Exceptions:

1. Fiberboard insulation shall comply with Chapter 23.
2. Foam plastic insulation shall comply with Chapter 26.
3. Duct and pipe insulation and duct and pipe coverings and linings in plenums shall comply with the *International Mechanical Code*.
4. All layers of single and multilayer reflective plastic core foil insulation shall comply with Section 2604.

719.2 Concealed installation. Insulating materials, where concealed as installed in buildings of any type of construction, shall have a flame spread index of not more than 25 and a smoke-developed index of not more than 450.

Exception: Cellulose loose-fill insulation that is not spray applied, complying with the requirements of Section 719.6, shall only be required to meet the smoke-developed index of not more than 450.

719.2.1 Facings. Where such materials are installed in concealed spaces in buildings of Type III, IV or V construction, the flame spread and smoke-developed limitations do not apply to facings, coverings, and layers of reflective foil insulation that are installed behind and in substantial contact with the unexposed surface of the ceiling, wall or floor finish.

Exception: All layers of single and multilayer reflective plastic core foil insulation shall comply with Section 2604.

3. Add new text as follows

SECTION 2604
REFLECTIVE PLASTIC CORE FOIL INSULATION

2604.1 General. The provisions of this section shall govern the requirements and uses of reflective plastic core foil insulation in buildings and structures. Reflective plastic core insulation shall comply with the requirements of 2604.2 and of one of the following: Section 2604.3, 2604.4 or 2604.5.

2604.2 Labeling and identification. Packages and containers of reflective plastic core foil insulation and reflective plastic core foil insulation components delivered to the job site shall bear the label of an approved agency showing the manufacturer's name, the product listing, product identification and information sufficient to determine that the end use will comply with the code requirements.

2604.3 Surface burning characteristics. Testing in accordance with ASTM E 84 or UL 723 shall be in accordance with Sections 2604.3.1 and 2604.3.2.

2604.3.1 Special preparation and mounting. Reflective plastic core foil insulation shall be tested in the manner intended for use and at the maximum thickness intended for use, in accordance with ASTM E 84, or UL 723, using the specimen preparation and mounting procedures of ASTM E 2231 or an alternate set of specimen preparation and mounting procedures for ASTM E 84, or UL 723, which are specific to the testing of reflective plastic core foil insulation.

2604.3.2 Exposed applications. If the reflective plastic core foil insulation is used exposed it shall be classified for surface burning characteristics in accordance with Section 803.1 and the requirements of this code for the application. The flame spread index shall not exceed 75 for any application.

2604.4 Room corner test heat release. Reflective plastic core foil insulation shall comply with the acceptance criteria of Section 803.1.2.1 when tested in accordance with NFPA 286 in the manner intended for use and at the maximum thickness intended for use.

2604.5 Thermal barrier. Reflective plastic core foil insulation shall be separated from the interior of a building by an approved thermal barrier of 0.5-inch (12.7 mm) gypsum wallboard or equivalent thermal barrier material that will limit the average temperature rise of the unexposed surface to not more than 250ºF (120ºC) after 15 minutes of fire exposure, complying with the standard time-temperature curve of ASTM E 119 or UL 263.

2604.5.1 Thermal barrier installation. The thermal barrier shall be installed in such a manner that it will remain in place for 15 minutes based on FM 4880, UL 1040, NFPA 286 or UL 1715.

2604.5.2 Surface burning characteristics. The reflective plastic core foil insulation shall exhibit a flame spread index no higher than 75 and a smoke developed index no higher than 450 when tested in accordance with Section 2604.3.1.

(Renumber subsequent sections)

4. Add standard to Chapter 35 as follows:

ASTM

E 2231-07 Standard Practice for Specimen Preparation and Mounting of Pipe and Duct Insulation Materials to Assess Surface Burning Characteristics

Reason: Recent work has shown that the traditional method of testing reflective plastic core foil insulation in the ASTM E 84 test (using chicken wire, or poultry netting, and rods) produces misleading results, with the serious potential for leading to severe fires. Testing reflective plastic core foil insulation with the ASTM E 84 test using chicken wire and rods suggests that the reflective plastic core foil insulation is safe and meets a flame spread index of 25 or less. In fact, when reflective plastic core foil insulation is tested in a more realistic way, with fasteners, the flame spread index of some materials jumps to over 200. A room corner test, NFPA 286, indicates that some types of reflective plastic core insulation do indeed cause rapid flashover (in less than 4 min, while the burner is still just at 40 kW and has not yet been raised to 160 kW). ASTM E 2231 is a standard practice for Steiner tunnel specimen preparation and mounting for pipe and duct insulation materials that does not permit testing using chicken wire (poultry netting) and that can be used for testing reflective plastic core foil insulation materials. Moreover, a process is underway, within the ASTM E05.22 subcommittee, to develop an alternate standard practice specific to reflective plastic core foil insulation materials. It has become apparent that testing via ASTM E 84 with either (a) mounting in accordance with ASTM E 2231 or (b) mounting in accordance with a standard practice specific to plastic core reflective foil insulation materials (yet to be developed) will represent a significant improvement in fire safety.
Alternately, reflective plastic core foil insulation materials can be tested using the room corner test, NFPA 286, or they can be covered with a thermal barrier, just like foam plastic insulation is required to be covered.
The fire safety issues have mainly been found with the foil/bubble materials, but they would also apply to the foil/foam materials, which are already covered under the requirements of foam plastic insulation and don't need additional requirements but should not be excluded from the foam plastic requirements.

This proposal differs from proposal FS147 in the 2006/2007 cycle in several major ways, as follows:

1. This proposal permits continued testing in the Steiner tunnel test (ASTM E 84 or UL 723), but requires the use of an appropriate specimen preparation and mounting method.
2. This proposal excludes reflective foil/fiberglass materials from the new requirements, as these materials are already appropriately tested at present.
3. This proposal includes a definition of reflective plastic core foil insulation, which was absent before.
4. This proposal adds a new section into Chapter 26 that is very similar to the section for foam plastic insulation, which immediately precedes it.
5. The specimen preparation and mounting method proposed, ASTM E 2231, is already used by the ICC family of codes both in the IMC and in the IRC.
6. The new code language proposed is already suitable for incorporating any future standard practice for ASTM E 84 test specimen preparation and mounting of reflective plastic core foil insulation materials, if and when it is developed.
7. The code proposal also addresses section 719.2.1, previously not addressed.

This proposal differs from proposal FS215 in the 2006/2007 cycle in several major ways, as follows:

1. This proposal permits continued testing in the Steiner tunnel test (ASTM E 84 or UL 723), but requires the use of an appropriate specimen preparation and mounting method.
2. This proposal excludes reflective foil/fiberglass materials from the new requirements, as these materials are already appropriately tested at present.
3. The specimen preparation and mounting method proposed, ASTM E 2231, is already used by the ICC family of codes both in the IMC and in the IRC.
4. The new code language proposed is already suitable for incorporating any future standard practice for ASTM E 84 test specimen preparation and mounting of reflective plastic core foil insulation materials, if and when it is developed.
5. This proposal addresses section 719 as well as the new section 2604.
6. This proposal revises the definition as requested by the committee.

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

Analysis: Review of proposed new standard ASTM E2231-07 indicated that, in the opinion of ICC Staff, the standard did comply with ICC standards criteria.

Committee Action: **Disapproved**

Committee Reason: As with FS148-07/08, the committee felt that the proposed requirements for reflective plastic core foil insulation were not totally appropriate. The referenced standard is applicable to a different component (pipe and duct insulation); therefore its applicability to plastic core foil insulation is not clear. Some of the items seem unnecessary, such as the thermal barrier requirements. Lastly, some of the language in the labeling requirements appears difficult to achieve, such as "information to determine that the end use will comply with the code requirements."

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jesse J. Beitel, Hughs Associates, Inc., representing Reflective Insulation Manufacturers Association, requests Approved as Modified by this public comment.

Marcelo M. Hirschler, GBH International, representing American Fire Safety Council, requests Approved as Modified by this public comment.

Replace proposal as follows:

REFLECTIVE PLASTIC CORE INSULATION. An insulation material packaged in rolls, that is less than 0.5 inches thick, with at least one exterior low emittance surface (0.1 or less) and a core material containing voids or cells.

719.1 General. Insulating materials, including facings such as vapor retarders and vapor-permeable membranes, similar coverings, and all layers of single and multilayer reflective foil insulations, shall comply with the requirements of this section. Where a flame spread index or a smoke-developed index is specified in this section, such index shall be determined in accordance with ASTM E 84 or UL 723. Any material that is subject to an increase in flame spread index or smoke-developed index beyond the limits herein established through the effects of age, moisture, or other atmospheric conditions shall not be permitted.

Exceptions:

1. Fiberboard insulation shall comply with Chapter 23.
2. Foam plastic insulation shall comply with Chapter 26.
3. Duct and pipe insulation and duct and pipe coverings and linings in plenums shall comply with the *International Mechanical Code*.
4. All layers of single and multilayer reflective plastic core insulation shall comply with Section 2612.

719.2 Concealed installation. Insulating materials, where concealed as installed in buildings of any type of construction, shall have a flame spread index of not more than 25 and a smoke-developed index of not more than 450.

Exception: Cellulose loose-fill insulation that is not spray applied, complying with the requirements of Section 719.6, shall only be required to meet the smoke-developed index of not more than 450.

719.2.1 Facings. Where such materials are installed in concealed spaces in buildings of Type III, IV or V construction, the flame spread and smoke-developed limitations do not apply to facings, coverings, and layers of reflective foil insulation that are installed behind and in substantial contact with the unexposed surface of the ceiling, wall or floor finish.

Exception: All layers of single and multilayer reflective plastic core insulation shall comply with Section 2612.

SECTION 2612
REFLECTIVE PLASTIC CORE INSULATION

2612.1 General. The provisions of this section shall govern the requirements and uses of reflective plastic core insulation in buildings and structures. Reflective plastic core insulation shall comply with the requirements of Section 2612.2 and of one of the following: Section 2612.3 or 2612.4.

2612.2 Identification. Packages and containers of reflective plastic core insulation delivered to the job site shall show the manufacturer's or supplier's name, product identification and information sufficient to determine that the end use will comply with the code requirements.

2612.3 Surface-burning characteristics. Reflective plastic core insulation shall have a flame-spread index of not more than 25 and a smoke-developed index of not more than 450 when tested in accordance with ASTM E 84 or UL 723. The reflective plastic core insulation shall be tested at the maximum thickness intended for use and shall be tested using one of the mounting methods in Section 2612.3.1 or 2612.3.2.

2612.3.1 Mounting of test specimen. The test specimen shall be mounted on 2-inch (51 mm) high metal frames so as to that create an air space between the unexposed face of the reflective plastic core insulation and the lid of the test apparatus.

2612.3.2 Specific testing. A set of specimen preparation and mounting procedures shall be used which are specific to the testing of reflective plastic core insulation.

2612.4 Room corner test heat release. Reflective plastic core insulation shall comply with the acceptance criteria of Section 803.1.2.1 when tested in accordance with NFPA 286 or UL 1715 in the manner intended for use and at the maximum thickness intended for use.

Commenter's Reason: (Beitel) This comment applies to the following Code proposals: FS148, FS149 and FS195. This comment is an agreement between the proponents of the three referenced Code proposals and other involved industries. This wording was developed at the Code Hearings in Palm Springs and it was proposed as a floor modification. At that time, the FS Committee Chair ruled that the proposed floor modification was out of order due to the perceived extent of the modifications. The Committee basically asked that the proponents of the three Code proposals submit the modification in the Comment process and this Comment addresses that request.

Background
In the last Code cycle, the issue of the fire performance and fire testing of reflective plastic core insulations was raised. The manufacturers of these products were then engaged in a research and testing program to evaluate the fire performance of these products and developed a new mounting method for these types of materials in the ASTM E84 test method such that the E84 flame-spread results could be correlated to full-scale fire tests of the same materials in end-use configurations. This has been accomplished and a new mounting method for these types of materials is currently being processed by ASTM.

FS 195, FS 148 and FS149 were Code proposals submitted to address these issues. The overall purpose was to add a new Section to Chapter 26 that adds a definition of reflective plastic core insulation and provide fire test requirements for these types of materials.

Comment
The proposed Comment is an incorporation of the best points from the three Code Proposals. The primary changes are:

1. Providing pointers in two Sections of the Code (§719.1 & §719.2.1) that send the reader to the appropriate Section in Chapter 26
2. (from FS148 & FS149)
3. Provides an improved definition of the Reflective Plastic Core Insulation material (from FS195, FS148 & FS149 plus other input)
4. Provides a better reference to the tests that are required. These tests use either a new ASTM E84 mounting method (either as a written description or as a new ASTM E84 mounting method in process) or a room/corner test. (from FS148, FS149 & FS195)

The modifications proposed in this Comment, are supported by the proponents of FS148, FS149 and FS195 as well as many other interested parties. These parties believe that this is a very good compromise for all and it should be adopted by the membership so these products can be appropriately regulated in the 2009 edition of the IBC.

Commenter's Reason: (Hirschler) This comment is the result of an agreement between the proponent of FS 148 and FS 149 and the proponent of FS 195. It combines the key elements of both proposals. This same wording was proposed as a floor modification at the Palm Springs code hearings but the committee chair ruled that the modifications to the individual proposals were too significant to be considered.

The key problem to be solved is that "reflective plastic core insulation" is not properly tested when the ASTM E 84 (Steiner tunnel) fire test method is used without the correct mounting procedure, since it has been shown that materials can pass the ASTM E 84 test (when conducted in a way that is inappropriate for reflective plastic core insulation materials) and yet lead to flashover in a room-corner test. Materials that perform in that fashion are not safe. Manufacturers have developed alternate materials that can be used properly.

The testing problem can be solved in two ways: (a) testing in accordance with the room-corner fire test (NFPA 286), which is suitable for use by all interior finish materials or (b) testing in accordance with ASTM E 84 but mounting the material such that it is tested at the maximum thickness intended for use and by using a mounting method that is specific for its use, such as being mounted on 2-inch (51 mm) high metal frames so as to that create an air space between the unexposed face of the reflective plastic core insulation and the lid of the test apparatus.

There are some differences between this comment and the original FS 149 proposal:
A more generic definition is being proposed here (not only foil needs to be used).

There is an understanding here that foam plastic core reflective insulation is a foam plastic and needs to meet the requirements of exposed foam plastics, so that this need not be repeated.

There is an understanding here that insulation materials intended for use as pipe and duct insulation (and tested in accordance with ASTM E 84 and the mounting method of ASTM E 2231) are properly covered by the International Mechanical Code, so that this need not be repeated.

There is no requirement for listing in this proposal.

There are some differences between this comment and the original FS 195 proposal:

A more generic definition is being proposed here (less restrictive).

The reflective insulation referenced in sections 719.1 and 719.2 are also addressed.

There is no reference to a potential future ASTM standard mounting method.

This comment has received approval from the two industries that made the original proposals, namely the manufacturers of fire retardants (American Fire Safety Council, submitters of FS 148 and FS 149) and the manufacturers of reflective plastic core insulation (Reflective Insulation Manufacturers Association, submitters of FS 195). The proposed code wording in this comment was distributed through a variety of other stake holders, many of whom were lined up in February at Palm Springs in support of the proposal.

Final Action: AS AM AMPC____ D

FS157-07/08
Table 721.2.1.4(1)

Proposed Change as Submitted:

Proponent: James C. Gerren, Clark County Department of Development Services, NV

Revise table as follows:

TABLE 721.2.1.4(1)
MULTIPLYING FACTOR FOR FINISHES ON NONFIRE-EXPOSED SIDE OF WALL

	TYPE OF AGGREGATE USED IN CONCRETE OR CONCRETE MASONRY			
TYPE OF FINISH APPLIED TO ~~MASONRY~~ WALL	**Concrete: siliceous or carbonate Masonry: siliceous or carbonate; ~~calcareous~~ ~~gravel~~ solid clay brick**	**Concrete: sand-lightweight ~~concrete~~ Masonry: ~~limestone, cinders or unexpanded slag,~~ clay tile; hollow clay brick; concrete masonry units of expanded shale and <20% sand**	**Concrete: lightweight ~~concrete~~ Masonry: concrete masonry units of expanded shale, expanded clay, expanded slag, or ~~slate~~ pumice< 20% sand**	**~~Concrete: pumice, or expanded slag~~ Masonry: concrete masonry units of expanded slag, expanded clay, or pumice**
Portland cement-sand plaster	1.00	0.75[a]	0.75[a]	0.50[a]
Gypsum-sand plaster ~~or gypsum wallboard~~	1.25	1.00	1.00	1.00
Gypsum-vermiculite or perlite plaster	1.75	1.50	~~1.50~~ 1.25	1.25
Gypsum wallboard	3.00	2.25	2.25	2.25

For SI: 1 inch = 25.4 mm

a. For Portland cement-sand plaster 5/8 inch or less in thickness and applied directly to the concrete or masonry on the non-fire-exposed side of the wall, the multiplying factor shall be 1.00.

Reason: The purpose of this proposal is to revise IBC Table 721.2.1.4(1) to be consistent with Table 5.1 of ACI 216.1-97, *Standard Method for Determining Fire Resistance of Concrete and Masonry Construction Assemblies*, and Tables 2-2 and 4-2 of ASCE/SFPE 29-2005, *Standard Calculation Methods for Structural Fire Protection*.

