Vertical openings contained entirely within a smoke compartment ~~shaft enclosure~~ complying with Section 407 or 408 ~~709~~ shall be permitted.

*(Portions of proposal not shown remain unchanged)*

**Commenter's Reason:**

- 712.1 - The charging section has been revised to make it clear that there are two paths that the designer may choose for protecting a vertical opening – enclose it in a shaft (Section 713) or meet one of the parameters found in new Section 712.
- 712.1.1 - In Section 712.1.1, the language has been modified to clarify the original intent – vertical openings in smoke compartments (only found in hospitals & penal facilities) are allowed within the parameters outlined in Sections 407 and 408.

## *Public Comment 4:*

### Sarah A. Rice, CBO, representing self, requests Approval as Modified by this Public Comment.

**Modify the proposal as follows:**

**712.1.8 Two story openings**. In other than Groups I-2 and I-3, a floor opening that is not used as one of the applications listed in this section shall be permitted if it complies with all the items below:

1. Does not connect more than two stories.
2. Does not contain an exit stairway or ramp required by Chapter 10.
3. Does not penetrate a horizontal assembly that separates fire areas or smoke barriers that separate smoke compartments.
4. Is not concealed within the construction of a wall or a floor/ceiling assembly.
5. Is not open to a corridor in Group I and R occupancies.
6. Is not open to a corridor on nonsprinklered floors.
7. Is separated from floor openings and air transfer openings serving other floors by construction conforming to required shaft enclosures.

**712.1.10 Mezzanine.** Vertical floor openings between a mezzanine or mezzanines, complying with Section 505 and the floor below shall be permitted.

**712.1.11 Fire-resistance rated Joints.** Joints shall be permitted where complying with Section 715.

*(Portions of proposal not shown remain unchanged)*

**Commenter's Reason:**

- 712.1.8 - The modification is needed to make it clear that the stair or ramp limitation in new Section 712.1.8, Item 3 is only for "exit" stairs. Given the revisions proposed for Chapter 10 in code change E5-09/10 (which was Approved as Submitted by the MOE Code Development Committee) some may interpret the limitation to apply to any stair or ramp covered by Chapter 10 – which is ALL stairs and ramps but this provision is only applicable to those that are "exits." Should E5-09/10 not be successful the proposed modification is still appropriate as it then emphasizes which stairs and ramps are being limited. Stairs and ramps that provide only intercommunication and are not required for the means of egress system would acceptable.
- 712.1.10 – The modification is needed to recognized that there may be more than one mezzanine in a story.
- 712.1.11 – The modification is needed so as to distinguish clearly this section from the provisions in new section 712.1.17 "nonfire-resistance rated joints."

*Public Comment 5:*

**Gregory R. Keith, Professional heuristic Development, representing the Boeing Company, requests Disapproval**

**Commenter's Reason:** The ICC Code Technology Committee (CTC) appointed a Vertical Openings Study Group on December 13, 2006. The CTC recognized that there were technical inconsistencies in IBC Chapter 7 requirements for the protection of openings in horizontal assemblies intended to restrict the vertical movement of fire. There were also concerns that opening and penetration requirements for horizontal assemblies were difficult for users to properly determine. It was suggested that there needs to be a vertical migration strategy and that technical requirements should support that strategy in concert, as opposed to being a collection of abstract requirements that perhaps achieve no practical end. Specifically, there were concerns that certain provisions required the protection of openings or penetrations in a given horizontal assembly while exceptions permitted unprotected openings in the same assembly.

FS56-09/10 was the second Vertical Opening Study Group attempt to achieve the CTC's stated goals. Upon close analysis, FS56 does very little to improve Chapter 7 provisions. The proponent's published reason statement explains, "Most of the changes proposed by the study group are editorial in nature and will not change how the code is applied or used. However, as you will see, the study group has also proposed changes separately that are technical in nature. During the review, we felt there are areas in code that, based on fire statistics, should be improved. The study group was very focused on getting a basic proposal in front of the committee and membership that fixes the code editorially. Our main proposal includes only amendments that this group feels are editorial or very minor changes. In addition to the main proposal, we are also proposing technical changes. The study group is in support of both of these; however we did not want to jeopardize the entire effort because of the technical change debate."

To gain a sense as to how FS56-09/10 actually impacts Chapter 7, the ICC staff has posted a document on the ICC website that shows how the proposal will overlay current Chapter 7 requirements. It can be found as follows: codes, standards and guidelines > Technical Committees > Other Code Committees > Code Technology Committee > Balanced Fire Protection > Study Groups: Vertical Openings > Impact of FS56-09/10. FS 56 provisions appear in red.

• Six definitions were either modified or created.

• Beginning with Section 708, several sections have been renumbered with no technical changes whatsoever.

• Sections 711.4.1 and 711.5 contain significant technical changes, contrary to the proponent's claims. Section 711 (current Section 712) applies to "horizontal assemblies." The definition of horizontal assembly in Section 702.1 states, "A fire-resistance rated floor or roof assembly of materials designed to restrict the spread of fire in which continuity is maintained." 2009 Section 712.1 states, "Floor and roof assemblies required to have a fire-resistance rating shall comply with this section." Additionally, it states, "Nonfire-resistance-rated floor and roof assemblies shall comply with Section 713.4.2." Section 713.4.2 prescribes penetration protection in nonfire-resistance rated floor and roof assemblies under certain conditions. Although additional joint protection requirements have been created for non-fire resistance rated assemblies, they are not referenced in the section charging language (Section 711.1). As previously stated, there has been absolutely no technical justification or fire statistics that would demonstrate the need for additional joint protection in nonfire-resistance rated floor or roof assemblies. Additionally, the proposed requirements are more stringent in scope than the current penetration protection requirements for nonfire-resistance rated floor and roof assemblies based on the number of interconnected stories. Currently, Section 717 provides requirements for the protection of concealed spaces. Increasing the scope of Section 711.5 to include concealed spaces, is without precedence, without technical substantiation, without loss history and is entirely inappropriate.

• A new Section 712 (Vertical Openings) has been created. It essentially represents a laundry list of potential opening protection requirements that potentially apply to floor and roof construction. The new section restates many provisions contained elsewhere in the Chapter 7. For instance, Sections 711.6 and 712.1.11 state essentially the same thing. The various opening protection requirements should be placed in the context of the assembly that they protect.

• Section 713 shaft enclosure provisions have been reformatted. What were formally exceptions are now stated as positive requirements. The requirements themselves, are virtually unchanged.

FS56-09/10 does little to improve continuity or understandability of Chapter 7 vertical opening protection requirements. It resolves none of the technical conflicts that currently exist and were the reason that the CTC appointed the Vertical Openings Study Group in the first place. In fact, through the inclusion of new technical requirements applicable to nonfire-resistance rated floor and roof construction, more technical and philosophical inconsistencies have been created. The technical ramifications or fire loss justification of these significant changes were never discussed at any point during the committee hearings. The proposal contains change for change's sake and accomplishes very little except for creating unreasonable, more stringent requirements for nonrated construction and concealed openings within horizontal assemblies. The result of approval of FS56-09/10 will be to only further confuse fundamental provisions that are in need of repair. FS56 should be disapproved and the CTC Vertical Openings Study Group should be instructed to produce a proposal that responds to the CTC's original concerns and actually improves the IBC.

Final Action: AS AM AMPC____
D

# F144-09/10
**910 (IBC [F] 910), 2306, Chapter 47 (IBC Chapter 35)**

***Proposed Change as Submitted***

**Proponent:** Paul K. Heilstedt, PE, HonAIA, Chair, representing ICC Code Technology Committee (CTC)

**1. Revise as follows:**

**SECTION 910**
**SMOKE AND HEAT VENTS**

**910.1 (IBC [F] 910.1) General.** Where required by this code ~~or otherwise installed~~, smoke and heat vents and draft curtains or mechanical smoke ~~exhaust~~ removal systems~~, and draft curtains~~ shall conform to the requirements of this section. The provisions of Section 910.3 shall only apply to buildings or portions thereof, which are not protected by an automatic sprinkler system. The provisions of Section 910.4 shall apply to buildings or portions thereof which are protected by an automatic sprinkler system in accordance with Section 903.3.1.1.