Currently, IBC Sections 721.2.1.4.1 and 721.3.2.1 reference Table 721.2.1.4(1) for the multiplying factors for finishes on the non-fire-exposed side of concrete or concrete masonry walls, respectively. The factors in Table 721.2.1.4(1) are used as part of a calculation method to determine the fire-resistance rating of concrete or concrete masonry walls with finishes of gypsum wallboard or plaster applied to one or both sides of the wall. However, the version of Table 721.2.1.4(1) currently provided in the IBC contains several errors, including:

1. The multiplying factors for gypsum wallboard finishes are lumped together with the factors listed for gypsum-sand plaster. This is a mistake in Table 721.2.1.4(1) that has no technical justification. Table 5.1 of ACI 216.1-97 and Tables 2-2 and 4-2 of ASCE/SFPE 29-2005 all identify separate multiplying factors for gypsum wallboard. The proposed revision to Table 721.2.1.4(1) would correct this mistake and make the multiplying factors for gypsum wallboard in Table 721.2.1.4(1) consistent with Table 5.1 of ACI 216.1-97 and Tables 2-2 and 4-2 of ASCE/SFPE 29-2005.
2. The multiplying factor indicated in Table 721.2.1.4(1) for gypsum-vermiculite or perlite plaster finish applied to lightweight concrete or concrete masonry units of expanded shale, expanded clay, or pumice less than 20% sand is liberally incorrect. Specifically, the multiplying factor is currently provided as 1.50, but should be 1.25, as it is in Table 5.1 of ACI 216.1-97 and Tables 2-2 and 4-2 of ASCE/SFPE 29-2005. Please note that without this correction, the factors in columns 3 and 4 of Table 721.2.1.4(1) are identical and could be merged. However, the separate columns are needed because they are supposed to have different multiplying factors for gypsum-vermiculite or perlite plaster finishes.
3. Column 5 of the current version of Table 721.2.1.4(1) incorrectly references concrete only (i.e., does note reference masonry). However, the intent of the factors in column 5 is to apply to masonry only, not concrete. Specifically, the factors in column 5 are intended to apply to concrete masonry units of expanded slag, expanded clay, or pumice. Please note that the factors provided in column 5 of IBC Table 721.2.1.4(1) are not even used in Table 5.1 of ACI 216.1-97. Instead, these factors are provided in Table 4-2 (masonry), but not Table 2-2 (concrete), of ASCE/SFPE 29-2005. The proposed revision would make IBC Table 721.2.1.4(1) consistent with Table 4-2 of ASCE/SFPE 29-2005.
4. The current column headings in IBC Table 721.2.1.4(1) are vague and inconsistent with Table 5.1 of ACI 216.1-97 and Tables 2-2 and 4-2 of ASCE/SFPE 29-2005. The proposed revisions to the column headings would eliminate potential interpretive issues and make Table 721.2.1.4(1) consistent with Table 5.1 of ACI 216.1-97 and Tables 2-2 and 4-2 of ASCE/SFPE 29-2005.

Since IBC Section 721.1 permits the calculated fire resistance of concrete, concrete masonry, and clay masonry assemblies to be in accordance with ACI 216.1-97, it is necessary to revise IBC Table 721.2.1.4(1) to make it consistent with Table 5.1 of ACI 216.1-97. In addition, the proposed revisions would make IBC Table 721.2.1.4(1) consistent with Tables 2-2 and 4-2 of ASCE/SFPE 29-2005, which is an industry standard regarding calculation methods for structural fire protection.

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

Committee Action: Approved as Modified

Modify proposal as follows:

TABLE 721.2.1.4(1)
MULTIPLYING FACTOR FOR FINISHES ON NONFIRE-EXPOSED SIDE OF WALL

TYPE OF FINISH APPLIED TO WALL	TYPE OF AGGREGATE USED IN CONCRETE OR CONCRETE MASONRY			
	Concrete: siliceous or carbonate Masonry: siliceous or carbonate; solid clay brick	**Concrete: sand-lightweight Masonry: clay tile; hollow clay brick; concrete masonry units of expanded shale and <20% sand**	**Concrete: lightweight Masonry: concrete masonry units of expanded shale, expanded clay, expanded slag, or pumice< 20% sand**	**Masonry: concrete masonry units of expanded slag, expanded clay, or pumice**
Portland cement-sand plaster	1.00	0.75[a]	0.75[a]	0.50[a]
Gypsum-sand plaster	1.25	1.00	1.00	1.00
Gypsum-vermiculite or perlite plaster	1.75	1.50	1.25	1.25
Gypsum wallboard	3.00	2.25	2.25	2.25

For SI: 1 inch = 25.4 mm

a. For Portland cement-sand plaster 5/8 inch or less in thickness and applied directly to the concrete or concrete masonry on the non-fire-exposed side of the wall, the multiplying factor shall be 1.00.

Committee Reason: The committee agreed that the proposal appropriately updates the multiplying factor for gypsum wallboard based on values in ACI 216-97/TMS 0216-97, *Standard Method for Determining Fire Resistance of Concrete and Masonry Construction Assemblies*, which is referenced in Section 721.1 of the IBC, and Tables 2-2 and 4-2 of ASCE/SFPE 29-2005, *Standard Calculation Methods for Structural Fire Protection*. The modification adds clarification to the footnote that it is concrete masonry that is the specified material.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Stephen V. Skalko, Portland Cement Association, requests Disapproval.

Commenter's Reason: The Fire Safety Code Change Committee recommended Approved as Modified of both code changes FS156 and FS157. These code changes, which are very similar, modify Table 721.2.1.4(1) for materials applied to the non-fire exposed side of concrete and masonry walls by revising the multiplier values for gypsum board consistent with Standards ACI 216.1 and ASCE 29. Table 721.2.1.4(1) is referenced in Section 721.2.1.4.1 for finishes applied to the non-fire exposed side of concrete walls and Section 721.3.2.1 for finishes applied to the non-fire exposed side of concrete masonry walls.

FS157 however also introduces clay brick (solid & hollow) and clay tile materials into the table headings. Section 721.4, which covers the calculation procedures for clay brick and clay tile walls, does not reference Table 721.2.1.4(1) for the clay masonry calculation procedures. Having clay brick and clay tile materials listed in Table 721.2.1.4(1) without a direct reference for the calculation procedures for clay masonry creates an inconsistency in the code. Since FS156 provides essentially the same revisions, FS157 should be disapproved

Final Action: AS AM AMPC____ D

FS160-07/08, Part II
IFC Chapter 7

THIS CODE CHANGE WILL BE HEARD ON THE IFC PORTION OF THE HEARING ORDER.

NOTE: PART I DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA. PART I IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY FOLLOWING ALL OF PART II.

Proposed Change as Submitted:

Proponent: Bill McHugh, Firestop Contractors International Association

PART II – IFC

Revise chapter title as follows:

CHAPTER 7
~~FIRE-RESISTANCE-RATED CONSTRUCTION~~
FIRE AND SMOKE PROTECTION FEATURES

Reason: Fire and smoke protection features better reflects the purpose of this chapter. Fire resistance is very one dimensional, while the chapter demands much more than simple fire resistance, including structural fire resistance, firestop systems that protect for fire and smoke, fire, smoke and fire/smoke dampers that protect against fire and smoke, fire doors, fire rated glazing, etc. Additionally, a fire protection feature may provide sound protection in addition to fire and smoke. Therefore, fire and smoke protection features fits the chapter better.

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

PART II – IFC
Committee Action: **Disapproved**

Committee Reason: The current chapter title is preferred and avoids potential confusion with the current title of Chapter 9. Also, a change could be premature since the ICC Code Technology Committee Fire Safety study group is currently working on a re-write of Chapter 7 which could include a title revision.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted for Part II.

Public Comment:

Bill McHugh, Firestop Contractors International Association, requests Approval as Submitted.

Commenter's Reason: Fire and smoke protection features better reflects the purpose of this chapter. Fire resistance is very one dimensional. Chapter 7's contents demands much more than simple fire resistance since smoke resistant systems are also located in the chapter. The Fire and Smoke Protection Features include: structural fire resistance, firestop systems, fire, smoke and fire/smoke dampers, swinging and rolling fire doors, fire rated glazing, the fire resistance rated walls and floors all of which protect against fire and smoke.

Fire resistance rated and smoke resistant features are important components of effective compartmentation. The chapter title needs to expand to fit the many facets of effective compartmentation supported by structural fire resistant construction.

Final Action: AS AM AMPC____ D

NOTE: PART I REPRODUCED FOR INFORMATIONAL PURPOSES ONLY – SEE ABOVE

FS160-07/08, PART I – IBC FIRE SAFETY

Bill McHugh, Firestop Contractors International Association

PART I – IBC FIRE SAFETY

Revise chapter title as follows:

CHAPTER 7
~~FIRE-RESISTANCE-RATED CONSTRUCTION~~
FIRE AND SMOKE PROTECITON FEATURES

Reason: Fire and smoke protection features better reflects the purpose of this chapter. Fire resistance is very one dimensional, while the chapter demands much more than simple fire resistance, including structural fire resistance, firestop systems that protect for fire and smoke, fire, smoke and fire/smoke dampers that protect against fire and smoke, fire doors, fire rated glazing, etc. Additionally, a fire protection feature may provide sound protection in addition to fire and smoke. Therefore, fire and smoke protection features fits the chapter better.

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

PART I – IBC FIRE SAFETY
Committee Action: **Approved as Modified**

Modify the proposal as follows:

CHAPTER 7
FIRE AND SMOKE ~~PROTECITON~~ PROTECTION FEATURES

Committee Reason: The committee agreed that the proposed title better reflects the purpose of Chapter 7. The modification was to correct a spelling error.

Assembly Action: **None**

FS161-07/08
707

Proposed Change as Submitted:

Proponent: Sarah A. Rice, CBO, Schirmer Engineering

1. Revise to read:

CHAPTER 7
~~FIRE-RESISTANCE-RATED~~ CONSTRUCTION OF HORIZONTAL AND VERTICAL ASSEMBLIES

2. Add new text as follows:

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.

OPENING. A void in a horizontal or vertical assembly, extending completely through the assembly, creating open ways of passage between adjacent stories, rooms or spaces. Ducts and air transfer openings are not materials that create openings.

PENETRATION. A void in a horizontal or vertical assembly, extending completely through or partially through the assembly, typically created by materials and/or equipment associated with building utilities and/or services. Penetrating items include but are not limited to pipes, tubes, conduit, wire, cable, chimneys and vents. Voids created by ducts, air transfer openings or joints are not penetrations.

3. Revise as follows:

701.1 (2007 Supp) Scope. The provisions of this chapter shall govern the materials, systems and assemblies used in the construction of horizontal and vertical assemblies used to ~~for structural fire resistance and fire-resistance-rated construction separation of~~ separate adjacent spaces ~~to safeguard against the spread of fire and smoke within a building and the spread of fire to or from buildings~~.

4. Add new text as follows:

704.10 Penetrations. Penetrations of fire-resistance-rated and non fire-resistance-rated exterior walls shall not be required to be protected.

5. Revise to read as follows:

705.9 Penetrations. Penetrations of fire walls shall comply with Section 710 ~~712~~.

706.8 Penetrations. Penetrations of fire barriers shall comply with Section 710 ~~712~~.

706.8.1 Prohibited penetrations. Penetrations ~~into~~ of fire barriers used to enclose an exit enclosure or an exit passageway shall not be allowed except ~~only~~ when permitted by Section 1020.1.2 or 1021.5, respectively.

6. Delete without substitution:

~~**SECTION 707 SHAFT ENCLOSURES**~~

8. Revise to read as follows:

(Entire section relocated from Section 708 and renumbered to Section 707)

SECTION ~~708~~ 707
FIRE PARTITIONS

708.7 Penetrations. Penetrations of fire-resistance-rated fire partitions shall comply with Section 710 ~~712~~. Penetrations of non-fire-resistance-rated fire partitions shall comply with Section 711.

(Entire section relocated from Section 709 and renumbered to Section 708)

SECTION ~~709~~ 708
SMOKE BARRIERS

709.6 Penetrations. Penetrations of smoke barriers shall comply with Section 710 ~~712~~.

(Entire section relocated from Section 710 and renumbered to Section 709)

SECTION ~~710~~ 709
SMOKE PARTITIONS

710.6 Penetrations and joints. The space around penetrating items into or through smoke partitions, and ~~in~~ joints of smoke partitions shall be filled with an approved material to limit the free passage of smoke.

9. Add new text as follows:

SECTION 710
PENETRATIONS OF FIRE RESISTANCE RATED INTERIOR VERTICAL ASSEMBLIES

710.1 Scope. The provisions of this section shall govern the materials and methods of construction used to protect through penetrations and membrane penetrations of fire resistance-rated interior vertical assemblies.

710.2 ~~712.2~~ Installation of sleeves. (no change to current text)

710.3 ~~712.3.4~~ Dissimilar materials. (no change to current text)

710.5 ~~712.3 (Supp) Fire-resistance rated walls~~ Fire walls, fire-barrier walls, fire partitions and smoke barriers. Through penetrations of fire walls, fire-barriers, fire partitions and smoke barriers required to have a fire-resistance rating shall comply with Sections 710.5.1. Membrane penetrations of fire walls, fire-barriers, and fire partitions required to have a fire-resistance rating shall comply with Sections 710.5.2. ~~Penetrations into or through fire walls, fire barriers, smoke barrier walls and fire partitions shall comply with Sections 712.3.1 through 712.3.4. Penetrations in smoke barrier walls shall also comply with 712.5.~~

710.5.1 ~~712.3.1 (Supp)~~ Through penetrations. Through penetrations of fire-resistance-rated fire walls, fire-barriers, fire partitions and smoke barriers shall comply with Section 710.5.1.2 or 710.5.1.3.

Exception: (no change to current text)

710.5.1.2 ~~712.3.1.1~~ Fire-resistance-rated assemblies. Through penetrations of fire-resistance-rated fire walls, fire-barriers, fire partitions and smoke barriers shall be installed as tested in an approved fire-resistance-rated assembly.

710.5.1.3 ~~712.3.1.2~~ Through-penetration firestop system. Through penetrations of fire-resistance-rated fire walls, fire-barriers, fire partitions and smoke barriers shall be protected by an approved penetration firestop system installed as tested in accordance with ASTM E 814 or UL 1479, with a minimum positive pressure differential of 0.01 inch (2.49 Pa) of water and shall have an F rating of not less than the required fire-resistance rating of the wall penetrated.

710.5.2 ~~712.3.2 (Supp)~~ Membrane penetrations. Membrane penetrations of fire-resistance-rated fire walls, fire-barriers, fire partitions and smoke barriers shall comply with Section 710.5.1 ~~712.3.1~~. Recessed fixtures in fire-resistance-rated fire walls, fire-barriers, and fire partitions ~~Where walls or partitions are required to have a fire-resistance rating~~ shall be installed such that the required fire resistance will not be reduced.

Exceptions:

1. through 5. (No change to current text)

710.3.2 ~~712.5~~ Smoke barrier walls. Through penetrations and membrane penetrations of smoke barrier walls shall be tested in accordance with the requirements of UL 1479 for air leakage. The air leakage rate of the penetration assembly shall not exceed 5.0 cfm per square foot ($0.025 m^3/s\ m^2$) of penetration opening at 0.30 inch (7.47 Pa) of water for both the ambient temperature and elevated temperature tests.

10. Add new text as follows:

SECTION 711
PENETRATIONS OF NON-FIRE RESISTANCE-RATED INTERIOR VERTICAL ASSEMBLIES

711.1 Scope. The provisions of this section shall govern the materials and methods of construction used to protect through penetrations and membrane penetrations of non-fire resistance-rated interior vertical assemblies,

711.2 Nonfire-resistance rated partitions. Penetrations of non-fire-resistance rated partitions, load bearing and nonloadbearing, shall not be required to be protected, unless otherwise required by the provisions of this code.

711.3 Incidental use area enclosure walls. The space around penetrations of non-fire-resistance rated wall assemblies used to enclose incidental use areas in accordance with Section 508.2.5.2 shall be filled with an approved material to limit the free passage of smoke.

11. Revise to read as follows:

(Entire section relocated from Section 711 and renumbered to Section 712)

SECTION ~~711~~ 712
HORIZONTAL ASSEMBLIES

712.1 ~~711.1 (Supp)~~ General The provisions of this section shall govern the materials and methods used to construct fire-resistance rated and non-fire resistance rated horizontal assemblies (floors and roofs). ~~Floor and roof assemblies required to have a fire-resistance rating shall comply with this section. Nonfire-resistance-rated floor and roof assemblies shall comply with Section 712.4.2~~. Horizontal assemblies required to have a fire-resistance rating shall comply with 712.4. Nonfire-resistance-rated horizontal assemblies ~~floor and roof assemblies~~ shall comply with Section 712.5 ~~712.4.2~~.

712.2 ~~711.2~~ Materials. (no change to current text)

712.3 ~~711.4 (Supp)~~ Continuity. Horizontal assemblies shall be continuous without openings, penetrations or joints except as permitted by this section, Section 713 or Section 1020.1~~ and Sections 707.2, 712.4, 713 and 1020.1~~. ~~Skylights and other penetrations through a fireresistance-rated roof deck or slab are permitted to be unprotected, provided that the structural integrity of the fireresistance-rated roof construction is maintained. Unprotected skylights shall not be permitted in roof construction 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, 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 419.3.~~
3. ~~Horizontal assemblies at smoke barriers constructed in accordance with Section 709.~~

712.4 Fire resistance rated horizontal assemblies. Fire resistance rated horizontal assemblies shall comply with Sections 712.4.1 through 712.4.8.

712.4.1 ~~711.3 (Supp)~~ Fire-resistance rating. (No change to current text)

712.4.2 Supporting construction. 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, 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 419.3.
3. Horizontal assemblies at smoke barriers constructed in accordance with Section 709..

712.4.3 ~~711.3.1~~ Ceiling panels. (No change to current text)

712.4.4 ~~711.3.2~~ (Supp) Access doors. (No change to current text)

712.4.5 ~~711.3.3~~ Unusable space. (No change to current text)

712.4.6 Penetrations of horizontal assemblies other than smoke barriers.. Penetrations in other than smoke barriers. shall be protected by a shaft enclosure complying with Section 714.

Exceptions.

1. Penetrations complying with Section 713.
2. A shaft enclosure is not required for penetrations totally within an individual residential dwelling unit and connecting four stories or less.
3. A shaft enclosure is not required for penetrations by ducts protected in accordance with Section 712.4. Grease ducts shall be protected in accordance with the *International Mechanical Code*.
4. A shaft enclosure is not required for approved masonry chimneys where annular space protection is provided at each floor level in accordance with Section 717.2.5.

712.4.6.1 ~~712.5~~ Penetrations in horizontal smoke barriers. (No change to current text)

712.4.7 Openings in roof/ceiling assemblies. Skylights and other openings 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 construction required to be fire-resistance rated in accordance with Section 704.10.

712.4.8 ~~707.2 (Supp)~~ Openings in floor/ceiling assemblies ~~Shaft enclosure required~~. Openings through a floor/ceiling assembly shall be protected by a shaft enclosure complying with this Section 714 ~~707.~~

Exceptions:

1. A shaft enclosure is not required for openings totally within an individual residential dwelling unit and connecting four stories or less.
2. A shaft enclosure is not required in a building 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 protected according to Item 2.1 or 2.2:
   2.1. Where the area of the floor 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. Where the 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. A shaft enclosure is not required for penetrations by pipe, tube, conduit, wire, cable and vents protected in accordance with Section 712.4.~~

~~4. A shaft enclosure is not required for penetrations by ducts protected in accordance with Section 712.4. Grease ducts shall be protected in accordance with the *International Mechanical Code*.~~

~~5.~~ 3. In other than Group H occupancies, a shaft enclosure is not required for floor openings complying with the provisions for atriums in Section 404.

~~6. A shaft enclosure is not required for approved masonry chimneys where annular space protection is provided at each floor level in accordance with Section 717.2.5.~~

~~7.~~ 4. In other than Groups I-2 and I-3, a shaft enclosure is not required for a floor opening ~~or an air transfer opening~~ that complies with the following:

~~7.1.~~ 4.1. Does not connect more than two stories.