~~**Exceptions:**~~

1. ~~Frozen food warehouses used solely for storage of Class I and II commodities where protected by an approved automatic sprinkler system.~~
2. ~~Where areas of buildings are equipped with early suppression fast-response (ESFR) sprinklers, automatic smoke and heat vents shall not be required within these areas.~~

**910.2 (IBC [F] 910.2) Where required.** Smoke and heat vents and draft curtains or a smoke removal system shall be ~~installed in the roofs of one-story buildings or portions thereof occupied for the uses set forth in Sections 910.2.1 through 910.2.3.~~ provided as required by Sections 910.2.1 through 910.2.3

**910.2.1 (IBC [F] 910.2.1) Group F-1 or S-1.** ~~Buildings and portions thereof used as~~ A mechanical smoke removal system shall be installed in one story buildings or portions thereof used as a Group F-1 or S-1 occupancy exceeding 50,000 square feet. ~~having more than 50,000 square feet (4645 m$^2$) in undivided area.~~

~~**Exception:** Group S-1 aircraft repair hangars.~~

**910.2.2 (IBC [F] 910.2.2) Nonsprinklered high-piled combustible storage.** ~~.~~ Smoke and heat vents and draft curtains shall be installed in one story buildings or portions thereof containing high-piled combustible storage ~~stock~~ which is not protected by an automatic sprinkler system ~~or rack storage in any occupancy group~~ in accordance with Section 2306.7.

**910.2.3 (IBC [F] 910.2.3) Sprinklered high-piled combustible storage.** ~~.~~ A mechanical smoke removal system shall be installed in one story buildings or portions thereof containing high-piled combustible storage which is protected by an automatic sprinkler system in accordance with Section 413 and the *International Fire Code*.

**910.3 (IBC [F] 910.3) Design and installation.** The design and installation of smoke and heat vents and draft curtains in buildings which are not protected by an automatic sprinkler system shall be ~~as specified in Sections 910.3.1 through 910.3.5.2 and Table 910.3.~~ in accordance with NFPA 204 and this section.

~~**TABLE 910.3 (IBC [F] TABLE 910.3)**~~
~~**REQUIREMENTS FOR DRAFT CURTAINS AND SMOKE AND HEAT VENTS[a]**~~
*(Delete table and notes in their entirety)*

**910.3.1 (IBC [F] 910.3.1) Smoke boundary layer.** Smoke and heat vents and draft curtain installations shall be designed to maintain the elevation of the smoke boundary layer as defined by NFPA 204 a minimum of 6 feet above the elevation of the means of egress for a period of 20 minutes after effective ignition.

~~**910.3.1 (IBC [F] 910.3.1) Design.**~~ **910.3.2 (IBC [F] 910.3.2) Listing and labeling.** Smoke and heat vents shall be listed and labeled to indicate compliance with UL 793 or FM 4430..

~~**910.3.2 (IBC [F] 910.3.2) Vent operation.** Smoke and heat vents shall be capable of being operated by approved automatic and manual means. Automatic operation of smoke and heat vents shall conform to the provisions of Sections 910.3.2.1 through 910.3.2.3.~~

~~**910.3.2.1 (IBC [F] 910.3.2.1) Gravity-operated drop-out vents.** Automatic smoke and heat vents containing heat-sensitive glazing designed to shrink and drop out of the vent opening when exposed to fire shall fully open within 5~~

~~minutes after the vent cavity is exposed to a simulated fire, represented by a time-temperature gradient that reaches an air temperature of 500°F (260°C) within 5 minutes.~~

~~**910.3.2.2 (IBC [F] 910.3.2.2) Sprinklered buildings.** Where installed in buildings provided with an approved automatic sprinkler system, smoke and heat vents shall be designed to operate automatically.~~

~~**910.3.2.3 (IBC [F] 910.3.2.3) Nonsprinklered buildings.** Where installed in buildings not provided with an approved automatic sprinkler system, smoke and heat vents shall operate automatically by actuation of a heat-responsive device rated at between 100°F (38°C) and 220°F (104°C) above ambient.~~

~~**Exception:** Gravity-operated drop-out vents complying with Section 910.3.2.1~~

~~**910.3.3 (IBC [F] 910.3.3) Vent dimensions.** The effective venting area shall not be less than 16 square feet (1.5 $m^2$) with no dimension less than 4 feet (1219 mm), excluding ribs or gutters having a total width not exceeding 6 inches (152 mm).~~

~~**910.3.4 (IBC [F] 910.3.4**~~ **910.3.3 (IBC [F] 910.3.3 Vent locations.** Smoke and heat vents shall be located 20 feet (6096 mm) or more from adjacent lot lines and fire walls and 10 feet (3048 mm) or more from fire barriers. ~~Vents shall be uniformly located within the roof in the areas of the building where the vents are required to be installed by Section 910.2 with consideration given to roof pitch, draft curtain location, sprinkler location and structural members~~.

~~**910.3.5 (IBC [F] 910.3.5)**~~ **910.3.4 (IBC [F] 910.3.4 Draft curtains.** Where required by ~~Table 910.~~3 NFPA 204, draft curtains shall be installed on the underside of the roof in accordance with this section.

**Exception:** Where areas of buildings are equipped with ESFR sprinklers, draft curtains shall not be provided within these areas. Draft curtains shall only be provided at the separation between the ESFR sprinklers and the non ESFR sprinklers.

~~**910.3.5.1 (IBC [F] 910.3.5.1**~~ **910.3.4.1 (IBC [F] 910.3.4.1) Construction.** Draft curtains shall be constructed of sheet metal, lath and plaster, gypsum board or other approved materials which provide equivalent performance to resist the passage of smoke. Joints and connections shall be smoke tight.

~~**910.3.5.2 (IBC [F] 910.3.5.2) Location and depth.** The location and minimum depth of draft curtains shall be in accordance with Table 910.3.~~

~~**910.4 (IBC [F] 910.4) Mechanical smoke exhaust.** Where approved by the fire code official, engineered mechanical smoke exhaust shall be an acceptable alternate to smoke and heat vents.~~
**[F] 910.4. Mechanical smoke removal system.** Where required by Sections 910.2.1 and 910.2.3, a mechanical smoke removal system shall be provided in accordance with this section.

**Exception:** Buildings or portions thereof which are protected by ESFR sprinklers.

~~**910.4.1 (IBC [F] 910.4.1) Location.** Exhaust fans shall be uniformly spaced within each draft-curtained area and the maximum distance between fans shall not be greater than 100 feet (30 480 mm).~~

**910.4.1 (IBC [F] 910.4.1) Exhaust fan number and spacing.** A minimum of two exhaust fans shall be provided. The spacing between exhaust inlets shall be a minimum of 40 feet and not exceed 100 feet.

~~**910.4.2 (IBC [F] 910.4.2) Size.** Fans shall have a maximum individual capacity of 30,000 cfm (14.2 m3/s). The aggregate capacity of smoke exhaust fans shall be determined by the equation:~~

~~$C = A \times 300$ **(Equation 9-10)**~~

~~where:~~

~~$C$ = Capacity of mechanical ventilation required, in cubic feet per minute (m3/s).~~
~~$A$ = Area of roof vents provided in square feet (m2) in accordance with Table 910.3.~~

**910.4.2 (IBC [F] 910.4.2) Exhaust fan construction.** Exhaust fans which are part of the smoke removal system shall be rated for operation at ambient temperatures. Exhaust fan motors shall be located outside of the exhaust air stream.

**910.4.2 (IBC [F] 910.4.3) System design criteria.** The mechanical smoke removal system shall be sized to exhaust the building at a minimum rate of 4 air changes per hour based upon the volume of the building or portion thereof without contents. The capacity of each exhaust fan shall not exceed 30,000 cubic feet per minute. Adequate make-up air shall be available and approved.

~~**910.4.3 (IBC [F] 910.4.3) Operation.** Mechanical smoke exhaust fans shall be automatically activated by the automatic sprinkler system or by heat detectors having operating characteristics equivalent to those described in Section 910.3.2. Individual manual controls of each fan unit shall also be provided.~~

**910.4.4 (IBC [F] 910.4.4) Activation.** The mechanical smoke removal system shall be activated by manual controls. The mechanical smoke removal system shall not be automatically activated.

**910.4.5 (IBC [F] 910.4.5) Manual control location.** Manual controls shall be located so as to be accessible to the fire service from the exterior of the building and be protected against interior fire exposure by not less than 1-hour fire barriers constructed in accordance with Section 707 or horizontal assemblies constructed in accordance with Section 712, or both.