~~7.2~~ 4.2. Is not part of the required means of egress system, except as permitted in Section 1020.1.

~~7.3.~~ 4.3 Is not concealed within the building construction.

~~7.4.~~ 4.4 Is not open to a corridor in Group I and R occupancies.

~~7.5.~~ 4.5 . Is not open to a corridor on nonsprinklered floors in any occupancy.

~~7.6.~~ 4.6 . Is separated from floor openings and air transfer openings serving other floors by construction onforming to required shaft enclosures.

~~7.7.~~ 4.7 . Is limited to the same smoke compartment.

~~8.~~ 5. A shaft enclosure is not required for automobile ramps in open and enclosed parking garages constructed in accordance with Sections 406.3 and 406.4, respectively.

~~9.~~ 6. A shaft enclosure is not required for floor openings between a mezzanine and the floor below.

~~10. A shaft enclosure is not required for joints protected by a fire-resistant joint system in accordance with Section 713.~~

~~11.~~ 7. A shaft enclosure shall not be required for floor openings created by unenclosed stairs or ramps in accordance with Exception 8 or 9 in Section 1020.1.

~~12.~~ 8. Floor openings protected by floor fire doors in accordance with Section 711.8.

~~13.~~ 9. Where permitted by other sections of this code.

~~14.~~ 10. Elevators in open parking garages that serve only the parking garage are not required to be enclosed.

712.4.9 ~~711.6~~ Joints. (No change to current text)

712.4.10 ~~711.7~~ Ducts and air transfer openings. Penetrations in horizontal assemblies by ducts and air transfer openings shall be enclosed in a shaft enclosure which complies with Section 714 or comply with Section 716. Penetrations of horizontal assemblies not protected with a shaft and not required to be protected with fire dampers by other sections of the code, shall comply with Sections 712.4 through 712.4.4. Ducts and air transfer openings that are protected with dampers shall comply with Section 716.

Exception: In other than Groups I-2 and I-3, a shaft enclosure is not required for an air transfer opening that complies with the following:

1. Does not connect more than two stories.
2. Is not part of the required means of egress system, except as permitted in Section 1020.1.
3. Is not concealed within the building construction.
4. Is not open to a corridor in Group I and R occupancies.
5. Is not open to a corridor on nonsprinklered floors in any occupancy.
6. Is separated from floor openings and air transfer openings serving other floors by construction conforming to required shaft enclosures.
7. Is limited to the same smoke compartment.

~~**71.8 Floor fire door assemblies.** Floor fire door assemblies used to protect openings in fire-resistance-rated floors shall be tested in accordance with NFPA 288, and shall achieve a fire resistance rating not less than the assembly being penetrated. Floor fire door assemblies shall be labeled by an approved agency. The label shall be permanently affixed and shall specify the manufacturer, the test standard and the fire-resistance rating.~~

712.5 Non-fire resistance rated horizontal assemblies. Nonfire resistance rated horizontal assemblies shall comply with Sections 712.5.1 through 712.5.**XXX**.

712.5.1 Penetrations in horizontal assemblies Penetrations in nonfire resistance rated horizontal assemblies shall be protected by a shaft enclosure complying with Section 714.

Exceptions:

1. Penetrations complying with Section 713.
2. A shaft enclosure is not required for penetrations totally within an individual residential dwelling unit and connecting four stories or less.
3. A shaft enclosure is not required for penetrations by ducts protected in accordance with Section 712.4. Grease ducts shall be protected in accordance with the *International Mechanical Code*.
4. A shaft enclosure is not required for approved masonry chimneys where annular space protection is provided at each floor level in accordance with Section 717.2.5.

712.5.2 Openings in roof/ceiling assemblies. Openings in nonfire-resistance-rated roof/ceiling assemblies shall not be required to be protected.

712.5.3 Openings in floor/ceiling assemblies. Openings through a nonfire-resistance-rated roof/ceiling assemblies floor/ceiling assembly shall be protected by a shaft enclosure complying with this Section 714.

Exceptions:

1. A shaft enclosure is not required for openings totally within an individual residential dwelling unit and connecting four stories or less.
2. A shaft enclosure is not required in a building 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 protected according to Item 2.1 or 2.2:
   2.1. Where the area of the floor 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. Where the 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. In other than Group H occupancies, a shaft enclosure is not required for floor openings complying with the provisions for atriums in Section 404.
4. In other than Groups I-2 and I-3, a shaft enclosure is not required for a floor opening that complies with the following:
   4.1. Does not connect more than two stories.

4.2. Is not part of the required means of egress system, except as permitted in Section 1020.1.
4.3. Is not concealed within the building construction.
4.4. Is not open to a corridor in Group I and R occupancies.
4.5. Is not open to a corridor on nonsprinklered floors in any occupancy.
4.6. Is separated from floor openings and air transfer openings serving other floors by construction conforming to required shaft enclosures.
4.7. Is limited to the same smoke compartment.

5. A shaft enclosure is not required for automobile ramps in open and enclosed parking garages constructed in accordance with Sections 406.3 and 406.4, respectively.
6. A shaft enclosure is not required for floor openings between a mezzanine and the floor below.
7. A shaft enclosure shall not be required for floor openings created by unenclosed stairs or ramps in accordance with Exception 8 or 9 in Section 1020.1.
8. Where permitted by other sections of this code.
9. Elevators in open parking garages that serve only the parking garage are not required to be enclosed.

712.5.4 Joints. Joints between nonfire-resistance-rated horizontal assemblies, and nonfire-resistance-rated horizontal assemblies and fire-resistance-rated horizontal assemblies, shall not be required to be protected.

712.5.5 Ducts and air transfer openings. Penetrations in horizontal assemblies by ducts and air transfer openings shall be enclosed in a shaft enclosure which complies with Section 714 or comply with Section 716. Penetrations of horizontal assemblies not protected with a shaft and not required to be protected with fire dampers by other sections of the code, shall comply with Sections 712.4 through 712.4.4. Ducts and air transfer openings that are protected with dampers shall comply with Section 716.

Exception: In other than Groups I-2 and I-3, a shaft enclosure is not required for an air transfer opening that complies with the following:

1. Does not connect more than two stories.
2. Is not part of the required means of egress system, except as permitted in Section 1020.1.
3. Is not concealed within the building construction.
4. Is not open to a corridor in Group I and R occupancies.
5. Is not open to a corridor on nonsprinklered floors in any occupancy.
6. Is separated from floor openings and air transfer openings serving other floors by construction conforming to required shaft enclosures.
7. Is limited to the same smoke compartment.

12. Revise to read as follows:

SECTION 713 ~~712~~
PENETRATIONS OF HORIZONTAL ASSEMBLIES

713.1 ~~712.1~~ Scope. The provisions of this section shall govern the materials and methods of construction used to protect through penetrations and membrane penetrations of horizontal assemblies ~~and fire-resistance-rated wall assemblies~~. Through penetrations of fire-resistance-rated horizontal assemblies shall comply with Sections 713.3. Membrane penetrations of fire-resistance rated horizontal assemblies shall comply with Section 713.3.2.. Through penetrations of nonfire-resistance-rated horizontal assemblies shall comply with Sections 713.4.

713.2 ~~712.2~~ Installation details. (No change to current text)

713.3 ~~712.4.1 (Supp)~~ Fire-resistance rated horizontal assemblies. Penetrations of the fire-resistance rated floor, floor/ceiling assembly shall comply with Sections 713.3.1 through 713.3.3.

713.3.1 ~~712.4.1.1 (Supp)~~ Through penetrations. (No change to current text)
713.3.1.1 ~~712.4.1.1.1~~ Installation. (No change to current text)
713.3.1.2 ~~712.4.1.1.2~~ Through-penetration firestop system. (No change to current text)
713.3.2 ~~712.4.1.2 (Supp)~~ Membrane penetrations. (No change to current text)

713.4 ~~712.4.2 (Supp)~~ Nonfire-resistance rated horizontal assemblies. Penetrations of nonfire-resistance rated floor or floor/ceiling assemblies or the ceiling membrane of a nonfire-resistance rated roof/ceiling assembly shall comply with Section 713.4.1 through 713.4.2.

713.4.1 ~~712.4.2.1~~ Noncombustible penetrating items. (No change to current text)
713.4.2 ~~712.4.2.2~~ Penetrating items. (No change to current text)

713.4.3 Membrane penetrations. Penetrations of membranes that are part of a nonfire-resistance-rated horizontal assembly shall not be required to be protected.

13. Add new text as follows:

SECTION 714
SHAFT ENCLOSURES

714.1 General. The provisions of this section shall apply to vertical shafts where such shafts are required to protect openings and penetrations through horizontal assemblies.

714.2 ~~707.1~~ Construction. ~~**General.** The provisions of this section shall apply to vertical shafts where such shafts are 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 706 or horizontal assemblies in accordance with Section 711, or both.

714.3 ~~707.3~~ Materials. (No change to current text)
714.4 ~~707.4~~ Fire-resistance rating. (No change to current text)
714.5 ~~707.5~~ Continuity. (No change to current text)
714.6 ~~707.6~~ Exterior walls. (No change to current text)
714.7 ~~707.7~~ Openings. (No change to current text)
714.7.1 ~~707.7.1~~ Prohibited openings. (No change to current text)
714.8 ~~707.8~~ Penetrations. (No change to current text)
714.8.1 ~~707.8.1~~ Prohibited penetrations. (No change to current text)
714.9 ~~707.9~~ Joints. (No change to current text)
714.10 ~~707.10~~ Ducts and air transfer openings. (No change to current text)
714.11 ~~707.11 (Supp)~~ Enclosure at the bottom. (No change to current text)
714.12 ~~707.12~~ Enclosure at the top. (No change to current text**)**
714.13 ~~707.13~~ Refuse and laundry chutes. (No change to current text)
714.13.1 ~~707.13.1~~ Refuse and laundry chute enclosures. (No change to current text**)**
714.13.2 ~~707.13.2~~ Materials. (No change to current text)
714.13.3 ~~707.13.3 (Supp)~~ Refuse and laundry chute access rooms. (No change to current text)
714.13.4 ~~707.13.4 (Supp)~~ Termination room. (No change to current text)
714.13.5 ~~707.13.5~~ Incinerator room. (No change to current text)
714.13.6 ~~707.13.6~~ Automatic sprinkler system. (No change to current text)
714.14 ~~707.14~~ Elevator, dumbwaiter and other hoistways. (No change to current text)
714.14.1 ~~707.14.1 (Supp)~~ Elevator lobby. (No change to current text)
714.14.2 ~~707.14.2~~ Enclosed elevator lobby pressurization alternative. (No change to current text)
714.14.2.1 ~~707.14.2.1 (Supp)~~ Pressurization requirements. (No change to current text)
714.14.2.2 ~~707.14.4~~ Ducts for system. (No change to current text)
714.14.2.3 ~~707.14.2.3~~ Fan system. (No change to current text)
714.14.2.3.1 ~~707.14.2.3.1~~ Fire resistance. (No change to current text)
714.14.2.3.2 ~~707.14.2.3.2~~ Smoke detection. (No change to current text)
714.14.2.3.3 ~~707.14.2.3.3~~ Separate systems. (No change to current text)
714.14.2.3.4 ~~707.14.2.3.4~~ Fan capacity. (No change to current text)
714.14.2.4 ~~707.14.2.4~~ Standby power. (No change to current text)
714.14.2.5 ~~707.14.2.5~~ Activation of pressurization system. (No change to current text)

14. Add new text as follows:

715.3 Floor fire doors assemblies. Floor fire door assemblies used to protect openings in fire-resistance-rated floors shall be tested in accordance with NFPA 288, and shall achieve a fire-resistance rating not less than the assembly being penetrated. Floor fire door assemblies shall be labeled by an approved agency. The label shall be permanently affixed and shall specify the manufacturer, the test standard and the fire-resistance rating.

15. Revise to read as follows:

715.5 ~~715.4~~ Fire door and shutter assemblies. Approved fire door and fire shutter assemblies in vertical assemblies shall be constructed of any material or assembly of component materials that conforms to the test requirements of Section 715.4.1, 715.4.2 or 715.4.3 and the fire-protection rating indicated in Table 715.5 ~~715.4~~.

Fire door assemblies and shutters in vertical assemblies shall be installed in accordance with the provisions of this section and NFPA 80.

Exceptions:

1. Labeled protective assemblies that conform to the requirements of this section or UL 10A, UL 14B and UL 14C for tin-clad fire door assemblies.
2. Floor fire door assemblies in accordance with Section 711.8.

(Entire section relocated from Section 713 and renumbered to Section 715)

SECTION 713 715
FIRE-RESISTANT JOINT SYSTEMS

(Entire section relocated from Section 714 and renumbered to Section 716)

SECTION 714 716
FIRE-RESISTANCE RATING OF STRUCTURAL MEMBERS

(Entire section relocated from Section 715 and renumbered to Section 717)

SECTION 715 717
OPENING PROTECTIVES

(Entire section relocated from Section 716 and renumbered to Section 718)

SECTION 716 718
DUCTS AND AIR TRANSFER OPENINGS

(Entire section relocated from Section 717 and renumbered to Section 719)

SECTION 717 719
CONCEALED SPACES

(Entire section relocated from Section 718 and renumbered to Section 720)

SECTION 718 720
FIRE-RESISTANCE REQUIREMENTS FOR PLASTER

(Entire section relocated from Section 719 and renumbered to Section 721)

SECTION 719 721
THERMAL-AND SOUND-INSULATING MATERIALS

(Entire section relocated from Section 720 and renumbered to Section 722)

SECTION 720 722
PRESCRIPTIVE FIRE RESISTANCE

(Entire section relocated from Section 721 and renumbered to Section 723)

SECTION 721 723
CALCULATED FIRE RESISTANCE

Reason: The current arrangement of the code sections which regulate penetrations of horizontal assemblies is relatively accepted as being unworkable, often creating what are best described as do-loops. The user is forced to move back and forth between sections that though connected are not placed in a rational order.

The primary intent of this proposal is to re-organize the existing materials that are currently found in Chapter 7 relative to vertical and horizontal assemblies and place them in a workable fashion. This entails rearranging, reformatting and relocation current sections. When complete the format will be as follows:

701 General
702 Definitions
703 Fire Resistance Ratings and Fire Tests
704 Exterior Walls

705 Fire Walls
706 Fire Barriers
707 Fire Partitions
708 Smoke Barriers
709 Smoke Partitions
710 Penetrations Of Fire Resistance Rated Interior Vertical Assemblies (New)
711 Penetrations Of Non-Fire Resistance Rated Interior Vertical Assemblies (New)
712 Horizontal Assemblies
713 Penetrations of Horizontal Assemblies (New)
714 Shaft Enclosures (New)
715 Fire Resistive Joints
716 Fire Resistance Rating of Structural Members
717 Opening Protectives
718 Duct and Air Transfer Openings
719 Concealed Spaces
720 Fire Resistance requirements for plaster
721 Thermal and Sound insulating materials
722 Prescriptive Fire Resistance
723 Calculated Fire Resistance

While the majority of this proposal does not contain any technical revisions. New provisions are introduced in New Section 712 Penetration of Non-Fire Resistance Rated Interior Vertical Assemblies. The code has been noticeable silent on how to address penetrations in non-fire rated wall assemblies. The proposed language gives specific direction on how penetrations are to be addressed.

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

Committee Action: Disapproved

Committee Reason: The committee understands that the ICC Code Technology Committee (CTC) is currently studying the reorganization of Chapter 7. The efforts of this proponent should be coordinated with the efforts of the CTC. Lastly, there are some technical changes in the proposal as well, which the committee felt should be dealt with under a separate proposal.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Sarah A. Rice, Schirmer Engineering Corporation, requests Approved as Modified by this public comment.

Modify proposal as follows:

CHAPTER 7
CONSTRUCTION OF HORIZONTAL AND VERTICAL ASSEMBLIES

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.

~~**OPENING.** A void in a horizontal or vertical assembly, extending completely through the assembly, creating open ways of passage between adjacent stories, rooms or spaces. Ducts and air transfer openings are not materials that create openings.~~

~~**PENETRATION.** A void in a horizontal or vertical assembly, extending completely through or partially through the assembly, typically created by materials and/or equipment associated with building utilities and/or services. Penetrating items include but are not limited to pipes, tubes, conduit, wire, cable, chimneys and vents. Voids created by ducts, air transfer openings or joints are not penetrations.~~

704.10 Penetrations. Penetrations of fire-resistance-rated and non fire-resistance-rated exterior walls shall not be required to be protected unless required by other provisions of this code.

712.6 Floor fire door assemblies. Floor fire door assemblies used to protect openings in fire-resistance-rated floors shall be tested in accordance with NFPA 288, and shall achieve a fire-resistance rating not less than the assembly being penetrated. Floor fire door assemblies shall be labeled by an approved agency. The label shall be permanently affixed and shall specify the manufacturer, the test standard and the fire-resistance rating.

~~**715.3 Floor fire doors assemblies.** Floor fire door assemblies used to protect openings in fire-resistance-rated floors shall be tested in accordance with NFPA 288, and shall achieve a fire-resistance rating not less than the assembly being penetrated. Floor fire door assemblies shall be labeled by an approved agency. The label shall be permanently affixed and shall specify the manufacturer, the test standard and the fire-resistance rating.~~

715.5 Fire door and shutter assemblies. Approved fire door and fire shutter assemblies in vertical assemblies shall be constructed of any material or assembly of component materials that conforms to the test requirements of Section 715.4.1, 715.4.2 or 715.4.3 and the fire-protection rating indicated in Table 715.5. Fire door assemblies and shutters in vertical assemblies shall be installed in accordance with the provisions of this section and NFPA 80.

Exceptions:

1. Labeled protective assemblies that conform to the requirements of this section or UL 10A, UL 14B and UL 14C for tin-clad fire door assemblies.
2. Floor fire door assemblies in accordance with Section 711.8.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The current arrangement of the code sections which regulate penetrations of horizontal assemblies is relatively accepted as being unworkable, often creating what are best described as do-loops. The user is forced to move back and forth between sections that though connected are not placed in a rational order.