~~**[F] 910.4.4 Wiring and control.** Wiring for operation and control of smoke exhaust fans shall be connected ahead of the main disconnect and protected against exposure to temperatures in excess of 1,000°F (538°C) for a period of not less than 15 minutes. Controls shall be located so as to be immediately accessible to the fire service from the exterior of the building and protected against interior fire exposure by not less than 1-hour fire barriers constructed in accordance with Section 706 or horizontal assemblies constructed in accordance with Section 711, or both.~~

**910.4.6 (IBC [F] 910.4.6) Wiring and control.** Wiring for the operation and control of smoke removal system fans shall be connected ahead of the main disconnect and be protected by materials with a finish rating of 30 minutes.

~~**910.4.5 (IBC [F] 910.4.5) Supply air.** Supply air for exhaust fans shall be provided at or near the floor level and shall be sized to provide a minimum of 50 percent of required exhaust. Openings for supply air shall be uniformly distributed around the periphery of the area served.~~

~~**910.4.6 (IBC [F] 910.4.6) Interlocks.** In combination comfort air-handling/ smoke removal systems or independent comfort air-handling systems, fans shall be controlled to shut down in accordance with the approved smoke control sequence.~~

**910.4.7 (IBC [F] 910.4.7) Interlocks.** Where building air-handling and smoke removal systems are combined or where independent building air-handling systems are provided, fans shall automatically shut down in accordance with the *International Mechanical Code*. The manual controls provided for the smoke removal system shall have the cability to override the automatic shutdown of fans that are part of the smoke removal system.

**TABLE 2306.2**
**GENERAL FIRE PROTECTION AND LIFE SAFETY REQUIREMENTS**

| COMMODITY CLASS | SIZE OF HIGH-PILED STORAGE AREA[a] (square feet) (see Sections 2306.2 and 2306.4) | ALL STORAGE AREAS (See Sections 2306, 2307 and 2308)[b] | | | | |
|---|---|---|---|---|---|---|
| | | Automatic fire-extinguishing system (see Section 2306.4) | Fire detection system (see Section 2306.5) | Building access (see Section 2306.6) | Smoke and heat ~~removal~~ venting (see Section 2306.7) | ~~Draft curtains (see Section 2306.7)~~ |
| I-IV | 0-500 | Not Required[a] | Not Required | Not Required[e] | Not Required | ~~Not Required~~ |
| | 501-2,500 | Not Required[a] | Yes[i] | Not Required[e] | Not Required | ~~Not Required~~ |
| | 2,501-12,000 Public accessible | Yes | Not Required | Not Required[e] | Not Required | ~~Not Required~~ |
| | 2,501-12,000 Nonpublic accessible (Option 1) | Yes | Not Required | Not Required[e] | Not Required | ~~Not Required~~ |
| | 2,501-12,000 Nonpublic accessible (Option 2) | Not Required[a] | Yes | Yes | Yes | ~~Yes~~[i] |

| COMMODITY CLASS | SIZE OF HIGH-PILED STORAGE AREA[a] (square feet) (see Sections 2306.2 and 2306.4) | ALL STORAGE AREAS (See Sections 2306, 2307 and 2308)[b] | | | | |
|---|---|---|---|---|---|---|
| | | Automatic fire-extinguishing system (see Section 2306.4) | Fire detection system (see Section 2306.5) | Building access (see Section 2306.6) | Smoke and heat ~~removal~~ venting (see Section 2306.7) | ~~Draft curtains (see Section 2306.7)~~ |
| | 12,001-20,000 | Yes | Not Required | Yes | Yes[j] | ~~Not Required~~ |
| | 20,001-500,000 | Yes | Not required | Yes | Yes[l] | ~~Not required~~ |
| | Greater than 500,000 ~~g~~,d | Yes | Not required | Yes | Yes[l] | ~~Not required~~ |
| High hazard | 0-500 | Not Required[a] | Not Required | Not Required[e] | Not Required | ~~Not Required~~ |
| | 501-2,500 Public accessible | Yes | Not Required | Not Required[e] | Not Required | ~~Not Required~~ |
| | 501-2,500 Nonpublic accessible (Option 1) | Yes | Not Required | Not Required[e] | Not Required | ~~Not Required~~ |
| | 501-2,500 Nonpublic accessible (Option 2) | Not Required[a] | Yes | Yes | Yes | ~~Yes~~[j] |
| | 2,501-300,000 | Yes | Not required | Yes | Yes[j] | ~~Not required~~ |
| | 300,001-500,000~~g~~,d,h | Yes | Not required | Yes | Yes[l] | ~~Not required~~ |

*(Portions of table not shown remain unchanged)*

For SI: 1 foot = 304.8 mm, 1 cubic foot = 0.02832 $m^3$ , 1 square foot = 0.0929 $m^2$ .

a. When automatic sprinklers are required for reasons other than those in Chapter 23, the portion of the sprinkler system protecting the high-piled storage area shall be designed and installed in accordance with Sections 2307 and 2308.
b. For aisles, see Section 2306.9.
c. Piles shall be separated by aisles complying with Section 2306.9.
d. For storage in excess of the height indicated, and high hazard storage areas greater than 300, 000 square feet, ~~special fire protection~~ an approved engineering design such as fire protection of structural elements and enhanced fire suppression shall be provided ~~in accordance with Note g when required by the fire code official~~. See also Chapters 28 and 34 for special limitations for aerosols and flammable and combustible liquids, respectively.
e. Section 503 shall apply for fire apparatus access.
f. For storage exceeding 30 feet in height, Option 1 shall be used.
~~g. Special fire protection provisions including, but not limited to, fire protection of exposed steel columns; increased sprinkler density; additional in-rack sprinklers, without associated reductions in ceiling sprinkler density; or additional fire department hose connections shall be provided when required by the fire code official.~~
h. High-piled storage areas shall not exceed 500,000 square feet. A 2-hour fire wall constructed in accordance with the International Building Code shall be used to divide high-piled storage exceeding 500,000 square feet in area.
i. Not required when an automatic fire-extinguishing system is designed and installed to protect the high-piled storage area in accordance with Sections 2307 and 2308.
j. Smoke and heat venting shall not be ~~Not~~ required when storage areas are protected by early suppression fast response (ESFR) sprinkler systems installed in accordance with NFPA 13. Where a standard sprinkler system is installed in these locations, a mechanical smoke removal system shall be provided in accordance with Section 910.4. See Section 2306.7.

**2306.7 Smoke and heat ~~removal~~ venting.** Where smoke and heat ~~removal~~ venting ~~are~~ is required by Table 2306.2 in buildings not protected by an automatic sprinkler system, smoke and heat vents and draft curtains shall be provided in accordance with Section 910. Smoke and heat venting shall not be required where storage areas are protected by early suppression fast response (ESFR) sprinkler systems installed in accordance with NFPA 13. Where Table 2306.2 requires smoke and heat venting in a building with a standard sprinkler system, a mechanical smoke removal system shall be provided in accordance with Section 910.4. Where draft curtains are required by Table 2306.2, they shall be provided in accordance with Section 910.3.4.

**2. Add new standards to Chapter 47 (IBC Chapter 35) as follows:**

**FM**
4430-07 Approval Standard for Heat and Smoke Vents

**NFPA**
204-2010 Standard for Smoke and Heat Venting

**Reason:** The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: http://www.iccsafe.org/cs/cc/ctc/index.html. Since its inception in April/2005, the CTC has held seventeen meetings - all open to the public.

This proposed change is a result of the CTC's investigation of the area of study entitled "Balanced Fire Protection – Roof vents". The scope of the activity is noted as:

Review the current IBC/IFC requirements for smoke/heat vents and draft curtains relative to balanced fire protection**.**

The purpose of this code change is to update the provisions which mandate roof vents in one-story industrial and storage buildings. The code change will delete the specification-oriented provisions for roof vents and draft curtains for unsprinklered buildings and substitute a reference to NFPA 204. The code change will further require that a manually-operated mechanical smoke removal system be provided for large one-story industrial and storage buildings protected by a sprinkler system in lieu of the requirements for roof vents and draft curtains.

The first issue assigned by the ICC Board of Directors to the Code Technology Committee (CTC) in 2005 was the issue of "balanced" fire protection. As part of the CTC's review of the "balanced" fire protection issue, the CTC formed a Study Group to review the issue of whether or not smoke/heat vents were necessary in large buildings protected by a sprinkler system.

After reviewing the available research on the interaction of standard sprinklers and roof vents (NISTIR 6196-1), it was determined that individually-activated automatic roof vents are unlikely to activate automatically in buildings protected by standard spray sprinklers (provided that the sprinkler system is adequate for the hazard protected and is operational). Given this determination, it was concluded that the performance of individually-activated automatic roof vents is essentially the same as manually-operated roof vents in buildings protected by a sprinkler system.

The explanatory information provided in NFPA 204 indicates that the capabilities of roof vents to perform their function are dependent upon the depth of the smoke layer which develops and the temperature differential between the smoke layer and ambient temperature. Given that standard spray sprinklers are highly efficient in reducing ceiling temperatures due to the finely divided water spray produced by these types of sprinklers, the ceiling temperatures produced even in "high challenges" fires are rapidly reduced and, after about 10 minutes of sprinkler discharge, return to near ambient and continue to drop with additional time. Based upon this, it can be concluded that roof vents which are manually opened 10 minutes or more after sprinkler activation will not provide effective venting for the building.

Where the smoke layer temperature differentials are less than 110$^{o}$C (198$^{o}$F), NFPA 204 recommends that a powered (mechanical) exhaust system be provided in lieu of providing roof vents. Based upon the recommendations contained in NFPA 204, the provisions for providing roof vents have been deleted and a requirement for a manually-operated mechanical smoke removal system has been substituted.

The proposal requires that the manually-operated mechanical smoke removal system be sized to provide a minimum of 6 air changes per hour. Since the use of roof vents for the purpose of providing venting in sprinklered buildings has been acceptable for over 25 years, the sizing of the mechanical smoke removal system has been determined based upon the venting capabilities of roof vents at a time equal to the typical fire department response time, 10 minutes and beyond. Given that opened roof vents will provide little actual venting capability after the sprinkler system has been discharging water spray for 10 minutes, providing a mechanical smoke removal system which provides a minimum of 4 air changes an hour will be a substantial improvement over the presently acceptable venting capabilities for sprinklered buildings required by the IBC/IFC. The 4 air changes were viewed as a reasonable value when compared against the BOCA National Building Code which required 2 and the Uniform Building Code which required 6.

It should be noted that this code change proposal permits the mechanical smoke removal system to designed to operate at ambient temperatures. The rationale for this provision is that the ceiling temperatures throughout the building will be returned to close to ambient at between 10 and 15 minutes after the first sprinkler activates. Given that the typical response time for fire departments is roughly 10 minutes, and the ceiling temperatures expected after 10 minutes, there is no need to design the mechanical system to withstand temperatures higher than ambient.

In the opinion of the Study Group which has developed this code change proposal, the proposal is a vast improvement over the existing provisions for roof venting presently contained in the IBC/IFC.

It should be noted that simply making a reference to NFPA 204 as a substitute for the present specification-oriented provisions for roof vents/draft curtains contained in the IBC/ IFC is not an option because the current edition of NFPA 204 does not contain specific design provisions for the design of roof vent systems in buildings protected by a standard sprinkler system. Without specific provisions for roof vent system in sprinklered buildings, the requirements for roof vent systems in sprinklered buildings cannot be enforced in a uniform manner in all jurisdictions which utilize the IBC/IFC.

It should also be noted that the NFPA 204 committee is presently working developing provisions which address the design of roof venting systems in sprinklered buildings; however, these provisions have been under development for more than 30 years. It is the Study Group's opinion that the IBC/IFC should not be written based upon the assumption that the NFPA 204 committee will be able to develop provisions for the design of venting systems anytime in the near future.

**Cost Impact:** The code change proposal will not increase the cost of construction.

**Analysis:** A review of the standard proposed for inclusion in the code, FM 4430-07, for compliance with ICC criteria for referenced standards given in Section 3.6 of Council Policy #CP 28 will be posted on the ICC website on or before September 24, 2009. Review of proposed new standard NFPA 204-2010 indicated that, in the opinion of ICC Staff, the standard did comply with ICC standards criteria.

ICCFILENAME: HEILSTEDT-F1-910.1.DOC

## ***Public Hearing Results***

**Note:** The following analysis was not in the Code Change monograph but was published on the ICC website at http://www.iccsafe.org/cs/codes/Documents/2009-10cycle/ProposedChanges/Standards-Analysis.pdf :

**Analysis:** Review of proposed new standard NFPA 204-2010 indicated that, in the opinion of ICC Staff, the standard did comply with ICC standards criteria in terms of the availability of a consensus draft for the committee hearing. Note that section 3.6.3.1 of CP28-05 requires that the standard be completed and readily available prior to Final Action Consideration. The final action of this proposal will occur May 14-23, 2010.

Review of the proposed standard FM 4430-07 indicated that in the opinion of ICC Staff the standard did not comply with ICC standards criteria. More specifically the standard did not meet the consensus process of requirement of Section 3.6.3.2 of CP28-05.

**Committee Action:** **Approved as Modified**

**Modify proposal as follows:**

**910.2.1 (IBC [F] 910.2.1) Group F-1 or S-1** ~~-~~A mechanical smoke removal system shall be installed in ~~one-story~~ buildings or portions thereof used as a Group F-1 or S-1 occupancy exceeding 50,000 square feet.

**910.2.3 (IBC [F] 910.2.3) Sprinklered high-piled combustible storage.** ~~.~~ A mechanical smoke removal system shall be installed in ~~one-story~~ buildings or portions thereof containing high-piled combustible storage which is protected by an automatic sprinkler system in accordance with Section 413 and the *International Fire Code*.

**[F] 910.4. Mechanical smoke removal system.** Where required by Sections 910.2.1 and 910.2.3, a mechanical smoke removal system shall be provided in accordance with this section.

**Exceptions:**

1. Buildings or portions thereof which are protected by ESFR sprinklers.
2. Buildings equipped with smoke and heat vents designed in accordance with NFPA 204, when permitted by NFPA 13.

**910.4.6 (IBC [F] 910.4.6) Wiring and control.** Wiring for the operation and control of smoke removal system fans ~~shall be connected ahead of the main disconnect~~ provided with power in accordance with Section 909.11 and be protected by materials with a finish rating of ~~30 minutes~~ not less than 1 hour.

**2306.7 Smoke and heat venting.** Where smoke and heat venting is required by Table 2306.2 in buildings not protected by an automatic sprinkler system, smoke and heat vents and draft curtains shall be provided in accordance with Section 910. Smoke and heat venting shall not be required where storage areas are protected by early suppression fast response (ESFR) sprinkler systems installed in accordance with NFPA 13. Where Table 2306.2 requires smoke and heat venting in a building with a standard sprinkler system, ~~a mechanical~~ smoke removal ~~system~~ shall be provided in accordance with Section 910.4. Where draft curtains are required by Table 2306.2, they shall be provided in accordance with Section 910.3.4.

**Revise Table 2306.2 Note j as follows:**

j. Smoke and heat venting shall not be required when storage areas are protected by early suppression fast response (ESFR) sprinkler systems installed in accordance with NFPA 13. Where a standard sprinkler system is installed in these locations, ~~a mechanical~~ smoke removal ~~system~~ shall be provided in accordance with Section 910.4. See Section 2306.7.

**NFPA**

204-~~2010~~ 2007 Standard for Smoke and Heat Venting

*(Portions of the proposal not shown remain unchanged)*

**Committee Reason:** The committee approved the proposal with amendments as it was felt that a major revision to this section was necessary. The proposal essentially requires mechanical smoke removal in sprinklered buildings and using smoke and heat vents in unsprinklered buildings. There were four major modifications to this code change. The first removed the phrase "one-story" from sections 910.2.1 and 910.2.3 as mechanical smoke removal does not need to be limited to 'one story" buildings as smoke and heat venting is limited. The second modification increases the rating of the wiring for the smoke removal system from 30 minutes to 1 hour and also requires standby power and some associated passive protection of such power supplies in accordance with Section 909.11. Members of the committee felt smoke removal systems are critical emergency systems that need additional protection even in buildings where sprinklers are operating. The third modification recognizes some situations that are permitted by NFPA 13 to allow smoke and heat vents in sprinklered buildings. Allowing smoke and heat vents as an option when appropriate was felt to be necessary. This revision adds a new exception to Section 910.4 to allow this in lieu of smoke removal systems. In addition, Section 2306.7 and footnote j to Table 2306.2 makes the reference to smoke removal more general to be inclusive of mechanical smoke removal and smoke and heat vents. The fourth modification changes the referenced edition of NFPA 204 from the 2010 edition to the 2007 edition. The reason for the change of edition years relates to the fact that the 2010 edition is likely not to be available prior to the final action hearings.