The primary intent of this proposal is to re-organize the existing materials that are currently found in Chapter 7 relative to vertical and horizontal assemblies and place them in a workable fashion. This entails rearranging, reformatting and relocation current sections. When complete the format will be as follows:

701 General
702 Definitions
703 Fire Resistance Ratings and Fire Tests
704 Exterior Walls
705 Fire Walls
706 Fire Barriers
707 Fire Partitions
708 Smoke Barriers
709 Smoke Partitions
710 Penetrations Of Fire Resistance Rated Interior Vertical Assemblies (New)
711 Penetrations Of Non-Fire Resistance Rated Interior Vertical Assemblies (New)
712 Horizontal Assemblies
713 Penetrations of Horizontal Assemblies (New)
714 Shaft Enclosures (New)
715 Fire Resistive Joints
716 Fire Resistance Rating of Structural Members
717 Opening Protectives
718 Duct and Air Transfer Openings
719 Concealed Spaces
720 Fire Resistance requirements for plaster
721 Thermal and Sound insulating materials
722 Prescriptive Fire Resistance
723 Calculated Fire Resistance

While the majority of this proposal does not contain any technical revisions. New provisions are introduced in New Section 712 Penetration of Non-Fire Resistance Rated Interior Vertical Assemblies. The code has been noticeable silent on how to address penetrations in non-fire rated wall assemblies. The proposed language gives specific direction on how penetrations are to be addressed.

Final Action: AS AM AMPC____ D

FS162-07/08, Part I
Table 601

Proposed Change as Submitted:

Proponent: Gregory R Keith, Professional heuristic Development, representing The Boeing Company and Ron Clements, Chesterfield County, Virginia

PART I – IBC GENERAL

Delete entire Section and relocate to Chapter 7, Section 715.8.3 (new):

~~**SECTION 404**~~
~~**ATRIUMS**~~

(Renumber subsequent sections)

1. Revise as follows:

TABLE 601
FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ~~ELEMENTS~~ ASSEMBLIES BASED ON TYPE OF CONSTRUCTION (hours)

BUILDING ~~ELEMENT~~ ASSEMBLY	TYPE I	TYPE II	TYPE III	TYPE IV	TYPE V

(Remainder of table to remain unchanged)

Reason: Please do not be intimidated by the length of this proposal. It represents a broad based initiative to improve the *International Building Code* in a very important area: the protection of openings intended to restrict the vertical movement of fire. Prior to technical discussions, I would like to provide a brief history as regards this proposal. Late last year, The Boeing Company approached the ICC Code Technology Committee and shared a concern about how opening and penetration requirements for horizontal assemblies were inconsistent and difficult for users to properly determine. To illustrate the point, it was noted that Section 713.1 would require that joints installed in a fire-resistance rated floor/ceiling assembly be protected with an approved fire-resistant joint system, while Section 1020.1 would permit an open convenience stairway within the same floor/ceiling assembly. 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. The CTC agreed with the concern and appointed a Vertical Openings Study Group to research the matter. The Study Group was constituted of diverse members from the public and private sectors. The Study Group met only twice; however, produced a "clean sheet" discussion draft that completely overhauled many Chapter 7 definitions and technical provisions. It also developed a fire and flame migration strategy that included a compartmentation concept. Current opening protective technical requirements were examined and reorganized in an effort to be more understandable by designers and code enforcement officials alike. A consistent format was created throughout the document to enhance user friendliness. Although a considerable amount of quality work had been accomplished in a relatively short period of time, the Study Group members could not achieve accord on acceptable migration limits. Some Study Group members felt that in light of arguably liberal allowable areas—especially in sprinklered buildings—that more conservative and complete compartmentation was necessary to compensate for current allowable areas. The Study Group decided to slow down and validate the strategy assumptions based on current exceptions to opening protection requirements. Unfortunately, this detailed study would sufficiently delay the project to where it would not be completed prior to the 2007/2008 code development submittal deadline.

Meanwhile, another CTC Study Group (BFP Features) was investigating the subject of allowable heights and areas. That group had met on numerous occasions and appeared to be mired in a comparison of the current IBC allowable heights and areas to those permitted in the legacy or former model codes. At a recent Features meeting in Chicago (August 1-3, 2007), that Study Group decided to take a "clean sheet" approach to the issue and developed a fire flow driven allowable area determination procedure based on a compartmentation concept. There were two primary premises with their approach. First, have low fire flow and allowable area thresholds to as to encourage the installation of an automatic sprinkler system early in design development. Secondly, create some necessary passive redundancy to the active fire protection features by establishing a number of relatively small fire compartments—especially in the so-called "lesser types of construction." By way of example, current IBC provisions would allow for up to approximately 174,000 square feet of gross Group F-1 area in a sprinklered building of Type IIB construction. Given the lack of inherent fire-resistance rated construction, the only compartmentation is achieved by way of fragmented vertical openings provisions. In comparison, the Type IIB, sprinklered, Group F-1 maximum compartment size would be approximately 32,000 square feet according to the progressive Features' approach. A major difference from current allowable area determination methods is that the "fire compartment" is an amorphous space that can include any number of stories as may be permitted based on the occupancy classification and type of construction under consideration. Under this system, the story-by-story determination of total allowable building area is a thing of the past. During the Features Study Group discussion it was emphasized that there were three volumetric entities: Buildings, fire compartments and fire zones. Buildings define the total allowable area. Fire compartments are generally limited as to individual area. Fire zones are subcompartments within fire compartments and serve to define the vertical migration limits within a given fire compartment. On numerous occasions, the Features Study Group referenced the Vertical Openings Study Group's thinking as completely compatible with their evolving concept and did not attempt to influence the Vertical Openings Group in any way. The BFP Features Study Group intends to submit their progressive allowable area proposal in this code development cycle. Given the close philosophical and technical relationship between the Features' proposal and the Vertical Openings discussion draft, it is imperative that the draft be submitted during the same code development cycle. It is somewhat likely that some of the reservations expressed by the Vertical Openings Study Group members concerning the proposed migration limits might be lessened given the Features group's fairly conservative approach to allowable area determination. It should be noted that although the two proposals would greatly complement each other, they are mutually exclusive can individually stand on their own merit.

As previously mentioned, this proposal is a "clean sheet" document intended to fairly completely overhaul IBC opening protection provisions. There are three major features to the proposal. First, it directly states a fire and flame migration strategy in its Table 713.2. Secondly, it provides a logical format to organize applicable technical provisions that will enhance usability by code practitioners. Lastly, specific technical requirements were reviewed for applicability and compatibility with the migration strategy and each other.

As regards the stated fire and flame migration strategy, this proposal takes a different tack than does the current IBC. Presently, the fundamental IBC premise with respect to the protection of openings in floor/ceiling assemblies—be they fire-resistance rated or nonfire-resistance rated—is that no unprotected openings are permitted. The reality is, however, that there are numerous exceptions that permit unprotected openings in floor/ceiling assemblies based on any one of a number of variables. The point being that these exceptions, become the rule and collectively define an implied vertical migration strategy. This proposal provides for an incremental migration strategy based on the collective intent of the multitude of current exceptions. The stated strategy is that for other than Group H and I occupancies, a two-story migration of fire and flame is acceptable. 2006 Sections 707.2, Exception 7 and 1020.1, Exceptions 1, 8 and 9, among others, serve as the precedent for this approach. It should be noted that the basic fire zone philosophy is that fire zone boundaries (both vertical and horizontal) have complete protection of openings. Within fire zones, the only protection of openings required for floor/ceiling assemblies would be those necessary to maintain the fire resistive integrity of a rated horizontal assembly. The lack of coordination between current opening protective requirements results in a "Swiss cheese" migration strategy. This proposal promotes an "all or nothing" philosophy that provides for a logical, predicable and dependable migration boundary.

It must also be understood that fire zones intended to restrict the upward movement of fire or flame, can occur in buildings of both rated and nonrated construction types. While the fire compartment provides for a fire-resistance rated boundary, regardless of the type of construction, fire zones within fire compartments are constructed with building assemblies that are consistent with the building type of

construction. As previously mentioned, the fire zone achieves its integrity through the protection of openings consistent with the inherent fire-resistance rating requirements for the building floor/ceiling assemblies. In fire-resistance rated construction, fire zone horizontal boundaries are protected by rated enclosures and/or listed opening protective assemblies. Within a fire zone in a rated building, no enclosures would be required and the only openings required to be protected would be those necessary to maintain the fire resistive integrity of the horizontal assembly itself. In buildings of nonrated construction, the fire zone horizontal boundaries would continue to be nonfire-resistance rated; however, openings would be required to be protected by rated enclosures and/or generic flamestopping methods. Within a fire zone in a nonrated building, there are no opening protection requirements.

The two-story migration limit is extended to three stories where the building is equipped throughout with an automatic sprinkler system. Numerous sprinkler progressions and current Section 707.2, Exception 2 serve as a precedent for this provision. It should be noted that although no inherent opening protection is required for the two floor/ceiling assemblies within a three story envelope—to include exit enclosures—each fire zone having a level more than two stories above grade plane is required to have at least one exit enclosure leading to the exterior of the building or all points of the fire zone have to be within 300 feet of an exit enclosure for fire department access and staging purposes. An exit enclosure is a unique building feature. It can actually serve three distinct purposes: One, it can serve to isolate one story from another for fire migration purposes. Hence, the term, "stair shaft." Two, it can serve as an exit component which provides for a protected, and potentially unlimited length path of travel. Three, an exit enclosure can serve as a protected area for fire department access and operations. During the first Vertical Openings Study Group meeting, it was decided that all openings and penetrations should be treated equally because, "a hole in the floor is a hole in the floor." Therefore, for fire migration purposes, an exit enclosure (as well as a shaft enclosure or atrium enclosure) would be required only at fire zone boundaries. From a means of egress perspective, an exit enclosure is an exit component similar to an exit passageway or horizontal exit. That is, they are incorporated into the building design as necessary to satisfy one or more means of egress design requirements—more than likely, travel distance limitations. Since a number of intercommunicating floors are unacceptable from a fire fighting perspective, an exit enclosure is mandated for fire zones above the second story.

Other than Group H or I occupancies are permitted to have four intercommunicating floor levels provided the building is provided with a sprinkler system and the fire zone is protected by a mechanical smoke control system. Section 404 atrium provisions serve as the precedent for this migration limit.

As previously suggested, the fire and flame migration limits established in this proposal are founded on current migration provisions and are positively stated in a single table and represent a logical progression of passive and active building fire protection features.

Once a migration strategy was developed, an editorial format was created to organize various technical provisions so as to support the adopted philosophy. Given the "hole is a hole—opening is an opening" methodology, it was determined that a single section (Section 713) would contain all opening protection provisions. Accordingly, Sections 404 and 707 have been deleted in their entirety and applicable provisions incorporated in context into proposed Section 713. Exit enclosure construction requirements have been relocated from Section 1020 to Section 713. All enclosure protection requirements have been consolidated in a single location. It is interesting to note that of the 22 exceptions formerly contained in Sections 707 and 1020, 21 were eliminated due to the formal establishment of migration limits as prescribed in proposed Table 713.2.

Also, a number of key definitions were created or modified to support this system. Perhaps the most important is that the term "opening" is defined for the first time. It simply states that any breach for virtually any purpose is treated as an opening. Where the current IBC differentiates between openings and penetrations, the proposed section does not (a hole is an opening). The fundamental premise is that where openings are required to be protected, they will be either enclosed by physical construction or protected by an opening protective assembly in rated construction or enclosed or flamestopped (another new definition) in nonrated construction.

With respect to opening protective assemblies, only seven are recognized as those seven are the only formally tested protectives. They are: fire door assemblies, fire window assemblies, fire dampers, ceiling dampers, smoke dampers, through-penetration fire stops and fire-resistant joint systems. Accordingly, opening protection goes to remedy. If the "hole" in a fire zone boundary can be mitigated by a listed opening protective assembly, migration requirements are satisfied. If not, the "hole" needs to be enclosed in accordance with Section 713.8. Additionally, each of the opening protective assembly sections has been subdivided with a consistent format: fire protection rating, testing, labeling and installation. All applicable technical requirements have been properly located within this editorial structure. This typical format allows for the objective comparison of various opening protective assembly requirements.

Another new definition worth noting is, "horizontal barrier." Currently, there are a number of vertical assemblies intended to address various structural or confinement requirements. On the horizontal plane, the "horizontal assembly" is presently the only fire-resistance rated assembly of choice. The proposed horizontal barrier is comparable to the fire barrier with openings required to be protected while the horizontal assembly is more based on type of construction requirements than fire confinement concerns. The two types of fire-resistance rated horizontal construction simplify opening protection requirement determination.

Specific technical requirements for the various enclosure and opening protective assembly options are very similar to current provisions. To account for all detailed technical provisions would take a number of pages. If one is concerned with a specific provision, it is suggested that it be copied from the current code and then entered as a search or find function in the proposed text. With this "clean sheet" document, there are countless changes made for the sake of editorial and technical continuity and user accommodation. It would be virtually impossible to address each and every change. The major points have been addressed. Hopefully, the more subtle details will appeal to common sense.

In summary, it is recognized that this is a very lengthy and comprehensive proposal submitted in a process that lends itself to incremental improvement. If the *International Building Code* is to be significantly and functionally improved, it is necessary to be more ambitious in the scrutiny of major subject areas. This proposal is the result of input by a number of nationally recognized code experts, although those individuals do not necessarily endorse this proposal at this time. Almost all concerned recognize that the current opening protective requirements are technically inconsistent and, in total, probably support no rational fire migration strategy. Opening protective technical requirements are presently difficult to determine and result in varying interpretations and applications. Similar to current code provisions, this proposal is certainly an imperfect document; however, it represents a significant improvement over those current code provisions and will serve as a foundation for subsequent revisions that will necessarily be in context. This proposal in combination with the BFP Features Study Group's similarly progressive allowable area determination proposal will significantly improve the schematic provisions of the International Building Code. Please view these proposals objectively and offer constructive vs. destructive criticism. The implementation of these concepts will greatly improve the effectiveness and usability of the IBC.

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

PART I – IBC GENERAL
Committee Action: Disapproved

Committee Reason: The provisions were felt by some of the committee members to best remain in Chapter 4 as the provisions address many non-Chapter 7 related issues such as smoke control and egress. Additionally the title "Atrium" is preferred over what the proponent is proposing in the new section in Chapter 7. There was also concern with deleting the definition of atrium.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

David Collins, The American Institute of Architects, representing himself, requests Approved as Modified by this public comment.

Modified proposal as follows:

TABLE 601
FIRE-RESISTANCE RATING REQUIREMENTS FOR
BUILDING ELEMENTS ~~ASSEMBLIES~~ BASED ON TYPE OF CONSTRUCTION (hours)

BUILDING ELEMENT ~~ASSEMBLY~~	TYPE I	TYPE II	TYPE III	TYPE IV	TYPE V

(Remainder of table to remain unchanged)

Commenter's Reason: FS162-07/08 was born as an initiative within the ICC Code Technology Committee. It was recognized that various opening and penetration requirements for horizontal assemblies were inconsistent and difficult for users to properly determine. In December of 2006, a Vertical Openings Study Group was appointed to research the issue and develop recommendations. The study group quickly went to work and decided that a "clean sheet" approach was in order. This total overhaul would include a general reorganization of Chapter 7 subject areas (sections); development of appropriate terminology and definitions so as to establish a "system" of opening protection requirements; a reorganization of applicable technical requirements so as to editorially support that system; and, the statement of the allowable fire migration limits in tabular form as opposed to the current inference through countless exceptions.

A draft Chapter 7 quickly emerged. It fundamentally contained all of the objectives of the study group. During a couple of study group meetings, details of the proposal were negotiated. As the August 20, 2007 submittal deadline for 07/08 code development cycle proposals drew near, it was apparent that a majority of study group members would not be able to support a consensus proposal. Two study group members felt that the draft to that point was fundamentally sound and could be perfected during the public comment cycle for inclusion in the 2009 Edition of the International Building Code. The latest revised study group draft at that time was submitted as a code change proposal and assigned to the IBC Fire Safety Code Development Committee as Item FS162-07/08.

The item was heard at the code development hearings in March of 2008. Considerable floor testimony criticized both editorial and technical aspects of the proposal. Opponent testimony included:

- Criticism that the "clean sheet" approach was too broad and that a more methodical, incremental approach should be taken, i.e., a piece by piece approach.
- Questions relative to the technical basis for the proposed migration limits, which were based on varying combinations of passive and active fire protection method.
- Doubt that the requirements for opening protective assemblies provide an adequate level of protection for horizontal assemblies installed solely for structural (Table 601) purposes even though opening enclosure requirements have been eliminated by exception.

While some Fire Safety Committee members expressed ~~a~~ concern with the three- and four-story fire migration limits contained in the proposal, the majority of committee members agreed that there is a need for comprehensive repair of the Chapter 7 opening protection requirements. Many lauded the effort and agreed with the clean sheet approach taken by FS162. During committee discussion many committee members expressed a concern that the proposal was not endorsed by the ICC Code Technology Committee (CTC) and further stated that such a wide-ranging initiative should originate from the CTC, not the Code Development Committee (CDC). FS162-07/08 was disapproved by a vote of 9-4. The published IBC Fire Safety committee action states, "The committee understands that the ICC Code Technology Committee (CTC) is currently studying the reorganization of Chapter 7. The efforts of this proponent should be coordinated with the efforts of the CTC. Further, the committee felt that the technical changes within the proposed Table 715.2 required further technical justification." To be within three votes of approval was very encouraging and indicated a desire by the code development committee to effect significant improvement in the IBC.

Since the Palm Springs hearings, the Vertical Openings Study Group has continued work on Item FS162-07/08. Numerous editorial and technical adjustments have been made based on the comments received by the study group. Most significantly, the progressive—and somewhat controversial—tabular fire migration limits have been reduced to a maximum of two stories. With that adjustment, exceptions have been added to acknowledge those instances where the IBC currently allows for greater intra-story migration. Additionally, a provision requiring opening protection assemblies in a fire-resistance-rated horizontal assembly that is not a portion of a fire zone envelope was added. Also, the structural support of horizontal assemblies was added. These modifications essentially maintain the technical/philosophical status quo with the current IBC. Countless other revisions have been made as well. Some terms have been modified for purposes of clarity and consistency. Building assemblies have been changed to building elements. Draftstopping has been changed to draftblocking. Examples of flamestopping methods have been included in the definition of flamestop. Numerous technical provisions have been improved, such as, the alternative firestopping methods listed in Sections 715.6.6.1.1 through 715.6.6.1.12. Smoke barrier and smoke partition charging requirements have been included in Section 715.5.2.4.1. Many specific opening protective assembly technical requirements have been reviewed and corrected or clarified for the purposes of technical accuracy. Fundamental fire zone provisions contained in Section 715.2 have been simplified. All of these modifications, and many others, are the result of constructive comments by study group members as well as other interested parties.

Despite the fact that the proposal had been modified to address all constructive criticism, on May 20, 2008 the CTC Vertical Openings Study Group voted to discontinue work on Item FS162 in favor of developing a new proposal. This action was based on the realization that due to internal differences of technical opinion, it was unlikely that study group unanimity could be achieved on FS162. On May 22, 2008, the IBC Code Technology Committee also voted not to support Item FS162.