**Assembly Action:** **None**

## ***Individual Consideration Agenda***

**This item is on the agenda for individual consideration because public comments were submitted.**

*Public Comment 1:*

**Richard Schulte representing Schulte & Associates, requests Approval as Submitted.**

**Commenter's Reason:** The reason for submitting this public comment is that it is Schulte & Associates' opinion that testimony heard in support of the modification to this code change proposal made by William Koffel, Koffel & Associates, was factually in error and, hence, the code changes committee was misled into believing that it is the intent of the 2010 edition of NFPA 13 to consider that the installation of roof vents "***is a viable technology in sprinklered buildings***".

It is also Schulte & Associates' opinion that the code changes committee was further misled by testimony provided by William Koffel that the next edition of NFPA 204 will contain a "methodology" for designing roof vent/draft curtain systems in buildings protected by a sprinkler system.

The text of William Koffel's testimony on the modification to code change proposal F144-09/10 is as follows:

*"To the modification. As Carl* [Baldassarra] *said, the name of this committee is Code Technology Committee, but their proposal is eliminating a technology that has been used for years without adequate substantiation. So, the nature of our modification is merely in sprinklered buildings to give the option using mechanical system or to use vents as we've used for a number of years.*

*Now, in their supporting statement, they identify several reasons for doing this. In the second to the last paragraph on the first page of their substantiation, they indicate that the differential on the smoke temperatures will be approximately 198°F. I don't see where they came up with that. In fact, Carl stood here earlier and said that the test to determine adequate sprinkler performance is that temperatures do not threaten the structural steel system. That's substantially higher than the temperatures that they just referenced here. And in fact, NFPA 13 encourages the use of high temperature, 286°F sprinklers, in this type of occupancy. So, we clearly could have temperatures in excess of what they've identified. Secondly, they talk about a recommendation of the NFPA 204 committee. I sit on the NFPA smoke management committee responsible for 204. I'm not representing that committee here. I sit on NFPA 13 discharge criteria committee which is responsible for Chapter 12. I'm not representing that committee. But I think this committee needs to know that NFPA 13 now allows vents and draft curtains in buildings protected throughout with a sprinkler system. In fact, they've even gone so far to allow it in a building with ESFR sprinklers, smoke vents that is, if the vents have a certain criteria. That's in Chapter 12 of the 2010 edition of NFPA 13.* ***So the 13 committee recognizes that this is a viable technology in sprinklered buildings.*** [Emphasis added.] *204 has a proposal, or a comment, that is being balloted now that has a new chapter for designing smoke vents in buildings protected with a sprinkler system, so the technology is being addressed by the appropriate NFPA committees. Thank you.*

The issue of whether roof vents should be required in buildings protected by a sprinkler system was first discussed at the Code Technology Committee (CTC) meeting held in Detroit in late September 2005. The CTC voted to form a study group on the issue of roof vents as part of the CTC's study of the "balanced fire protection" issue at its meeting in Kansas City in October 2006. The study group began its work in January 2007 and it quickly became apparent (in my opinion) that the representatives of the Smoke Vent Task Group, Dr. Craig Beyler and Rick Thornberry, intended to delay the work of the study group for as long as possible.

At the CTC meeting held in Cincinnati in June 2007, the CTC voted to hold a debate over the issue of the use of roof vents in buildings protected by a sprinkler system in order to "break the logjam" created by Messrs. Thornberry and Beyler. Each side in the debate was given 30 minutes to make a presentation to the CTC. The debate before the CTC took place in Baltimore in late May 2008. Given the lack of time available for discussion at the meeting in Baltimore, the debate was repeated at the next CTC meeting held in Chicago in November 2008.

Speaking for the Smoke Vent Task Group, Dr. Craig Beyler, Hughes Associates, Inc. (HAI), presented HAI's research on the concept of the automatic "ganged" operation of roof vents (60 seconds after sprinkler system water flow is detected) to the CTC. This research relied on a fire modeling study of the interaction between sprinklers and roof vents. The "validation" of the fire model used in HAI's research was challenged and it was eventually determined that the use of the fire model, the Fire Dynamics Simulator (FDS), was not "validated" for the purpose the model was utilized by HAI. In a Smoke Vent Task Group teleconference held on March 24, 2009, the SVTG characterized HAI's fire modeling study as "***worthless***" and both of the SVTG's representatives to the CTC Roof Vent Study Group appear to have been dismissed by the Smoke Vent Task Group some time during 2009.

(**Source:** Minutes of the Smoke Vent Task Group Conference Call-Tuesday, March 24, 2009; 2009 AAMA 72nd Annual Conference, February 22-25, 2009-Revised as of May 11, 2009. See the notes at the end of this comment for the exact text indicating that the research work done by Hughes Associates, Inc. is "***worthless***".)

Based upon direction by the CTC provided at its November, 2008 meeting, the Roof Vent Study Group developed what became code change F144-09/10. The CTC's direction to the Study Group was that the code change proposal should reference NFPA 204.

Given that the latest edition of NFPA 204, the 2007 edition, does not contain any mandatory provisions for the design of roof vent/draft curtain systems in buildings protected by a sprinkler system, the Study Group developed a code change proposal which references NFPA 204 for the design of roof vent/draft curtain systems in buildings which are not protected by a sprinkler system and requires a manually-activated mechanical smoke removal system for buildings protected by a sprinkler system. Providing a mechanical smoke removal system is in accordance with the provisions contained in NFPA 204 which state that a mechanical smoke removal system should be considered, rather than roof vents, where the differential between the (**average**) temperature of the smoke layer and ambient temperature is less than 100°C (198°F).

The code change proposal developed by the Roof Vent Study Group/CTC contains no provisions for the use of roof vent systems in buildings protected by a sprinkler system. **Over the course of the three years in which the Roof Vent Study Group has been in existence, neither the Smoke Vent Task Group, the consultants retained by the SVTG or other interested parties submitted any documentation or testing which demonstrated that roof vent systems in buildings protected by a sprinkler system actually "work".**

In 1997/1998, a research study of the interaction between sprinklers and roof vents funded by the National Fire Protection Research Foundation (NFPRF) and conducted at Underwriters Laboratories (UL) determined that it was unlikely that thermally-activated automatic roof vents would open if the temperature rating of the activating device was the same (or greater than the) temperature rating of the sprinklers. More specifically, **Test P-2** in a series of five large-scale fire tests which were conducted as part of this research demonstrated that even if the ignition point of the fire was directly beneath an automatic roof vent, a vent may fail to open due to the activation of sprinklers in the vicinity of the vent. (The final report on this research can be found in a document referred to as **NISTIR 6196-1** dated September 1998. The title of this report is "Sprinkler, Smoke & Heat Vent, Draft Curtain Interaction-Large Scale Experiment and Model Development". The authors of this report were Kevin B. McGrattan, Anthony Hamins and David Stroup of NIST. The summary and discussion of Test P-2 begins on page 42 of this report.)

In response to the published report on the UL/NFPRF research, the chairman of the Smoke Vent Task Group, Paul Simony, issued a memorandum in early September 1999 which made a commitment to fund additional research into the interaction of sprinklers and roof vents. After 10-1/2 years, the research announced in September 1999 has yet to begin.

In the Summer 2006 issue of the AAMA newsletter, AAMAnet.work, the Smoke Vent Task Group announced that a contract had been awarded to Hughes Associates, Inc. to conduct fire modeling "***to concretely demonstrate the value of S&HV*** [smoke and heat vents] ***in terms of property protection, occupant safety, firefighter safety, and firefighter effectiveness***". The findings of this research were released in a report titled "*Analysis of the Performance of Ganged Operation of Smoke and Heat Vents with Sprinklers and Draft Curtains*" dated February 18, 2008, however, the "validation" of the fire model, the Fire Dynamics Simulator (FDS), for the purposes utilized in the research was challenged (by Schulte & Associates and others) and Hughes Associates, Inc. was unable to demonstrate that the FDS has been "validated" for the purposes which the FDS was used. Hence, Hughes Associates, Inc.'s client, the Smoke Vent Task Group has characterized the fire modeling study which was to *"concretely demonstrate the value of S&HV*" as "***worthless***".

(**Source:** Minutes of the Smoke Vent Task Group Conference Call-Tuesday, March 24, 2009; 2009 AAMA 72nd Annual Conference, February 22-25, 2009-Revised as of May 11, 2009. See the notes at the end of this comment for the exact text indicating that the research work conducted by Hughes Associates, Inc. is "***worthless***".)

In a meeting of the CTC Balanced Fire Protection Study Group held at the Orange County Fire Authority (OCFA) in January 2007, Rick Thornberry, representing the Smoke Vent Task Group, announced that the SVTG would conduct testing of the concept of the "ganged" operation of roof vents in an aircraft hangar scheduled for demolition located on the Marine Corps Base in Orange County, California in conjunction with the OCFA. Later in 2007, Rick Thornberry announced that the planned research had been cancelled because of a lack of agreement regarding the use of the aircraft hangar with the United States Navy and that there were no other plans to conduct further research due to the problem of finding a suitable building and compliance with air pollution regulations.

In summary, in the 11-1/2 years since the findings of the UL/NFPRF study were published, the manufacturers of roof vents have made three commitments to conduct additional studies and research on the interaction of roof vents and sprinklers, but have not honored any of these commitments. (One of those commitments did result in "***worthless***" research, however.) In other words, the 1998 finding that the operation of sprinklers interferes with the openings of roof vents remains uncontested by any additional research. Further, Dr. Craig Beyler, formerly a representative for the Smoke Vent Task Group, has stated on a number of occasions since September 1998 that the number of thermally-activated roof vents which will open automatically in a fire in a building protected by a sprinkler system will be either 0 or 1 (if the sprinkler system effectively controls the fire).

Recently, the NFPA 13 committee has addressed the issue of the installation of roof vents in buildings protected by a sprinkler system. The original proposal considered by the NFPA 13 subcommittee published in the ROP document dated **October 20, 2007** reads as follows:

"**12.1.1** *Roof Vents and Draft Curtains. Roof vents and draft curtains shall* ***not*** *be used in conjunction with the sprinkler protection criteria for storage in this standard.*

This original 2007 proposal was amended to its final form for inclusion in the 2010 edition of NFPA 13. The substantiation for the provisions addressing roof vents included in the 2010 edition of NFPA 13 reads as follows:

"**Substantiation:** *The intent of the standard is that roof vents and draft curtains should* ***not*** *be used in conjunction with storage protection. Previous language was unenforceable.*"

In addition to the above, an "Explanation of Negative" comment submitted on the proposal which addresses the use of roof vent systems in buildings protected by a sprinkler system reads as follows:

**MULTER, T.:** *The following original proposal on ROP documents dated 10/20/2007 should be accepted as proposed but with a change to the annex statement. . . .*

**A.12.1.1** *The design parameters in NFPA 13 were developed based upon the absence of roof vents or draft curtains. (See Annex C.6) Fire tests for sprinklers specifically listed for storage applications are tested without vents or draft curtains. References to control mode sprinklers in other building standards pertain to standard spray sprinklers that were not specifically tested by the laboratories for storage applications. With the advent of K-11.2 and larger sprinklers for storage applications and now Specific Application Control Mode sprinklers (being revised to CMSA), we need to realize that ESFRs are not the only storage sprinklers and that* ***the use of smoke vents and draft curtains can be detrimental to all sprinklers that are specifically tested for storage applications.*** *FM Global's recommended storage protection designs are based upon vents not being provided and that the use of automatic vents may increase the sprinkler water demand.*"

(**Source:** [NFPA] 13-325 Log #CP43 AUT-SSD Final Action: Accept; **Submitter:** *Technical Committee on Sprinkler System Discharge Criteria*)

Given all of the information above, it would be difficult to conclude anything but that William Koffel's statement that ***"this is a viable technology in sprinklered buildings"*** in his testimony at the code development hearings in Baltimore was misinformation. Given the fact that William Koffel is (and was) a member of the NFPA 13 sub-committee which developed the NFPA 13 provisions addressing roof vents and that he cast ballots on these proposals, it is also not too difficult to conclude that William Koffel's statement was intentional disinformation. (It should be noted that an ethics complaint against William Koffel based upon his testimony in the code development hearings in Baltimore was filed with the ICC in January, 2010.)

Regarding William Koffel's statements that "***204 has a proposal, or a comment, that is being balloted now that has a new chapter for designing smoke vents in buildings protected with a sprinkler system, so the technology is being addressed by the appropriate NFPA committees***", two special expert members of the NFPA Smoke Management Committee submitted the following comments regarding the proposed "methodology" for utilizing roof vents/draft curtains in buildings protected by a sprinkler system:

***DILLON, M.:*** *The document* ***prematurely and improperly*** *requires and relies upon unproven methods of calculation for the effectiveness of smoke and heat vents in the presence of automatic water-based sprinkler protection systems.* ***It also relies on calculations of questionable accuracy to determine activation times for the vents and the sprinklers.***

***WOLIN, S.:*** *While the proposal would substantially increase the amount of text in Chapter 11, I do not believe that the proposed revisions provide any significant guidance on the use of smoke and heat vents in sprinklered buildings that would not otherwise be addressed in the performance analysis that is already required. . . .*

**(Source:** [NFPA] 204-1 Log #5, Report on Comments, June 2010.)

While the comments above made by Messrs. Dillon and Wolin were published after William Koffel's testimony, these comments are essentially the same comments made 6 months prior to the code development hearings in Baltimore by Messrs. Kenneth Isman, representing the National Fire Sprinkler Association (NFSA), and Richard Schulte, Schulte & Associates.

The following are excerpts from comments made by Messrs. Isman and Schulte in the spring of 2009:

***ISMAN, K.:*** *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.***

***SCHULTE, R.:*** *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:*

"*. . . . there is* ***no consensus*** *metric in fire protection engineering by which a model is considered validated or not for a particular application. . . .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. . . .**But I hope you understand that I simply cannot make a blanket statement like "FDS is validated for predicting multiple sprinkler activations.***"

(**Source:** [NFPA] 204-6 Log #1; Report on Comments A2010)

Given that William Koffel is a member of the NFPA Smoke Management Committee and is listed on the roster of committee members as representing the Smoke Vent Task Group, there can be little doubt that William Koffel reviewed the comments by Messrs. Isman and Schulte. Hence, it seems reasonable to assume that William Koffel is and was aware that the "methodology" for utilizing roof vent systems in building protected by a sprinkler system was considered to be questionable at the time of his testimony in the code development hearings. Once again, the above demonstrates that William Koffel's testimony was at best misinformation and, more than likely, intentional disinformation.

Subsequent to the code development hearings held in Baltimore, William Koffel has now been named as the representative of the Smoke Vent Task Group for purposes of participation in the ICC code development process. In the latest two teleconferences, one held on January 22, 2010 and another held on February 2, 2010, William Koffel no longer asserts that roof vents "work" in buildings protected by a sprinkler system, however, William Koffel has asserted that manually-activated roof vents can be used as a source of make-up air for exhaust fans provided and deployed by the fire service and that manually-activated roof vents are equivalent to the manually-activated smoke removal system proposed in code change proposal F144-09/10. (It should be noted that William Koffel has yet to concede that roof vents do **not** "work" in buildings protected by a sprinkler system, at least in the two teleconferences addressed above.)

**Are manually-operated roof vents really the equivalent of a manually-activated smoke removal system?** In order to open manually-activated roof vents, it is necessary for fire fighters to go onto the roof and individually open each roof vent and, since cold smoke does not rise, fire fighters must also deploy portable exhaust fans at the floor of the building (or attempt positive pressure ventilation). A manually-activated mechanical smoke removal system is activated by a switch located in an approved location and does not require that fire fighters go onto the roof or deploy portable exhaust fans. Obviously, from the standpoint of fire fighter safety, the level of safety provided by a manually-activated mechanical system far exceeds that provided by manually-operated roof vents. Given this, William Koffel's assertion that these two systems provide an e-quivalent level of fire fighter safety is obviously in error.