The public comment being offered has attempted to address the comments and concerns voiced by both the IBC Fire Safety Code Development Committee and floor testimony in Palm Springs. Suggested adjustments in Table 715.2 have been made. Unfortunately, the proposal has proven to be too controversial with those opposed to this clean sheet concept.

Although one and a half years may not seem like much time in code development terms, a considerable amount of effort by a diverse group of individuals has resulted in a viable and necessary improvement in a fundamental chapter of the International Building Code. This proposal represents an initiative intended to clarify the system used in the code for the determination of appropriate protection requirements for openings in horizontal assemblies so as to encourage consistent interpretations and applications of applicable provisions. The format and organization presented in this code change represents a significant improvement over current highly fragmented and disjoined opening protection requirements.

It is hoped that 2/3 of the voting members will recognize the need for quantum improvement in this tremendously important area of the IBC and also recognize the considerable effort by many recognized experts in the field of fire migration. Inclusion of this system in the 2009 Edition of the IBC will greatly enhance the usability of current provisions while providing a format that will accommodate future developments in the area of fire migration.

Final Action: AS AM AMPC____ D

FS162-07/08, Part II
Chapter 7

Proposed Change as Submitted:

Proponent: Gregory R Keith, Professional heuristic Development, representing The Boeing Company and Ron Clements, Chesterfield County, Virginia

PART II – IBC FIRE SAFETY

Revise as follows:

702.1 Definitions. (Definitions not shown to remain unchanged)

OPENING. A breach in a building assembly that is necessary for utility, egress or architectural purposes.

BUILDING ASSEMBLY. An element of building construction as indicated in Table 601. Building assemblies are comprised of one or more construction components.

~~**BUILDING ELEMENT. (Supp)** A fundamental component of building construction, listed in Table 601, which may or may not be of fire-resistance-rated construction and is constructed of materials based on the building type of construction.~~

FIRE-RESISTANCE RATING. The period of time that a building ~~element, component or~~ assembly maintains the ability to confine a fire, continues to perform a given structural function, or both, as determined by the tests, or the methods based on tests, prescribed in Section 703.

HORIZONTAL ASSEMBLY. A fire-resistance-rated floor or roof building assembly based on building type of construction requirements and which is designed to perform a given structural function ~~of materials designed to restrict the spread of fire in which continuity is maintained~~.

HORIZONTAL BARRIER. A fire-resistance-rated floor building assembly wherein openings are protected and which is designed to maintain the ability to confine a fire and to perform a given structural function.

SHAFT ENCLOSURE. An enclosure for an opening that serves utility purposes such as, accommodating electrical, mechanical. plumbing equipment and elevator hoistways ~~The walls or construction forming the boundaries of a shaft.~~

EXIT ENCLOSURE. An enclosure for an opening that serves means of egress or human movement purposes such as stairways and ramps. An exit component that is separated from other interior spaces of a building or structure by fire-resistance rated construction and opening protectives, and provides for a protected path of egress travel in a vertical or horizontal direction to the exit discharge or the public way.

~~**ATRIUM.** An opening connecting two or more stories other than enclosed stairways, elevators, hoistways, escalators, plumbing, electrical, air-conditioning or other equipment, which is closed at the top and not defined as a mall. Stories, as used in this definition, do not include balconies within assembly groups or mezzanines that comply with Section 505.~~

ATRIUM ENCLOSURE. An enclosure for an opening that serves functional or aesthetic purposes such as atria, escalators and air transfer openings.

AIR TRANSFER OPENING. An unducted opening designed to allow the movement of environmental air between two contiguous spaces.

FIRESTOP. A material, device or construction installed to maintain the fire-resistance rating required for a building assembly.

FLAMESTOP. A material, device or construction installed to resist the free passage of flame and products of combustion in nonfire-resistance rated building assemblies.

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

DRAFTSTOP. A material, device or construction installed to restrict the movement of air within open spaces of concealed areas of a building ~~components~~ such as crawl spaces, floor/ceiling assemblies, roof/ceiling assemblies and attics.

FIRE AREA. The aggregate floor area enclosed and bounded by fire walls, fire barriers, horizontal barriers or exterior walls ~~or fire-resistance-rated horizontal assemblies~~ of a building.

FIRE ZONE. A fire-resistance rated or nonfire-resistance rated envelope of building construction intended to restrict the spread of fire or flame, and in which, continuity is maintained.

OPENING PROTECTIVE ASSEMBLY. A listed device installed in a building assembly that is designed to confine a fire or to resist the spread of fire for a prescribed period of time. Opening protective assemblies include fire door assemblies, fire window assemblies, fire dampers, ceiling dampers, smoke dampers, through-penetration fire stops and fire-resistant joint systems.

(Section 703 to remain without changes)

(Entire section relocated from Section 720 and renumbered to Section 704)

SECTION ~~720~~ 704
PRESCRIPTIVE FIRE RESISTANCE

(Entire section relocated from Section 721 and renumbered to Section 705)

SECTION ~~721~~ 705
CALCULATED FIRE RESISTANCE

(Entire section relocated from Section 704 and renumbered to Section 706)

SECTION ~~704~~ 706
EXTERIOR WALLS

(Entire section relocated from Section 705 and revised as follows)

~~704.8.2~~ 706.8.2 (Supp) Protected openings. Where openings are required to be protected, fire doors and fire shutters shall comply with Section ~~715.4~~ 715.6.1 and fire window assemblies shall comply with Section ~~715.5~~ 715.6.2.

> **Exception:** Opening protective assemblies are not required where the building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 and the water curtain using automatic sprinklers approved for that use.

~~704.9~~ 706.9 (Supp) Joints. Joints made in or between exterior walls required by this section to have a fire-resistance rating shall comply with Section ~~713~~ 715.6.7.

Exception: Joints in exterior walls that are permitted to have unprotected.

~~**704.9.1**~~ **706.9.1 (Supp) Voids.** The void created at the intersection of a floor/ceiling assembly and an exterior curtain wall assembly shall be protected in accordance with Section ~~713.4~~ 715.6.7.

~~**704.10**~~ **706.10 (Supp) Ducts ~~and air transfer openings~~.** Penetration by air ducts ~~and air transfer openings~~ in fire-resistance rated exterior walls required to have protected openings shall be protected in accordance ~~comply~~ with Section ~~716~~ 715.6.3.

Exception: Foundation vents installed in accordance with this code are permitted.

SECTION ~~705~~ 707
FIRE WALLS

(Renumber Sections 705.1 through 705.7 to 707.1 through 707.7 respectively without any other changes)

~~**705.8**~~ **707.8 Openings. (Supp)** Each opening through a fire wall shall be protected in accordance with Section ~~715.4~~ 715.5.2.2 and shall not exceed 156 square feet (15 m^2). The aggregate width of openings at any floor level shall not exceed 25 percent of the length of the wall.

Exceptions:

1. Openings are not permitted in party walls constructed in accordance with Section 705.1.1.
2. Openings shall not be limited to 156 square feet (15 m^2) where both buildings are equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.

~~**705.9 Penetrations.** Penetrations of fire walls shall comply with Section 712.~~

~~**705.10 Joints.** Joints made in or between fire walls shall comply with Section 713.~~

~~**705.11 Ducts and air transfer openings (Supp).** Ducts and air transfer openings shall not penetrate fire walls.~~

~~**Exception:** Penetrations by ducts and air transfer openings of fire walls that are not on a lot line shall be allowed provided the penetrations comply with Section 716. The size and aggregate width of all openings shall not exceed the limitations of Section 705.8.~~

(Entire section relocated from Section 706 and revised as follows)

SECTION ~~706~~ 708
FIRE BARRIERS

(Renumber Sections 706.1 through 706.5 to 708.1 through 708.5 respectively without any other changes)

~~**706.6**~~ **708.6 Openings. (Supp)** Openings in a fire barrier shall be protected in accordance with Section 715.5.2.2. Openings shall be limited to a maximum aggregate width of 25 percent of the length of the wall, and the maximum area of any single opening shall not exceed 156 square feet (15 m^2). ~~Openings in exit enclosures and exit passageways shall also comply with Sections 1020.1.1 and 1021.4, respectively.~~

Exceptions:

1. Openings shall not be limited to 156 square feet (15 m^2) where adjoining floor areas are equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.
2. Openings shall not be limited to 156 square feet (15 m^2) or an aggregate width of 25 percent of the length of the wall where the opening protective is a fire door serving an exit enclosure.
3. Openings shall not be limited to 156 square feet (15 m^2) or an aggregate width of 25 percent of the length of the wall where the opening protective assembly has been tested in accordance with ASTM E 119 or UL 263 and has a minimum fire-resistance rating not less than the fire-resistance rating of the wall.
4. Fire window assemblies permitted in atrium separation walls shall not be limited to a maximum aggregate width of 25 percent of length of the wall.

~~**706.7 Penetrations.** Penetrations of fire barriers shall comply with Section 712.~~

~~**706.7.1 Prohibited penetrations.** Penetrations into an exit enclosure or an exit passageway shall be allowed only when permitted by Section 1020.1.2 or 1021.5, respectively.~~

~~**706.8 Joints.** Joints made in or between fire barriers shall comply with Section 713.~~

~~**706.9 Ducts and air transfer openings.** Penetrations in a fire barrier by ducts and air transfer openings shall comply with Section 716.~~

Delete Section 707 in its entirety and substitute with proposed Section 715 (see below).

~~**SECTION 707**~~
~~**SHAFT ENCLOSURES**~~

(Entire section relocated from Section 708 and revised as follows)

SECTION ~~708~~ 709
FIRE PARTITIONS

(Renumber Sections 708.1 through 708.5 to 709.1 through 709.5 respectively without any other changes)

~~**708.6**~~ **709.6 Openings.** Openings in a fire partition shall be protected in accordance with Section 715.5.2.2.

~~**708.7 Penetrations.** Penetrations of fire partitions shall comply with Section 712.~~

~~**708.8 Joints.** Joints made in or between fire partitions shall comply with Section 713.~~

~~**708.9 Ducts and air transfer openings.** Penetrations in a fire partition by ducts and air transfer openings shall comply with Section 716.~~

(Entire section relocated from Section 709 and revised as follows)

SECTION ~~709~~ 710
SMOKE BARRIERS

(Renumber Sections 709.1 through 709.4 to 710.1 through 710.4 respectively without any other changes)

~~709.5~~ 710.5 Openings. Openings in a smoke barrier shall be protected in accordance with Section ~~715~~ 715.5.2.2.

> **Exception:** In Group I-2, where doors are installed across corridors, a pair of opposite-swinging doors without a center mullion shall be installed having vision panels with fire-protection-rated glazing materials in fire-protection-rated frames, the area of which shall not exceed that tested. The doors shall be close fitting within operational tolerances, and shall not have undercuts, louvers or grilles. The doors shall have head and jamb stops, astragals or rabbets at meeting edges and shall be automatic closing by smoke detection in accordance with Section 715.4.7.3. Positive-latching devices are not required.

~~**709.6 Penetrations.** Penetrations of smoke barriers shall comply with Section 712.~~

~~**709.7 Joints.** Joints made in or between smoke barriers shall comply with Section 713.~~

~~**709.8 Ducts and air transfer openings.** Penetrations in a smoke barrier by ducts and air transfer openings shall comply with Section 716.~~

(Entire section relocated from Section 710 and revised as follows)

SECTION ~~710~~ 711
SMOKE PARTITIONS

(Renumber Sections 710.1 through 710.5.2 to 711.1 through 711.5.2 respectively without any other changes)

~~710.5.3~~ **711.5.3 Self- or automatic-closing doors.** Where required elsewhere in the code, doors in smoke partitions shall be self- or automatic closing by smoke detection in accordance with Section ~~715.4.7.3~~ 715.6.1.5.1.

(Renumber Section 710.6 to 711.6 without any other changes)

~~710.7~~ **711.7 Ducts and air transfer openings.** The space around a duct penetrating a smoke partition shall be filled with an approved material to limit the free passage of smoke. Air transfer openings in smoke partitions shall be provided with a smoke damper complying with Section ~~716.3.2~~ 715.6.5.1.

Exception: Where the installation of a smoke damper will interfere with the operation of a required smoke control system in accordance with Section 909, approved alternative protection shall be utilized.

(Entire section relocated from Section 711 and revised as follows)

SECTION ~~711~~ 712
HORIZONTAL ASSEMBLIES

(Renumber Sections 711.1 and 711.2 to 712.1 and 712.2 respectively without any other changes)

~~711.3~~ **712.3 Fire-resistance rating. (Supp)** Horizontal assemblies shall have a ~~The~~ fire-resistance rating ~~of floor and roof assemblies shall~~ not be less than that required by Table 601 based on the building type of construction. ~~Where the floor assembly separates mixed occupancies, the assembly shall have a fire-resistance rating of not less than that required by Section 508.3.3 based on the occupancies being separated. Where the floor assembly separates a single occupancy into different fire areas, the assembly shall have a fire-resistance rating of not less than that required by Section 706.3.9. Horizontal assemblies separating dwelling units in the same building and horizontal assemblies separating sleeping units in the same building shall be a minimum of 1-hour fire-resistance-rated construction.~~

~~**Exception:** Dwelling unit and sleeping unit separations in buildings of Types IIB, IIIB, and VB construction shall have fire-resistance ratings of not less than 1/2 hour in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.~~

~~711.4~~ **712.4 ~~Continuity~~ Openings. (Supp)** Openings in horizontal assemblies shall be protected in accordance with Section 715.3.2 ~~Assemblies shall be continuous without openings, penetrations or joints except as permitted by this section and Sections 707.2, 712.4, 713 and 1020.1.~~ 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 construction 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, 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 419.3.
3. Horizontal assemblies at smoke barriers constructed in accordance with Section 709.

(Delete Sections 712 and 713 in their entirety and substitute with Section 715, see below)

~~**SECTION 712**~~
~~**PENETRATIONS**~~

~~**SECTION 713**~~
~~**FIRE-RESISTANT JOINT SYSTEMS**~~

2. Add new text as follows:

SECTION 713
HORIZONTAL BARRIERS

713.1 General. Where required by other provisions of this code, horizontal barriers shall comply with this section.

713.2 Materials. Horizontal barriers shall be constructed of materials consistent with those permitted for the type of construction of the building in accordance with Section 602.

713.3 Fire-resistance rating. Horizontal barriers shall have a fire-resistance rating not less than that required by Table 601 based on the building type of construction and as required elsewhere in this code. Construction supporting a horizontal barrier shall be protected so as to provide the required fire-resistance rating of such horizontal barrier.

Horizontal barriers separating dwelling units in the same building and horizontal barriers separating sleeping units in the same building shall be a minimum of 1-hour fire-resistance-rated construction.

Exception: Dwelling unit and sleeping unit separations in buildings of Types IIB, IIIB, and VB construction shall have fire-resistance ratings of not less than 1/2 hour in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

713.4 Openings. Openings in horizontal barriers shall be protected in accordance with Section 713.3.3.

(Section 714 to remain without changes)

(Delete Section 715 in its entirety and substitute with new Section 715 see below)

~~**SECTION 715**~~
~~**OPENING PROTECTIVES**~~

SECTION 715
PROTECTION OF OPENINGS

715.1 General. Openings in building assemblies shall be protected in accordance with the provisions of this section.

715.1.1 Unconcealed openings. Where required to be protected, openings that are not concealed within building construction shall be enclosed by fire-resistance rated construction or protected by an opening protective assembly.

Exceptions:

1. Openings totally within an individual dwelling unit and connecting four stories or less.
2. Openings in Group S-2 open and enclosed parking garages that serve only the parking structure.
3. Openings in Group A-5 occupancies that are essentially open to the outdoors.

715.1.2 Concealed openings. Openings that are concealed within building construction shall be protected in accordance with Section 714.

Exception: Openings within enclosures constructed in accordance with Section 715.8.

715.2 Fire zones. Fire zones shall include those contiguous building areas not separated by fire walls, fire barriers or horizontal barriers. Areas so separated shall be considered separate fire zones. Enclosures in accordance with Section 715.8 and exit passageways in accordance with Section 1021 shall not be considered separate fire zones; however, the protection of openings shall be required between such areas and the fire zones in which they are located. Areas isolated by fire partitions shall not be considered separate fire zones; however, the protection of openings shall be required between such areas and the fire zones in which they are located.

Fire zones shall be permitted to extend vertically and include intercommunicating stories in accordance with Table 715.2. Openings that are not concealed within building construction and serve the indicated number of adjacent stories are not required to be enclosed or protected provided such interconnected stories do not communicate with additional stories, other fire zones or tenant spaces in a fire event.

Exception: Fire zones more than two stories above grade plane shall be served by at least one exit enclosure that extends to the exterior of the building or all points of the fire zone shall be within 300 feet (91,440 mm) of an exit enclosure. The primary purpose of such exit enclosure is to provide protected fire department access to upper building levels. Exit enclosures provided to satisfy means of egress design requirements shall also qualify as fire department access enclosures.

The total height of communicating stories within a given fire zone shall not exceed 50 feet. Stories, as used in this section, shall include basements, but not include balconies in Group A occupancies or mezzanines that comply with Section 505.

TABLE 715.2
ALLOWED NUMBER OF INTERCOMMUNICATING STORIES WITHIN FIRE ZONES

OCCUPANCY	NUMBER OF STORIES	SPRINKLER SYSTEM	MECHANICAL SMOKE CONTROL[A]
Group A, B, E, F, M, R, S or U	2	3[b]	4[c]
Group H or I	1	1	1

a. In other than Group H occupancies, unlimited intercommunicating stories are permitted where buildings comply with the provisions of Section 715.8.3.6.
b. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.
c. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 and a mechanical smoke control system in accordance with Section 909 within the applicable fire zone.

715.3 Floor, floor/ceiling construction. Openings in floors or floor/ceiling construction shall be protected in accordance with the provisions of this section. Structural members supporting floor, floor/ceiling construction that is a portion of a fire zone shall be protected consistent with the supported construction. Flexible ducts and air connectors shall not pass through any fire-resistance-rated assembly. Flexible air connectors shall not pass through any floor.

715.3.1 Building assemblies. Openings in nonfire-resistance rated floor/ceiling construction that is not a portion of a fire zone envelope shall not require protection unless required by other provisions of this code. Openings in nonfire-resistance rated floor/ceiling construction that is a portion of a fire zone envelope shall be protected in accordance with Section 715.7 or enclosed in accordance with Section 715.8.

715.3.2 Horizontal assemblies. Openings in horizontal assemblies that are not a portion of a fire zone envelope shall not require protection other than as necessary to maintain the integrity of the assembly itself unless required by other provisions of this code. Openings in horizontal assemblies that are a portion of a fire zone envelope shall be protected with opening protective assemblies in accordance with Sections 715.6.1 through 715.6.6 or enclosed in accordance with Sections 715.8.

715.3.3 Horizontal barriers. Openings in horizontal barriers shall be protected with opening protective assemblies in accordance with Sections 715.6.1 through 715.6.6 or enclosed in accordance with Section 715.8.

715.4 Roof, roof/ceiling construction. Openings in roofs or roof/ceiling construction shall be protected in accordance with the provisions of this section. Flexible ducts and air connectors shall not pass through any fire-resistance-rated assembly. Flexible air connectors shall not pass through any ceiling.

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 construction required to be fire-resistance rated in accordance with Section 704.10.

715.5 Wall construction. Openings in fire-resistance rated wall construction shall comply with the provisions of this section. Flexible ducts and air connectors shall not pass through any fire-resistance-rated assembly. Flexible air connectors shall not pass through any wall.

715.5.1 Exterior walls. Openings in bearing and nonbearing exterior walls shall be protected in accordance with Section 706.8.

715.5.2 Interior walls. Openings in bearing and nonbearing interior walls shall be protected in accordance with the provisions of this section.

715.5.2.1 Building assemblies. Openings in interior bearing walls required to have a fire-resistance rating by Table 601 shall not require protection other than as necessary to maintain the integrity of the assembly itself unless required by other provisions of this code.

715.5.2.2 Fire walls, fire barriers and fire partitions. Openings in fire walls, fire barriers and fire partitions shall be protected in accordance with the provisions this section.

715.5.2.2.1 Doors. Door openings shall be protected in accordance with Section 715.6.1.

715.5.2.2.2 Windows. Window openings shall be protected in accordance with Section 715.6.2. Window openings in fire walls shall not be permitted.

Exceptions:

1. Fire-resistance-rated glazing tested as part of a fire-resistance-rated wall assembly in accordance with ASTM E 119 or UL 263 and labeled in accordance with Section 703.5 shall be permitted in fire doors and fire window assemblies in accordance with their listings.
2. Glazing protected by fire door assemblies.

715.5.2.2.3 Ducts. Duct openings shall be protected in accordance with Sections 715.6.3, 715.6.4 and 715.6.5.

Exceptions:

1. In other than Group H occupancies, fire dampers are not required in fire barriers where any of the following apply:
   - 1.1. In other than Group H occupancies, in ducted HVAC systems where fire barriers have a required fire-resistance rating of 1 hour or less and are in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2. For the purposes of this exception, a ducted HVAC system shall be a duct system for conveying supply, return or exhaust air as part of the structure's HVAC system. Such a duct system shall be constructed of sheet steel not less than 26 gage thickness and shall be continuous from the air-handling appliance or equipment to the air outlet and inlet terminals.
2. In other than Group H occupancies, fire dampers are not required in fire partitions where any of the following apply:
   - 2.1. The fire partitions are tenant separation or corridor walls in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 and the duct is protected as a through penetration in accordance with Section 715.6.5.
   - 2.2. Tenant partitions in covered mall buildings where the fire partitions are not required to extend to the underside of the floor or roof deck above by other provisions of this code.
   - 2.3. The duct system is constructed of approved materials in accordance with the *International Mechanical Code* and the duct penetrating the fire partition complies with all of the following requirements:
     - 2.3.1. The duct shall not exceed 100 square inches (0.06 m^2).
     - 2.3.2. The duct shall be constructed of steel a minimum of 0.0217 inch (0.55 mm) in thickness.
     - 2.3.3. The duct shall not have openings that communicate between the corridor and adjacent spaces or rooms.
     - 2.3.4. The duct shall be installed above a ceiling.
     - 2.3.5. The duct shall not terminate at a wall register in the fire-resistance-rated wall.
     - 2.3.6. A minimum 12-inch-long (305 mm) by 0.060-inch-thick (1.52 mm) steel sleeve shall be centered in each duct opening. The sleeve shall be secured to both sides of the wall and all four sides of the sleeve with minimum 1½-inch by 1½-inch by 0.060-inch (38 mm by 38 mm by 1.52 mm) steel retaining angles. The retaining angles shall be secured to the sleeve and the wall with No. 10 (M5) screws. The annular space between the steel sleeve and the wall opening shall be filled with mineral wool batting on all sides.

715.5.2.2.4 Penetrations. Through-penetrations and membrane-penetrations shall be protected in accordance with Section 715.6.5.

715.5.2.2.5 Joints. Joints in shall be protected in accordance with Section 715.6.6.

715.6 Opening protective assemblies. Opening protective assemblies required by other provisions of this code shall comply with the provisions of this section.

The application of any of the alternative methods listed in this section shall be based on the fire exposure and acceptance criteria specified in NFPA 252, NFPA 257 or UL 9. The required fire resistance of an opening protective shall be permitted to be established by any of the following methods or procedures:

1. Designs documented in approved sources.

2. Calculations performed in an approved manner.
3. Engineering analysis based on a comparison of opening protective designs having fire-protection ratings as determined by the test procedures set forth in NFPA 252, NFPA 257 or UL 9.
4. Alternative protection methods as allowed by Section 104.11.

The application of any of the alternative methods listed in this section shall be based on the fire exposure and acceptance criteria specified in referenced test standards.

715.6.1 Fire door assemblies. Fire door assemblies shall comply with the provisions of this section. Fire door assemblies shall be constructed of any material or assembly of materials that conforms to the test requirements of Section 715.6.1.1, 1-3. Fire shutters shall comply with the provisions for fire doors.

Exceptions:

1. Labeled fire door assemblies that conform to the requirements of this section or UL10A, UL14B and UL 14C for tin-clad fire door assemblies.
2. Floor fire door assemblies in accordance with this section.

715.6.1.1 Fire protection rating. Fire door assemblies shall have the fire protection rating indicated in Table 715.6.1.

Exceptions:

1. Corridor door assemblies in Group I-2 occupancies shall be in accordance with Section 407.3.1.
2. Unprotected openings shall be permitted for corridors in multitheater complexes where each motion picture auditorium has at least one-half of its required exit or exit access doorways opening directly to the exterior or into an exit passageway.
3. Floor fire door assemblies used to protect openings in horizontal assemblies and horizontal barriers shall have a fire-resistance rating not less than the assembly being penetrated.

3. Revise as follows:

TABLE ~~715.4~~ 715.6.1
FIRE DOOR AND FIRE SHUTTER FIRE PROTECTION RATINGS

(No change to table entries)

4. Add new text as follows:

715.6.1.2 Testing. Fire door assemblies shall be tested in accordance with NFPA 252, UL 10B or UL 10C, as specified below.

Fire door assemblies with side-hinged and pivoted swinging doors shall be tested in accordance with NFPA 252 or UL 10C. After 5 minutes into the NFPA 252 test, the neutral pressure level in the furnace shall be established at 40 inches (1016 mm) or less above the sill.

Fire door assemblies with other types of doors, including swinging elevator doors and fire shutter assemblies, shall be tested in accordance with NFPA 252 or UL 10B. The pressure in the furnace shall be maintained as nearly equal to the atmospheric pressure as possible. Once established, the pressure shall be maintained during the entire test period.

Fire door assemblies in exit enclosures and exit passageways shall have a maximum transmitted temperature end point of not more than 450°F (250° C) above ambient at the end of 30 minutes of standard fire test exposure.

Exception: The maximum transmitted temperature rise is not required in buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.

Fire door assemblies located in corridor walls or smoke-barrier walls and required to have a minimum fire protection rating of 20 minutes in accordance with Table 715.6.1 shall be tested in accordance with NFPA 252 or UL 10C without the hose stream test. Such smoke and draft control assemblies shall also be tested in accordance with UL 1784. Louvers are prohibited.

Exception: View ports that require a hole not larger than 1 inch (25 mm) in diameter through the door, have at least a 0.25-inch-thick (6.4 mm) glass disc and the holder is of metal that will not melt out where subject to temperatures of 1,700°F (927°C) shall be permitted.

Floor fire door assemblies used to protect openings in fire-resistance-rated floors shall be tested in accordance with NFPA 288.

715.6.1.3 Labeling. Fire door assemblies shall be labeled by an approved agency. The labels shall comply with NFPA 80 and shall be permanently affixed to the door or frame. The label shall be applied at the factory or location where fabrication and assembly are performed. Fire door labels shall include the name of the manufacturer, the name of the third-party inspection agency, the fire protection rating, and where required for fire doors used in exit enclosures and exit passageways, the maximum transmitted temperature end point. Fire door frames shall be labeled showing the name of the manufacturer or other identification readily traceable back to the manufacturer and the name or trademark of the third-party inspection agency, the fire protection rating and, where required for fire doors in exit enclosures and exit passageways by Section 715.6.1.2, the maximum transmitted temperature end point.

Smoke and draft control assemblies complying with UL 1784 shall be labeled and shall show the letter "S" on the fire protection rating label of the door. This marking shall indicate that the door and frame assembly are in compliance when listed or labeled gasketing is also installed.

Oversized fire door assemblies shall bear an oversized fire door label by an approved agency or shall be provided with a certificate of inspection furnished by an approved testing agency. When a certificate of inspection is furnished by an approved testing agency, the certificate shall state that the door conforms to the requirements of design, materials and construction, but has not been subjected to the fire test.

Floor fire door assemblies shall be labeled by an approved agency. The label shall be permanently affixed and shall specify the manufacturer, the test standard and the fire-resistance rating.

715.6.1.4 Installation. Fire door assemblies shall be installed in accordance in accordance with NFPA 80. Smoke and draft control assemblies shall be installed in accordance with NFPA 105.

715.6.1.5 Closing. Fire door assemblies shall be self- or automatic-closing in accordance with this section.

Exceptions:

1. Fire door assemblies located in walls separating sleeping units in Group R-1 occupancies shall be permitted without self- or automatic-closing devices.
2. The elevator car doors and the associated hoistway enclosure doors at the floor level designated for recall in accordance with Section 3003.2 shall be permitted to remain open during Phase I emergency recall operation.

Unless otherwise permitted, single fire door assemblies and both leaves of pairs of side-hinged swinging fire door assemblies shall be provided with an active latch bolt that will secure the door when it is closed.

715.6.1.5.1 Smoke-activated doors. Automatic-closing doors installed in the following locations shall be automatic-closing by the actuation of smoke detectors installed in accordance with Section 907.10 or by loss of power to the smoke detector or hold-open device. Doors that are automatic-closing by smoke detection shall not have more than a 10-second delay before the door starts to close after the smoke detector is actuated:

1. Doors installed across a corridor.
2. Doors that protect openings in exits or corridors required to be of fire-resistance-rated construction.
3. Doors that protect openings in walls that are capable of resisting the passage of smoke in accordance with Section 508.2.2.1.
4. Doors installed in smoke barriers in accordance with Section 910.5.
5. Doors installed in fire partitions in accordance with Section 709.6.
6. Doors installed in a fire wall in accordance with Section 707.8.
7. Doors installed in shaft enclosures in accordance with Section 715.8.1.
8. Doors installed in refuse and laundry chutes and access and termination rooms in accordance with Section 715.8.1.2.3.
9. Doors installed in the walls for compartmentation of underground buildings in accordance with Section 405.4.2.
10. Doors installed in the elevator lobby walls of underground buildings in accordance with Section 405.4.3.
11. Doors installed in smoke partitions in accordance with Section 911.5.

715.6.1.5.2 Fire shutters and steel fire doors. Vertical sliding or vertical rolling steel fire door assemblies in openings through which pedestrians travel shall be heat activated or activated by smoke detectors with alarm verification.

Where fire shutters of the rolling type are installed, such shutters shall include approved automatic-closing devices.

Where fire shutters of the swinging type are installed in exterior openings, not less than one row in every three vertical rows shall be arranged to be readily opened from the outside, and shall be identified by distinguishing marks or letters not less than 6 inches (152 mm) high.

715.6.1.6 Glazing. Fire-protection-rated glazing shall be permitted in fire door assemblies in accordance with NFPA 80.

Fire-protection-rated glazing in fire door assemblies located in fire walls are prohibited.

> **Exception:** Where serving as a horizontal exit, a self-closing swinging fire door assembly shall be permitted to have a vision panel of not more than 100 square inches (0.065 m^2) without a dimension exceeding 10 inches (254 mm).

Fire-protection-rated glazing shall not be installed in fire door assemblies having a 1½-hour fire protection rating intended for installation in fire barriers.

> **Exception:** Glazing not more than 100 square inches (0.065 m^2) in area.

Fire-protection-rated glazing in excess of 100 square inches (0.065 m^2) shall be permitted in fire door assemblies when tested as components of the door assemblies and not as glass lights, and shall have a maximum transmitted temperature rise of 450◦F (250◦C) in accordance with Section 715.6.1.2.

> **Exception:** The maximum transmitted temperature end point is not required in buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.

Fire-protection-rated glazing in smoke and draft control assemblies shall have a minimum fire-protection rating of 20 minutes and shall be exempt from the hose stream test. Glazing material in any other part of the door assembly, including transom lites and sidelites, shall be tested in accordance with NFPA 257 and UL 9, including the hose stream test, in accordance with Section 715.6.2.

715.6.1.6.1 Labeling. Fire-protection-rated glazing in fire door assemblies shall be labeled by an approved agency. The labels shall comply with NFPA 80 and shall be permanently affixed to the glazing. The label shall be applied at the factory or location where fabrication and assembly are performed. For fire-protection-rated glazing, the label shall include the name of the manufacturer, the test standard and shall bear the following four-part identification: "D – H or NH – T or NT – XXX." "D" indicates that the glazing shall be used in fire door assemblies and that the glazing meets the fire containment requirements of the NFPA 257 and UL 9. "H" shall indicate that the glazing meets the hose stream requirements of the test standard. "NH" shall indicate that the glazing does not meet the hose stream requirements of the test. "T" shall indicate that the glazing meets the temperature requirements of Section 715.6.1.2. "NT" shall indicate that the glazing does not meet the temperature requirements of Section 715.6.1.2. The placeholder "XXX" shall specify the fire-protection-rating period, in minutes, as tested.

715.6.1.6.1 Installation. Wired glass used in fire door assemblies shall comply with Table 715.6.2.1. Other fire-protection-rated glazing shall comply with the size limitations of NFPA 80.

Approved fire-protection-rated glazing used in fire door assemblies in elevator and exit enclosures shall be so located as to furnish clear vision of the passageway or approach to the elevator, ramp or stairway.

Fire-protection-rated glazing installed in fire door assemblies or fire window assemblies in areas subject to human impact in hazardous locations shall comply with Chapter 24.

715.6.2 Fire window assemblies. Fire window assemblies shall comply with the provisions of this section.

> **Exception:** Glazing tested as part of a fire-resistance-rated wall assembly in accordance with ASTM E 119.

Fire window assemblies shall be limited to fire partitions in accordance with Section 708 and fire barriers utilized in the applications set forth in Sections 706.3.6 and 706.3.8 where the fire-resistance rating does not exceed 1 hour.

Glazing installed in fire door assemblies shall comply with Section 715.6.1.6.

715.6.2.1 Fire protection rating. Fire window assemblies shall have the fire protection rating indicated in Table 715.6.2. Metal mullions that exceed a nominal height of 12 feet (3658 mm) shall be protected with materials to afford the same fire-resistance rating as required for the wall construction in which the fire window assembly is located.

Exceptions:

1. Steel window frame assemblies of 0.125-inch (3.2 mm) minimum solid section or of not less than nominal 0.048-inch-thick (1.2 mm) formed sheet steel members fabricated by pressing, mitering, riveting, interlocking or welding and having provision for glazing with ¼-inch (6.4 mm) wired glass where securely installed in the building construction and glazed with ¼-inch (6.4 mm) labeled wired glass shall be deemed to meet the requirements for a ¾-hour fire window assembly. Wired glass panels shall conform to the size limitations set forth in Table 715.6.2.1.
2. Fire window assemblies in 0.5-hour fire-resistance-rated partitions are permitted to have a 20 minute fire protection rating.

5. Revise table as follows:

TABLE ~~715.5~~ 715.6.2 (Supp)
FIRE WINDOW ASSEMBLY FIRE PROTECTION RATINGS

TYPE OF ASSEMBLY		REQUIRED ASSEMBLY RATING (hours)	MINIMUM FIRE WINDOW ASSEMBLY RATING (hours)
Interior walls:	Fire walls	All	NP [a]
	Fire barriers	> 1 1	NP [a] 3/4
	Smoke barriers	1	3/4
	Fire partitions	1 ½	3/4 1/3
Exterior walls[b]		> 1 1	1 ½ 3/4
Party wall		All	NP

NP = Not Permitted.

a. Not permitted except as specified in Section 715.2.

b. Openings in nonfire-resistance-rated exterior wall assemblies that require protection in accordance with Section 706.3, 706.8.2, 706.8.5 or 706.8.6 shall have a fire-protection rating of not less than ¾ hour.

TABLE ~~715.5.3~~ 715.6.2.1
LIMITING SIZES OF WIRED GLASS PANELS

(No change to table entries)

6. Add new text as follows:

715.6.2.2 Testing. Fire window assemblies shall be tested in accordance with NFPA 257 and UL 9.

NFPA 257 AND UL 9 shall evaluate fire window assemblies under positive pressure. Within the first 10 minutes of a test, the pressure in the furnace shall be adjusted so at least two-thirds of the test specimen is above the neutral pressure plane, and the neutral pressure plane shall be maintained at that height for the balance of the test.

Nonsymmetrical glazing systems in fire partitions, fire barriers or in exterior walls with a fire separation distance of 5 feet (1524 mm) or less in accordance with Section 704 shall be tested with both faces exposed to the furnace, and the assigned fire protection rating shall be the shortest duration obtained from the two tests conducted in compliance with NFPA 257 AND UL 9.

715.6.2.3 Labeling. Fire windows shall be labeled by an approved agency. The labels shall comply with NFPA 80 and shall be permanently affixed to the glazing. The label shall be applied at the factory or location where fabrication and assembly are performed. Fire window labels shall include the name of the manufacturer, the test standard and shall bear the following two-part identification: "OH – XXX." "OH" indicates that the glazing meets both the fire containment and the hose-stream requirements of NFPA 257 and UL 9. "XXX" represents the fire-protection rating period, in minutes, as tested.

715.6.2.4 Installation. Fire window assemblies shall be installed in approved frames in a fixed position or be automatic-closing.

715.6.3 Fire dampers. Fire dampers shall comply with the provisions of this section.

Exceptions:

1. Openings included as part of a fire-resistance-rated wall assembly tested in accordance with ASTM E 119.
2. Where ducts are used as part of an approved smoke control system in accordance with Section 909 and where the use of a fire damper would interfere with the operation of a smoke control system.

Where a building assembly is required to have both fire dampers and smoke dampers, combination fire/smoke dampers or a fire damper and a smoke damper shall be required.

Fire dampers for hazardous exhaust duct systems shall comply with the *International Mechanical Code*.