The public comment submitted by the ICC Code Technology Committee (CTC) will address other modifications approved to code change proposal F144-09/10. The public comment submitted by the CTC will provide the rationale and justification for providing 30 minute finish rating protection for the wiring for the mechanical smoke removal system and for not including a requirement for standby power. Hence, this comment will not address these issues.

The modifications to code change F144-09/10 approved by the code changes committee do not improve the original proposal and, in my opinion, the committee's decision to allow the use of roof vents was based upon hearing the misinformation included in William Koffel's testimony in the code development hearing. Given this, it is requested that code change proposal F144 be approved "as submitted".

The probability that code change F144 being approved as "as submitted" is essentially nil. Given this, I would like to urge that the membership give consideration to the "as further modified" proposal submitted by the ICC Code Technology Committee. While I find any provisions which permits manually-activated roof vents to be provided, and to be considered to be equivalent to the manually-activated mechanical smoke removal system proposed, to be objectionable, the CTC's "as further amended" proposal is at least a first step in recognizing that roof vents do not perform as claimed by the vent manufacturers and their highly-paid consultants/lobbyists.

If the manufacturers of roof vents want to claim that their product does indeed "work" in buildings protected by a sprinkler system, then the further testing and research that was promised by the manufacturers 11-1/2 years ago should be conducted. The membership should not continue to "fall prey" to promises of imminent testing and research made time and again by a trade association with a long history of making false commitments to conducting further testing and research. It is time for the ICC membership to demand to see the research and testing from the vent manufacturers' trade association that conclusively demonstrates that roof vents will make "cold and wet smoke" defy the laws of physics and actually rise.

For more than 30 years now, the vent manufacturers have claimed that roof vents cause "cold and wet smoke" to defy the laws of physics and many in the fire service have fallen for this ruse. The "**laws of physics**" are referred to as laws because they have been proven over and over again to be true. The vent manufacturers cannot point to a single test or study that demonstrates that their product causes "cold and wet smoke" to rise. Why do so many in the fire service continue to believe the manufacturers claims without any evidence?

A vote for "as submitted" will force the manufacturers of vents to either do the testing and research to prove their claims or to stop making unsubstantiated claims. A vote for "as further modified" as proposed by the CTC will also do the same, but in a less forceful manner. Adopting this public comment or the CTC's public comment is far more preferable than the present code provisions or the original CTC proposal as modified by the code changes committee.

**Notes: Excerpt from AAMA Smoke Vent Task Group (SVTG) Teleconference Minutes-March 24, 2009:**

". . . .*The concern remains that if C. Beyler is not willing to support the $100K SVTG Modeling Study, then the study is **worthless**. The members questioned why no other groups, organizations, or Fire Protection Engineers have come forward to defend the FDS program, particularly, Kevin McGratten* [McGrattan]*, from NIST, who wrote the original version of FDS, and has been intimately involved in it since its development. B.Sampson will contact K. McGratten* [McGrattan] *to obtain his thoughts on this.*"

## *Public Comment 2:*

### Paul K. Heilstedt, PE, HonAIA, Chair, representing ICC Code Technology Committee (CTC), requests Approval as Modified by this Public Comment.

**Further modify the proposal as follows:**

**910.2.1 (IBC [F] 910.2.1) Group F-1 or S-1** -A mechanical smoke removal system shall be installed in buildings or portions thereof used as a Group F-1 or S-1 occupancy exceeding 50,000 square feet <u>in undivided area.</u>

**[F] 910.4. Mechanical smoke removal system.** Where required by Sections 910.2.1 and 910.2.3, a mechanical smoke removal system shall be provided in accordance with this section.

**Exception<u>s</u>:**

1. Buildings or portions thereof which are protected by ESFR sprinklers.
2. Buildings equipped with smoke and heat vents ~~designed in accordance with NFPA 204, when permitted by NFPA 13.~~ <u>where approved by the code official. Where installed in buildings provided with an approved automatic sprinkler system, the operation of smoke and heat vents shall be in accordance with NFPA 13.</u>

**910.4.6 (IBC [F] 910.4.6) Wiring and control.** Wiring for the operation and control of smoke removal system fans shall be connected ahead of the main disconnect installed in an approved location. ~~provided with power in accordance with Section 909.11~~ and be protected by materials with a finish rating of 30 minutes ~~not less than 1 hour~~.

*(Portions of proposal not shown remain unchanged)*

**Commenter's Reason:** The CTC studied available information and conducted numerous public meetings on this subject through a study group representing various interests, including building officials, fire officials, manufacturers, architects, engineers and consultants. The intent of the original proposal was to provide reasonable smoke removal provisions for post-fire fighting considerations. The IFC committee, via the modifications that were approved in Baltimore, has taken the original proposal in a direction for which the CTC is in significant disagreement. In effect, the modification took the proposal in a direction not intended by the original code change. This was evidenced by testimony at the hearings themselves where the CTC representative spoke against the modifications. Further, upon confusion of the committee action for "As Modified"; the CTC representative made a floor motion for "As Submitted" as the modified change is not consistent with the intent of the original proposal. The following is a discussion of the modifications approved by the IFC committee and how this public comment intends to direct the code change more closely back to the original intent.

**Section 910.2.1:**
**IFC Modification:** The IFC committee modification extends the application of the present smoke venting requirements from being limited to one-story buildings to buildings of any story height.

**CTC's evaluation of the IFC modification:**

- The modification lacks technical substantiation;
- This is a post fire fighting operation, not involving life safety;

**CTC Public comment:** As a post fire fighting system, CTC has not proposed to revise the requirements back to one story buildings. If the system is necessary and works for a single story, it will work for buildings having multiple stories. The public comment proposes to clarify that the 50,000 square feet area is a contiguous area and not the entire area of the building.

**Section 910.4:**
**IFC Modification:** The IFC committee modification allows the continued use of smoke and heat vents in sprinklered buildings.

**CTC evaluation of the IFC modification:**

- After studying this issue for 2-1/2 years, the CTC concluded that there is no technical basis for vents in sprinklered buildings and proposed to remove the requirement;
- Mechanical systems should be required for sprinklered buildings because any smoke removal must deal with cool smoke; reference is made to NFPA 204 for unsprinklered buildings only;
- A review of the rationale included in the recent change to NFPA 13 includes recognition by the NFPA 13 technical committee that vents are mandated by other regulations, e.g., the IBC, and the standard actually includes precautionary measures for the use of vents in sprinklered buildings;
- NFPA 204 -2010; CTC's original code change proposed a reference to the 2010 edition of NFPA 2010 which is not yet complete:
    - The draft of NFPA 204 – 2010 does not provide design criteria for vents in a sprinklered building; the draft of NFPA 204 includes vague guidance formerly included in the Annex of the standard;
    - The draft of NFPA 204 - 2010 does not include a design goal for the system (unlike the the criteria for mechanical systems), nor one which can be evaluated by an AHJ.
- NFPA 204 – 2007: The modification by the IFC committee changed the referenced edition of NFPA 204 to the 2007 edition because this edition was complete and the 2010 edition (which may not be published until 2011) will not be available by the May/2010 Final Action Hearings:
    - The 2007 edition of the standard includes only an Annex which is not part of the standard for smoke and heat vent design.

**CTC public comment:** Due to a lack of comprehensive design criteria in the 2007 edition of NFPA 204, the decision to allow smoke and heat vents needs to rest with the code official in terms of an assessment of the building in question. The added text to Exception 2 is taken from current section 910.3.2 which stipulates that the vents must be operational in accordance with NFPA 13.

**Section 910.4.6:**
**IFC Modification:** The IFC committee modification requires standby-power and one-hour rated electrical service to the ventilation equipment.

**CTC evaluation of the IFC modification:**

- The mechanical smoke venting system is not an emergency system for "defend-in-place" strategy;
- Smoke venting is a post fire fighting operation, not involving life safety of occupants or fire fighters;
- It is unlikely there would be a need to intentionally cut power during fire fighting operations in a sprinklered building;
- Other systems that are considered critical are not required to have standby power: the fire pump for the sprinklers, and general lighting needed for fire fighting operations;
- Supporting one-hour power conductors by an unrated building structure presents a conflict with general fire protection philosophy.