715.6.3.1 Fire protection rating. Fire dampers shall have the fire protection rating indicated in Table 715.6.3.

7. Revise as follows:

TABLE ~~716.3.1~~ 715.6.3
FIRE DAMPER FIRE PROTECTION RATINGS

(No change to table entries)

8. Add new text as follows:

715.6.3.2 Testing. Fire dampers shall be tested in accordance with UL 555. Combination fire/smoke dampers shall be tested in accordance with both UL 555 and UL 555S.

715.6.3.3 Labeling. Fire dampers shall be labeled by an approved agency.

Only fire dampers labeled for use in dynamic systems shall be installed in heating, ventilation and air-conditioning systems designed to operate with fans on during a fire event.

715.6.3.4 Installation. The fire damper actuating device shall meet one of the following requirements:

1. The operating temperature shall be approximately 50°F (10°C) above the normal temperature within the duct system, but not less than 160°F (71°C).
2. The operating temperature shall be not more than 286°F (141°C) where located in a smoke control system complying with Section 909.
3. Where a combination fire/smoke damper is located in a smoke control system complying with Section 909, the operating temperature rating shall be approximately 50°F (10°C) above the maximum smoke control system designed operating temperature, or a maximum temperature of 350°F (177°C). The temperature shall not exceed the UL 555S degradation test temperature rating for a combination fire/smoke damper.

Fire dampers shall be provided with an approved means of access, which is large enough to permit inspection and maintenance of the damper and its operating parts. The access openings shall not reduce the fire-resistance rating of the building assembly. Access points shall be permanently identified on the exterior by a label having letters not less than 0.5 inch (12.7 mm) in height reading: FIRE DAMPER or FIRE/SMOKE DAMPER. Access doors in ducts shall be tight fitting and suitable for the required duct construction.

Fire dampers and combination fire/smoke dampers located within air distribution and smoke control systems shall be installed in accordance with the requirements of this section, the manufacturer's installation instructions and the dampers' listing.

715.6.4 Ceiling radiation dampers. Ceiling radiation dampers shall comply with the provisions of this section and the applicable provisions of Section 715.6.3.

Exception: Ceiling radiation dampers are not required where either of the following applies:

1. Where tests in accordance with ASTM E 119 have shown that ceiling radiation dampers are not necessary in order to maintain the fire-resistance rating of the assembly.

2. Where exhaust duct penetrations are protected in accordance with Section 715.6.5, are located within the cavity of a wall and do not pass through another dwelling unit or tenant space.

715.6.4.1 Fire protection rating. Ceiling radiation dampers shall be installed in accordance with their listing.

715.6.4.2 Testing. Ceiling radiation dampers shall be tested in accordance with UL 555C. Ceiling radiation dampers shall be tested in accordance with UL 555C and installed in accordance with the manufacturer's installation instructions and listing.

715.6.4.3 Labeling. Ceiling radiation dampers shall be labeled by an approved agency.

715.6.4.4 Installation. Ceiling radiation dampers located within air distribution and smoke control systems shall be installed in accordance with the requirements of this section, the manufacturer's installation instructions and the dampers' listing.

715.6.5 Smoke dampers. Smoke dampers shall comply with the provisions of this section. Where a building assembly is required to have both fire dampers and smoke dampers, combination fire/smoke dampers or a fire damper and a smoke damper shall be required.

715.6.5.1 Leakage rating. Smoke damper leakage ratings shall not be less than Class II. Elevated temperature ratings shall not be less than 250°F (121°C).

715.6.5.2 Testing. Smoke dampers shall comply with the requirements of UL 555S. Combination fire/smoke dampers shall comply with the requirements of both UL 555 and UL 555S.

715.6.5.3 Labeling. Smoke dampers shall be listed and bear the label of an approved testing agency indicating compliance with the referenced standards in this section.

715.6.5.4 Installation. Smoke dampers and combination fire/smoke dampers located within air distribution and smoke control systems shall be installed in accordance with the requirements of this section, the manufacturer's installation instructions and the dampers' listing.

Smoke dampers shall close upon actuation of a listed smoke detector or detectors installed in accordance with Section 907.10 and one of the following methods, as applicable:

1. Where a smoke damper is installed within a duct, a smoke detector shall be installed in the duct within 5 feet (1524 mm) of the smoke damper with no air outlets or inlets between the detector and the damper. The smoke detector shall be listed for the air velocity, temperature and humidity anticipated at the point where it is installed. Other than in mechanical smoke control systems, smoke dampers shall be closed upon fan shutdown where local smoke detectors require a minimum velocity to operate.
2. Where a smoke damper is installed above doors in a smoke barrier, a spot-type detector listed for releasing service shall be installed on either side of the smoke barrier door opening.
3. Where a smoke damper is installed within an unducted opening in a wall, a spot-type detector listed for releasing service shall be installed within 5 feet (1524 mm) horizontally of the smoke damper.
4. Where a smoke damper is installed in a corridor wall or ceiling, the damper shall be permitted to be controlled by a smoke detection system installed in the corridor.
5. Where a smoke damper is installed within areas served by a heating, ventilation and air-conditioning (HVAC) system and a total-coverage smoke detector system is provided, smoke dampers shall be permitted to be controlled by the smoke detection system.

Smoke dampers shall be provided with an approved means of access, which is large enough to permit inspection and maintenance of the damper and its operating parts. The access openings shall not reduce the fire-resistance rating of the building assembly. The access shall not affect the integrity of fire-resistance-rated building assemblies. Access points shall be permanently identified on the exterior by a label having letters not less than 0.5 inch (12.7 mm) in height reading: SMOKE DAMPER or FIRE/SMOKE DAMPER. Access doors in ducts shall be tight fitting and suitable for the required duct construction.

A listed smoke damper designed to resist the passage of smoke shall be provided at each point a duct or air transfer opening penetrates a corridor enclosure required to have smoke and draft control doors in accordance with Section 715.6.1.2.

Exceptions:

1. Smoke dampers are not required where the building is equipped throughout with an approved smoke control system in accordance with Section 909, and smoke dampers are not necessary for the operation and control of the system.

2. Smoke dampers are not required in corridor penetrations where the duct is constructed of steel not less than 0.019 inch (0.48 mm) in thickness and there are no openings serving the corridor.

715.6.6 Through-penetration fire stops. Through-penetration or membrane- penetration fire stops shall comply with the provisions of this section. Through-penetrations or membrane-penetrations in fire-resistance rated building assemblies, that are not smoke barriers, shall be shall tested in accordance with ASTM E 814 or UL 1479 with a minimum positive pressure differential of 0.01 inch (2.49 Pa) of water, or shall comply with any of the alternative methods listed in Sections 715.6.6.1 through 715.6.6.9. The tested system shall have a minimum one hour F-rating or a rating equal to the required rating of the building assembly penetrated if such assembly has a fire resistance rating greater than one hour. Penetration protection of smoke barriers shall comply with Section 910.6.

Exceptions:

1. Penetrations of nonfire resistance rated horizontal fire zone envelope assemblies are permitted to comply with the provisions of this section or section 715.7.1.
2. Penetrations tested as part of a fire-resistance-rated wall assembly in accordance with ASTM E 119.
3. Floor penetrations contained and located within the cavity of a wall do not require a T- rating.

715.6.6.1 Single concrete floor penetrations (metal pipe or tube). Penetrations in a single concrete floor by steel, ferrous or copper conduits, pipes, tubes or vents with a maximum 6-inch (152 mm) nominal diameter, provided the concrete, grout or mortar is installed the full thickness of the floor or the thickness required to maintain the fire-resistance rating. The penetrating items shall not be limited to the penetration of a single concrete floor, provided the area of the opening through each floor does not exceed 144 square inches (92 900 mm^2).

715.6.6.2 Single fire-resistance rated floor penetrations (metal pipe or tube). Penetrations by steel, ferrous or copper conduits, pipes, tubes or vents or concrete or masonry items through a single fire-resistance-rated floor assembly where the annular space is protected with materials that prevent the passage of flame and hot gases sufficient to ignite cotton waste when subjected to ASTM E 119 time-temperature fire conditions under a minimum positive pressure differential of 0.01 inch (2.49 Pa) of water at the location of the penetration for the time period equivalent to the fire-resistance rating of the construction penetrated. Penetrating items with a maximum 6-inch (152 mm) nominal diameter shall not be limited to the penetration of a single fire-resistance-rated floor assembly, provided the aggregate area of the openings through the assembly does not exceed 144 square inches (92 900 mm^2) in any 100 square feet (9.3 m^2) of floor area.

715.6.6.3 Fire-resistance rated wall penetrations (metal pipe or tube). Penetrations by steel, ferrous or copper pipes, tubes or conduits, are permitted provided the annular space between the penetrating item and the fire-resistance-rated wall is protected as follows:

1. In concrete or masonry walls where the penetrating item is a maximum 6-inch (152 mm) nominal diameter and the area of the opening through the wall does not exceed 144 square inches (0.0929 m^2), concrete, grout or mortar is permitted where it is installed the full thickness of the wall or the thickness required to maintain the fire-resistance rating; or
2. The material used to fill the annular space shall prevent the passage of flame and hot gases sufficient to ignite cotton waste when subjected to ASTM E 119 time-temperature fire conditions under a minimum positive pressure differential of 0.01 inch (2.49 Pa) of water at the location of the penetration for the time period equivalent to the fire-resistance rating of the construction penetrated.

715.6.6.4 Floor assembly membrane penetrations (metal pipe or tube). Membrane-penetrations of a maximum 2-hour fire-resistance-rated horizontal assembly or horizontal barrier by steel, ferrous or copper conduits, pipes, tubes or vents, or concrete or masonry items where the annular space is protected 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 mm^2) in any 100 square feet (9.3 m^2) of ceiling area in assemblies tested without penetrations.

715.6.6.5 Listed electrical box penetrations. 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 (3.1 mm) unless listed otherwise.

715.6.6.6 Listed electrical box membrane penetrations. Membrane-penetrations of a fire-resistance rated assembly membrane by listed electrical boxes of any material are permitted 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 wall membrane and the box shall not exceed 1/8 inch (3.1 mm) unless listed otherwise. Such boxes on opposite sides of the wall or partition shall be separated as follows:

1. By a horizontal distance of not less than 24 inches (610 mm);
2. By solid fireblocking in accordance with Section 717.2.1;
3. By protecting both boxes with listed putty pads; or
4. By other listed materials and methods.
5. The annular space created by the penetration of a fire sprinkler, provided it is covered by a metal escutcheon plate.

715.6.6.7 Steel electrical box membrane floor penetrations. Ceiling membrane penetrations of maximum 2-hour fire-resistance-rated horizontal assemblies or horizontal barriers by steel electrical boxes that do not exceed 16 square inches (10 323 mm^2) in area, provided the aggregate area of such penetrations does not exceed 100 square inches (44 500 mm^2) in any 100 square feet (9.29 m^2) of ceiling area, and the annular space between the ceiling membrane and the box does not exceed 1/8 inch (3.12 mm).

715.6.6.8 Steel electrical box membrane wall penetrations. Membrane-penetrations of an assembly membrane of maximum two-hour fire-resistance-rated walls and partitions are permitted by steel electrical boxes that do not exceed 16 square inches (0.0103 m^2) in area, provided the aggregate area of the openings through the membrane does not exceed 100 square inches (0.0645 m^2) in any 100 square feet (9.29 m^2) of wall area. The annular space between the wall membrane and the box shall not exceed 1/8 inch (3.1 mm). Such boxes on opposite sides of the wall or partition shall be separated by one of the following:

1. By a horizontal distance of not less than 24 inches (610 mm);
2. By a horizontal distance of not less than the depth of the wall cavity where the wall cavity is filled with cellulose loose-fill, rockwool or slag mineral wool insulation;
3. By solid fireblocking in accordance with Section 717.2.1;
4. By protecting both outlet boxes with listed putty pads; or
5. By other listed materials and methods.

715.6.6.9 Sprinkler head penetrations. The annular space created by the penetration of a fire sprinkler head is permitted to be protected by a metal escutcheon plate that completely covers the annular space.

715.6.5.10 Installation. Noncombustible penetrating items shall not connect to combustible items beyond the point of firestopping unless it can be demonstrated that the integrity of the fire-resistance rated building assembly is maintained.

Where sleeves are used, they shall be securely fastened to the building assembly penetrated. The space between the item contained in the sleeve and the sleeve itself and any space between the sleeve and the assembly penetrated shall be protected in accordance with the applicable provisions of Section 715.6.6. Insulation and coverings on or in the penetrating item shall not penetrate the building assembly unless the specific material used has been tested as part of the assembly in accordance with this section.

715.6.7 Fire-resistant joint systems. Fire-resistant joint systems shall comply with the provisions of this section. Joints in or between fire-resistance-rated building assemblies shall be protected by a fire-resistant joint system.

Exception: Fire-resistant joint systems shall not be required for joints in the following locations:

1. Floors within a single dwelling unit.
2. Floors within malls.
3. Mezzanine floors.
4. Walls that are permitted to have unprotected openings.
5. Roofs where openings are permitted.
6. Joints not exceeding a maximum width of 0.625 inch (15.9 mm) and tested in accordance with ASTM E 119.

715.6.7.1 Fire protection rating. Fire-resistant joint systems shall be designed to resist the passage of fire for a time period not less than the required fire-resistance rating of the building assembly in or between which it is installed.

715.6.7.2 Testing. Fire-resistant joint systems shall be tested in accordance with the requirements of either ASTM E 1966 or UL 2079. Nonsymmetrical wall joint systems shall be tested with both faces exposed to the furnace, and the assigned fire-resistance rating shall be the shortest duration obtained from the two tests. Where evidence is furnished to show that the wall was tested with the least fire-resistant side exposed to the furnace, subject to approval by the building official, the wall need not be subjected to tests from the opposite side.

Exception: For exterior walls with a horizontal fire separation distance greater than 5 feet (1524 mm), the joint system shall be required to be tested for interior fire exposure only.

715.6.7.3 Installation. Fire-resistant joint systems shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to accommodate expected building movements and to resist the passage of flame and hot gases.

715.6.7.4 Exterior curtain wall/floor intersection. Where fire resistance-rated floor or floor/ceiling assemblies are required, voids created at the intersection of the exterior curtain wall assemblies and such floor assemblies shall be sealed with an approved material or system to prevent the interior spread of fire. Such material or systems shall be securely installed and capable of preventing the passage of flame and hot gases sufficient to ignite cotton waste where subjected either to ASTM E 119 time-temperature fire conditions under a minimum positive pressure differential of 0.01 inch (0.254 mm) of water column (2.5 Pa) or installed as tested in accordance with ASTM E 2307 for the time period at least equal to the fire-resistance rating of the floor assembly. Height and fire-resistance requirements for curtain wall spandrels shall comply with Section 706.9.

715.7 Nonfire-resistance-rated fire zone opening protection. Openings in nonfire-resistance rated floor/ceiling construction that is a portion of a fire zone envelope shall be protected in accordance with this section or enclosed in accordance with Sections 715.8.

715.7.1 Penetrating items. Through-membrane or membrane-penetrations in or between floor or floor/ceiling building assemblies shall be protected by an approved flamestop or a listed through-penetration firestop system.

715.7.2 Construction joints. Joints installed in or between floor or floor/ceiling building assemblies shall be protected by an approved flamestop or a listed fire-resistant joint system.

715.7.3 Ducts. Ducts shall be constructed of sheet steel not less than 0.019 inch (0.48 mm) (26 gage) in thickness. The annular space around the duct shall not exceed 1/8 inch (3.1 mm) and shall be filled with cellulose loose-fill, rockwool or slag mineral wool insulation or other approved material. Or, ducts shall be protected with a listed fire damper.

715.7.4 Flamestops. Where required by other provisions of this code, flamestops shall be protected with materials that prevent the passage of flame and hot gases; however, need not comply to ASTM E 119 time-temperature fire conditions.

715.8 Enclosures. Shaft enclosures, exit enclosures and atrium enclosures required by other provisions of this code shall comply with the provisions of this section.

715.8.1 Utility openings. Except as permitted in Section 715.2, openings in floor/ceiling construction for elevators, dumbwaiters, or other hoistways; refuse and laundry chutes and plumbing, electrical, HVAC or other equipment shall be enclosed by a shaft enclosure constructed in accordance with this section. Elevator, dumbwaiter and other hoistway enclosures shall be also be constructed in accordance with Chapter 30.

Exception: A shaft enclosure is not required for approved masonry chimneys, where annular space protection is provided at each floor level in accordance with Section 717.2.5.

A shaft enclosure containing a refuse chute or laundry chute shall not be used for any other purpose and shall originate and terminate in rooms in accordance with Section 715.8.1.2.3.

Exception: Chutes serving, and contained within, a single dwelling unit.

Refuse chutes shall not terminate in an incinerator room.

715.8.1.1 Materials. Shaft enclosures shall be constructed of materials consistent with those permitted for the type of construction of the building in accordance with Section 602.

715.8.1.2 Construction. Shaft enclosures shall be constructed as fire barriers in accordance with Section 708 or horizontal barriers in accordance with Section 711, or both.

715.8.1.2.1 Bottom enclosure. Shaft enclosures that do not extend to the bottom of the building or structure shall comply with one of the following:

1. They shall be enclosed at the lowest level with construction of the same fire-resistance rating as the lowest floor through which the enclosure passes, but not less than the rating required for the shaft enclosure.
2. They shall terminate in a room having a use related to the purpose of the utility opening. The room shall be separated from the remainder of the building by fire barriers constructed in accordance with Section 708 or horizontal assemblies constructed in accordance with Section 711, or both. The fire-resistance rating and protectives shall be at least equal to the protection required for the shaft enclosure.
3. They shall be protected by approved fire dampers installed in accordance with their listing at the lowest floor level within the shaft enclosure.

Exceptions:

1. The fire-resistance-rated room separation is not required, provided there are no openings in the shaft enclosure to the interior of the building except at the bottom. The bottom of the shaft enclosure shall be closed off around the penetrating items with materials permitted by Section 714.3.1 for draftstopping, or the room shall be provided with an approved automatic fire suppression system.
2. A shaft enclosure containing a refuse chute or laundry chute shall not be used for any other purpose and shall terminate in a room protected in accordance with Section 715.8.1.2.3.
3. The fire-resistance-rated room separation and the protection at the bottom of the shaft are not required provided there are no combustibles in the shaft and there are no openings or other penetrations through the shaft enclosure to the interior of the building.

715.8.1.2.2 Top enclosure. Shaft enclosures that do not extend to the underside of the roof sheathing, slab or deck of the building shall be enclosed at the top with a horizontal barrier having the same fire-resistance rating as the topmost floor through which the shaft enclosure passes, but not less than the fire-resistance rating required for the shaft enclosure.