**CTC public comment:** The mechanical smoke exhaust system is not an emergency smoke control system. A smoke control system is an active system designed to be used during fire conditions. The smoke exhaust system proposed by CTC is intended to be a post-fire system for use by the fire-service. As such, it need not be provided with emergency power. The finish rating originally proposed for 30 minutes is adequate since we are dealing with fully sprinklered buildings and is reasonably accomplished in buildings of all construction types. As a rule of thumb, membranes of one hour fire resistance rated assemblies will provide a 30 minute finish rating. CTC believes that this provides a reasonable level of protection for the circuits and that it should be acceptable to route the conductors within the cavities of one hour assemblies.

This public comment retains the committee modification to reference the 2007 edition of NFPA 204 as the standard is published because the 2010 edition will not be available by the 2010 May Final Action Hearings.

## *Public Comment 3:*

**Gregory R. Keith, Professional heuristic Development, representing The Boeing Company, requests Approval as Modified by this Public Comment.**

**Further modify the proposal as follows:**

**910.2.1 (IBC [F] 910.2.1) Group F-1 or S-1.** A mechanical smoke removal system shall be installed in buildings or portions thereof used as a Group F-1 or S-1 occupancy exceeding 50,000 square feet.

**Exception:** Group S-1 aircraft repair hangars.

*(Portions of proposal not shown remain unchanged)*

**Commenter's Reason:** The purpose of Item F144-09/10 was to update the provisions that mandate roof vents in industrial and storage buildings. The code change requires that a manually-operated mechanical smoke removal system be provided for large industrial and storage buildings protected by a sprinkler system in lieu of the requirements for roof vents and draft curtains. Formerly, smoke and heat vents were not required in Group S-1 aircraft repair hangars due to an exception to Section 910.2.1. This exception was based on the fact that aircraft hangars are designed in accordance with the provisions of NFPA 409. IBC or IFC fire protection features should not be overlaid on that comprehensive standard.

This public comment for approval as modified reinstates the status quo for aircraft repair hangars. Inasmuch as aircraft repair hangars were exempt from smoke and heat vent requirements, it stands to reason that they should also be exempt from the provisions that replaced them. As was previously the case, NFPA 409 provisions should be allowed to stand on their own merit for these highly specialized buildings. The absence of loss history would indicate that current provisions are very adequate and additional fire protection features are not necessary and are unjustified.

*Public Comment 4:*

**Tracey D. Bellamy, Telgian Corporation, representing self, requests Disapproval.**

**Commenter's Reason:** The provisions of the proposal contain substantial design criteria changes that have not been supported by any technical data. The proposed criteria for design of mechanical exhaust systems using 4 air changes per hour is indicated in the original substantiation as being a reasonable value; however, no technical support is provided other than an indication that it is an average value between 2 and 6 air changes per hour. This change is premature at this time as efforts to develop a consensus design criteria for mechanical exhaust systems in a sprinklered building has not been completed. The far reaching impact of such criteria without sound technical justification is not acceptable.

Final Action: AS AM AMPC____
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# F146-09/10

**910.5 (New) [IBC ([F] 910.5 (New)], Chapter 47**

***Proposed Changes as Submitted***

**Proponent:** Justin H. Beal, representing the City of Fresno, CA, Fire Department

**1. Add new text as follows:**

**910.5 (IBC [F] 910.5) Maintenance.** Smoke and heat vents and mechanical smoke exhaust systems shall be maintained in an operative condition in accordance with NFPA 204. Fusible links shall be promptly replaced whenever fused, damaged or painted. Smoke and heat vents and mechanical smoke exhaust systems shall not be modified.

**2. Add new standard to Chapter 47 as follows:**

| NFPA | |
|---|---|
| 204-2007 | Standard for Smoke and Heat Venting |

**Reason:** The maintenance of heat and smoke vents and mechanical smoke exhaust systems is not clearly addressed within the model International Fire Code. Installation and design criteria for smoke and heat vents can be found in I.F.C. section 910.3.1 (U.L. 793), however, maintenance provisions for these systems should be included within section 910 to provide clarity for the end user of the code. This proposal incorporates National Fire Protection Association Standard 204, Standard for Smoke and Heat Venting, 2007 edition, as the referenced standard for the maintenance of smoke and heat vents and mechanical smoke exhaust systems.

Routine inspection, testing and maintenance of these devices is essential for several reasons: These devices are typically only found in the largest commercial structures, and within these structures, the amount of fire loading is usually very high, to include high piled combustible storage.

Ensuring that these devices are inspected, tested and maintained in proper working order by the building owner (as specified in the new referenced standard) will have several positive effects for firefighter safety. These benefits include: easy identification of the location of the fire within the structure, the release of excess heat within the structure decreasing fire severity, increased visibility for firefighters within the structure, and the reduction of toxic products of combustion within the structure.

Additionally, the maintenance of these devices will have a mitigating effect on damage to the structure and/or its contents should a fire occur. These include: decreased likelihood of structural failure from heat retained within the structure and reduced damage to the structure and stored materials from smoke.

Finally, these devices are considered "fire protection systems" as noted in the I.F.C. section 902.1, and as such, a provision requiring specified inspection, testing and maintenance intervals via a referenced standard should be included within the body of the code.

The language of this section has been developed to follow (and is substantially similar to, and consistent with) the format found within the International Fire Code, Section 703.2.

**Cost Impact:** The code change proposal will not increase the cost of construction.

**Analysis:** Review of proposed new standard NFPA 204-2007 indicated that, in the opinion of ICC Staff, the standard did comply with ICC standards criteria.

ICCFILENAME: BEAL-F1-910.5.DOC

## ***Public Hearing Results***

**Note:** The following analysis was not in the Code Change monograph but was published on the ICC website at http://www.iccsafe.org/cs/codes/Documents/2009-10cycle/ProposedChanges/Standards-Analysis.pdf

**Analysis:** Review of proposed new standard NFPA 204-2007 indicated that, in the opinion of ICC Staff, the standard did comply with ICC standards criteria. Note that section 3.6.3.1 of CP28-05 requires that the standard be completed and readily available prior to Final Action Consideration. The final action of this proposal will occur May 14-23, 2010.

**Committee Action:** **Approved as Modified**

**Modify proposal as follows:**

**NFPA**

204-~~2007~~2010 Standard for Smoke and Heat Venting

*(Portions of the proposal not shown remain unchanged.)*

**Committee Reason:** The committee approved the proposal as it provides the necessary maintenance requirement for smoke and heat vents that the code currently lacks. The modification simply revises the standard edition of NFPA 204 to the 2010 edition.

**Assembly Action:** **None**

## ***Individual Consideration Agenda***

**This item is on the agenda for individual consideration because public comments were submitted.**

*Public Comment:*

**Justin Beal representing the City of Fresno, CA, Fire Department and Marcelo M. Hirschler, GBH International, request Approval as Modified by this Public Comment.**

**Further modify the proposal as follows:**

**NFPA**

204-~~2010~~ 2007 Standard for Smoke and Heat Venting

*(Portions of the proposal not shown remain unchanged.)*

**Commenter's Reason (Beal):** I am the original proponent of this code change proposal. During the code development hearings held in October 2009, a floor modification to this proposal was made and approved by the committee. The modification to the proposal consisted of changing the referenced standard to the 2010 edition of National Fire Protection Association Standard 204 – Standard for Smoke and Heat Venting (NFPA 204), from the 2007 edition of the same document. At the time of the code development hearings, it was generally thought that the 2010 edition of the standard would be readily available before the final action hearings, as those hearings had tentatively been scheduled for October 2010. Based upon the facts known at the time, this modification was acceptable.

However, as the final action hearing schedule has been revised, it has become apparent that the 2010 edition of NFPA 204 will not be readily available before the final action hearings as required by I.C.C. policy.

To ensure this proposal is included in the upcoming edition of the International Fire Code, it must be modified back to its original configuration to specify the 2007 edition of NFPA 204 as the referenced standard for the code section.

**Commenter's Reason (Hirschler):** The public comment simply revises the edition of the standard to 2007 as the 2010 edition will not be available prior to the final action hearings in Dallas. The ICC Code Development Policy Section 3.6.3.1 of CP28-05 requires that the standard be completed and readily available prior to Final Action Consideration.

Final Action: AS AM AMPC____
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