Openings in a horizontal barrier at the top of a shaft enclosure shall be protected with opening protective assemblies in accordance with Sections 715.6.3 through 715.6.6

715.8.1.2.3 Access and termination rooms. Access and termination rooms shall comply with the provisions of this section. Where applicable, termination rooms shall also comply with the provisions of Section 508.2. Access and termination rooms shall be constructed as fire barriers in accordance with Section 708 or horizontal barriers in accordance with Section 711, or both and shall have a fire-resistance ratings of not less 1 hour. Access and termination rooms shall be equipped with an automatic sprinkler system installed in accordance with Section 903.2.10.2.

715.8.1.2.4 Elevator lobbies. An enclosed elevator lobby shall be provided at each floor where an elevator shaft enclosure connects more than three stories. The lobby shall separate the elevator shaft enclosure doors from each floor by fire partitions equal to the fire-resistance rating of the corridor and the required opening protection. Elevator lobbies shall have at least one means of egress complying with Chapter 10 and other provisions within this code.

Exceptions:

1. Enclosed elevator lobbies are not required at the street floor, provided the entire street floor is equipped with an automatic sprinkler system in accordance with Section 903.3.1.1.
2. Elevators not required to be located in a shaft enclosure in accordance with Section 715.2 are not required to have enclosed elevator lobbies.
3. Where additional doors are provided at the hoistway opening in accordance with Section 3002.6. Such doors shall be tested in accordance with UL 1784 without an artificial bottom seal.
4. In other than Group I-2 and I-3 occupancies, and buildings having occupied floors located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access, enclosed elevator lobbies are not required where the building is protected by an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.

5. Smoke partitions shall be permitted in lieu of fire partitions to separate the elevator lobby at each floor where the building is equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.
6. Enclosed elevator lobbies are not required where the elevator hoistway is pressurized in accordance with Section 715.8.1.3.4.1.

715.8.1.2.4.1 Pressurization alternative. Shaft enclosure pressurization is permitted to be provided in lieu of required elevator lobbies. The pressurization system shall comply with this section.

Elevator hoistways shall be pressurized to maintain a minimum positive pressure of 0.04 inches of water (9.96 Pa) and a maximum positive pressure of 0.06 inches of water (14.94 Pa) with respect to adjacent occupied space on all floors. This pressure shall be measured at the midpoint of each hoistway door, with all elevator cars at the floor of recall and all hoistway doors on the floor of recall open and all other hoistway doors closed. The opening and closing of hoistway doors at each level must be demonstrated during this test. The supply air intake shall be from an outside, uncontaminated source located a minimum distance of 20 feet (6096 mm) from any air exhaust system or outlet.

Fan systems located within the building and duct systems that are part of the pressurization system shall be protected with the same fire-resistance rating as required for the elevator shaft enclosure. The fan system shall be equipped with a smoke detector that will automatically shut down the fan system when smoke is detected within the system. A separate fan system shall be used for each elevator hoistway. The supply air intake shall be from an outside, uncontaminated source located a minimum distance of 20 feet (6096 mm) from any air exhaust system or outlet. The supply fan shall either be adjustable with a capacity of at least 1,000 cfm (.4719 m^3/s) per door, or that specified by a registered design professional to meet the requirements of a designed pressurization system. The pressurization system shall be provided with standby power from the same source as other required emergency systems for the building. The shaft enclosure pressurization system shall be activated upon activation of the building fire alarm system or upon activation of the elevator lobby smoke detectors.

715.8.1.3 Fire-resistance rating. Shaft enclosures shall have a fire-resistance rating of not less than 1 hour where connecting less than four stories and not less than 2 hours where connecting four stories or more. Shaft enclosures shall have a fire-resistance rating not less than the floor/ceiling assembly penetrated, but need not exceed 2 hours.

Exception: Where exterior walls serve as a part of a shaft enclosure, such walls shall comply with the requirements of Section 706 for exterior walls and the fire-resistance-rated shaft enclosure requirements shall not apply.

715.8.1.4 Openings. Openings in shaft enclosures shall be protected with opening protective assemblies in accordance with Section 715.5.2.2 for fire barriers.

Exceptions:

1. Fire dampers are not required in shafts where:
   1.1. Steel exhaust subducts are extended at least 22 inches (559 mm) vertically in exhaust shafts, provided there is a continuous airflow upward to the outside; or
   1.2. The penetrations are in parking garage exhaust or supply shafts that are separated from other building shafts by not less than 2-hour fire-resistance-rated construction.
2. In Group B and R occupancies equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1, smoke dampers are not required in shafts where:
   2.1. Kitchen, clothes dryer, bathroom and toilet room exhaust openings are installed with steel exhaust subducts, having a wall thickness of at least 0.019 inch (0.48 mm); and
   2.2. Subducts extend at least 22 inches (559 mm) vertically; and
   2.3. An exhaust fan is installed at the upper terminus of the shaft that is, powered continuously in accordance with Section 909.11, so as to maintain a continuous upward airflow to the outside.
3. Smoke dampers are not required in exhaust or supply shafts in parking garages that are separated from other building shafts by not less than 2-hour fire-resistance-rated construction.
4. Smoke dampers are not required in shafts where ducts are used as part of an approved mechanical smoke control system designed in accordance with Section 909 and where the smoke damper will interfere with the operation of the smoke control system.

Openings other than those necessary for the utility purpose of the shaft shall not be permitted in shaft enclosures.

Openings into refuse or laundry chutes shall not be located in means of egress corridors. Heat-activated closing devices shall be permitted between refuse or laundry chutes and their termination rooms.

715.8.2 Egress openings. Except as permitted in Section 715.2, openings in floor/ceiling construction for interior means of egress stairways and ramps shall be enclosed by an exit enclosure constructed in accordance with this section.

Exceptions:

1. Means of egress stairways as required by Section 410.5.4 are not required to be enclosed.
2. Stairways in Group I-3 occupancies, as provided for in Section 408.3.6, are not required to be enclosed.

715.8.2.1 Materials. Exit enclosures shall be constructed of materials consistent with those permitted for the type of construction of the building in accordance with Section 602.

715.8.2.2 Construction. Exit enclosures shall be constructed as fire barriers in accordance with Section 708 or horizontal barriers in accordance with Section 711, or both.

Exterior walls of an exit enclosure shall comply with the requirements of Section 706. Where nonrated walls or unprotected openings enclose the exterior of the stairway and the walls or openings are exposed by other parts of the building at an angle of less than 180 degrees (3.14 rad), the building exterior walls within 10 feet (3048 mm) horizontally of a nonrated wall or unprotected opening shall have a fire-resistance rating of not less than 1 hour. Openings within such exterior walls shall be protected by opening protectives having a fire protection rating of not less than 3/4 hour. This construction shall extend vertically from the ground to a point 10 feet (3048 mm) above the topmost landing of the stairway or to the roof line, whichever is lower.

715.8.2.3 Fire-resistance rating. Exit enclosures shall have a fire-resistance rating of not less than 1 hour where connecting less than four stories and not less than 2 hours where connecting four stories or more. Exit enclosures shall have a fire-resistance rating not less than the floor/ceiling assembly penetrated, but need not exceed 2 hours.

715.8.2.4 Openings. Openings in exit enclosures shall be protected with opening protective assemblies in accordance with Section 715.5.2.2 for fire barriers.

Openings in exit enclosures shall be limited to those necessary for exit access to the enclosure from normally occupied spaces and for egress from the exit enclosure.

Exceptions:

1. Unprotected exterior openings as permitted in Section 706.8.
2. Service areas as permitted in Section 402.4.6.

Openings into or through an exit enclosure are prohibited except for required exit doors, equipment and ductwork necessary for independent pressurization, sprinkler piping, standpipes, electrical raceways for fire department communication systems and electrical raceways serving the exit enclosure and terminating at a steel box not exceeding 16 square inches (0.010 m^2). Such openings shall be protected in accordance with Section 715.6.5. There shall be no penetrations or communication openings, whether protected or not, between adjacent exit enclosures.

Equipment and ductwork for exit enclosure ventilation shall comply with one of the following items:

1. Such equipment and ductwork shall be located exterior to the building and shall be directly connected to the exit enclosure by ductwork enclosed in construction as required for shafts.
2. Where such equipment and ductwork is located within the exit enclosure, the intake air shall be taken directly from the outdoors and the exhaust air shall be discharged directly to the outdoors, or such air shall be conveyed through ducts enclosed in construction as required for shafts.
3. Where located within the building, such equipment and ductwork shall be separated from the remainder of the building, including other mechanical equipment, with construction as required for shafts.

In each case, openings into the fire-resistance-rated construction shall be limited to those necessary for maintenance and operation and shall be protected by opening protective assemblies in accordance with Section 715.8.1.4 for shaft enclosures.

Exit enclosure ventilation systems shall be independent of other building ventilation systems.

Elevators shall not open into an exit enclosure.

Fire door assemblies in exit enclosures shall comply with Section 715.6.1.2.

715.8.3 Architectural openings. Except as permitted in Section 715.2, openings in floor/ceiling construction for aesthetic or functional purposes, to include escalators, shall be enclosed by an atrium enclosure constructed in accordance with this section.

The floor of the atrium shall not be used for other than low fire hazard uses and only approved materials and decorations in accordance with the *International Fire Code* shall be used in the atrium space.

Exception: The atrium floor area is permitted to be used for any approved use where the individual space is provided with an automatic sprinkler system in accordance with Section 903.3.1.1.

715.8.3.1 Materials. Atrium enclosures shall be constructed of materials consistent with those permitted for the type of construction of the building in accordance with Section 602.

715.8.3.2 Construction. Atrium enclosures shall be constructed as fire barriers in accordance with Section 708 or horizontal barriers in accordance with Section 711, or both.

715.8.3.3 Fire-resistance rating. Atrium enclosures shall have a fire-resistance rating of not less than 1 hour.

Exceptions:

1. A glass wall forming a smoke partition where automatic sprinklers are spaced 6 feet (1829 mm) or less along both sides of the separation wall, or on the room side only if there is not a walkway on the atrium side, and between 4 inches and 12 inches (102 mm and 305 mm) away from the glass and designed so that the entire surface of the glass is wet upon activation of the sprinkler system without obstruction. The glass shall be installed in a gasketed frame so that the framing system deflects without breaking (loading) the glass before the sprinkler system operates.
2. A glass-block wall assembly in accordance with Section 2110 and having a ¾-hour fire protection rating.

715.8.3.4 Openings. Openings in atrium enclosures shall be protected with opening protective assemblies in accordance with Section 715.5.2.2 for fire barriers.

Exception: Fire window assemblies permitted in atrium enclosure walls shall not be limited to a maximum aggregate width of 25 percent of length of the wall.

715.8.3.5 Escalators. An enclosure is not required in a building 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 protected according to Item 1 or 2:

1. Where the area of the floor 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. Where the 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 1/2 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.

715.8.3.6 Unlimited height in stories. An atrium is permitted to be of unlimited height in stories based on the building type of construction when complying with the provisions of this section.

715.8.3.6.1 Automatic sprinkler system. An approved automatic sprinkler system shall be installed throughout the entire building.

Exceptions:

1. That area of a building adjacent to or above the atrium need not be sprinklered provided that portion of the building is separated from the atrium portion by not less than a 2-hour fire-resistance-rated fire barriers constructed in accordance with Section 708 or horizontal barriers constructed in accordance with Section 711, or both.
2. Where the ceiling of the atrium is more than 55 feet (16 764 mm) above the floor, sprinkler protection at the ceiling of the atrium is not required.

715.8.3.6.2 Smoke control system. A smoke control system shall be installed in accordance with Section 909.

715.8.3.6.3 Standby power. Equipment required to provide smoke control shall be connected to a standby power system in accordance with Section 909.11.

715.8.3.6.4 Interior finish. The interior finish of walls and ceilings of the atrium shall not be less than Class B with no reduction in class for sprinkler protection.

715.8.3.6.5 Travel distance. In other than the lowest level of the atrium, where the required means of egress is through the atrium space, the portion of means of egress travel distance within the atrium space shall not exceed 200 feet (60 960 mm).

(Delete Section 716 in its entirety and substitute with new Section 715, see above)

~~SECTION 716~~
~~DUCTS AND AIR TRANSFER OPENINGS~~

(Entire section relocated from Section 717 and renumbered to Section 716)

SECTION ~~717~~ 716
CONCEALED SPACES

(Entire section relocated from Section 718 and renumbered to Section 717)

SECTION ~~718~~ 717
FIRE-RESISTANCE REQUIREMENTS FOR PLASTER

(Entire section relocated from Section 719 and renumbered to Section 718)

SECTION ~~719~~ 718
THERMAL- AND SOUND-INSULATING MATERIALS

Reason: Please do not be intimidated by the length of this proposal. It represents a broad based initiative to improve the *International Building Code* in a very important area: the protection of openings intended to restrict the vertical movement of fire. Prior to technical discussions, I would like to provide a brief history as regards this proposal. Late last year, The Boeing Company approached the ICC Code Technology Committee and shared a concern about how opening and penetration requirements for horizontal assemblies were inconsistent and difficult for users to properly determine. To illustrate the point, it was noted that Section 713.1 would require that joints installed in a fire-resistance rated floor/ceiling assembly be protected with an approved fire-resistant joint system, while Section 1020.1 would permit an open convenience stairway within the same floor/ceiling assembly. 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. The CTC agreed with the concern and appointed a Vertical Openings Study Group to research the matter. The Study Group was constituted of diverse members from the public and private sectors. The Study Group met only twice; however, produced a "clean sheet" discussion draft that completely overhauled many Chapter 7 definitions and technical provisions. It also developed a fire and flame migration strategy that included a compartmentation concept. Current opening protective technical requirements were examined and reorganized in an effort to be more understandable by designers and code enforcement officials alike. A consistent format was created throughout the document to enhance user friendliness. Although a considerable amount of quality work had been accomplished in a relatively short period of time, the Study Group members could not achieve accord on acceptable migration limits. Some Study Group members felt that in light of arguably liberal allowable areas—especially in sprinklered buildings—that more conservative and complete compartmentation was necessary to compensate for current allowable areas. The Study Group decided to slow down and validate the strategy assumptions based on current exceptions to opening protection requirements. Unfortunately, this detailed study would sufficiently delay the project to where it would not be completed prior to the 2007/2008 code development submittal deadline.

Meanwhile, another CTC Study Group (BFP Features) was investigating the subject of allowable heights and areas. That group had met on numerous occasions and appeared to be mired in a comparison of the current IBC allowable heights and areas to those permitted in the legacy or former model codes. At a recent Features meeting in Chicago (August 1-3, 2007), that Study Group decided to take a "clean sheet" approach to the issue and developed a fire flow driven allowable area determination procedure based on a compartmentation concept. There were two primary premises with their approach. First, have low fire flow and allowable area thresholds to as to encourage the installation of an automatic sprinkler system early in design development. Secondly, create some necessary passive redundancy to the active fire protection features by establishing a number of relatively small fire compartments—especially in the so-called "lesser types of

construction." By way of example, current IBC provisions would allow for up to approximately 174,000 square feet of gross Group F-1 area in a sprinklered building of Type IIB construction. Given the lack of inherent fire-resistance rated construction, the only compartmentation is achieved by way of fragmented vertical openings provisions. In comparison, the Type IIB, sprinklered, Group F-1 maximum compartment size would be approximately 32,000 square feet according to the progressive Features' approach. A major difference from current allowable area determination methods is that the "fire compartment" is an amorphous space that can include any number of stories as may be permitted based on the occupancy classification and type of construction under consideration. Under this system, the story-by-story determination of total allowable building area is a thing of the past. During the Features Study Group discussion it was emphasized that there were three volumetric entities: Buildings, fire compartments and fire zones. Buildings define the total allowable area. Fire compartments are generally limited as to individual area. Fire zones are subcompartments within fire compartments and serve to define the vertical migration limits within a given fire compartment. On numerous occasions, the Features Study Group referenced the Vertical Openings Study Group's thinking as completely compatible with their evolving concept and did not attempt to influence the Vertical Openings Group in any way. The BFP Features Study Group intends to submit their progressive allowable area proposal in this code development cycle. Given the close philosophical and technical relationship between the Features' proposal and the Vertical Openings discussion draft, it is imperative that the draft be submitted during the same code development cycle. It is somewhat likely that some of the reservations expressed by the Vertical Openings Study Group members concerning the proposed migration limits might be lessened given the Features group's fairly conservative approach to allowable area determination. It should be noted that although the two proposals would greatly complement each other, they are mutually exclusive can individually stand on their own merit.

As previously mentioned, this proposal is a "clean sheet" document intended to fairly completely overhaul IBC opening protection provisions. There are three major features to the proposal. First, it directly states a fire and flame migration strategy in its Table 713.2. Secondly, it provides a logical format to organize applicable technical provisions that will enhance usability by code practitioners. Lastly, specific technical requirements were reviewed for applicability and compatibility with the migration strategy and each other.

As regards the stated fire and flame migration strategy, this proposal takes a different tack than does the current IBC. Presently, the fundamental IBC premise with respect to the protection of openings in floor/ceiling assemblies—be they fire-resistance rated or nonfire-resistance rated—is that no unprotected openings are permitted. The reality is, however, that there are numerous exceptions that permit unprotected openings in floor/ceiling assemblies based on any one of a number of variables. The point being that these exceptions, become the rule and collectively define an implied vertical migration strategy. This proposal provides for an incremental migration strategy based on the collective intent of the multitude of current exceptions. The stated strategy is that for other than Group H and I occupancies, a two-story migration of fire and flame is acceptable. 2006 Sections 707.2, Exception 7 and 1020.1, Exceptions 1, 8 and 9, among others, serve as the precedent for this approach. It should be noted that the basic fire zone philosophy is that fire zone boundaries (both vertical and horizontal) have complete protection of openings. Within fire zones, the only protection of openings required for floor/ceiling assemblies would be those necessary to maintain the fire resistive integrity of a rated horizontal assembly. The lack of coordination between current opening protective requirements results in a "Swiss cheese" migration strategy. This proposal promotes an "all or nothing" philosophy that provides for a logical, predicable and dependable migration boundary.

It must also be understood that fire zones intended to restrict the upward movement of fire or flame, can occur in buildings of both rated and nonrated construction types. While the fire compartment provides for a fire-resistance rated boundary, regardless of the type of construction, fire zones within fire compartments are constructed with building assemblies that are consistent with the building type of construction. As previously mentioned, the fire zone achieves its integrity through the protection of openings consistent with the inherent fire-resistance rating requirements for the building floor/ceiling assemblies. In fire-resistance rated construction, fire zone horizontal boundaries are protected by rated enclosures and/or listed opening protective assemblies. Within a fire zone in a rated building, no enclosures would be required and the only openings required to be protected would be those necessary to maintain the fire resistive integrity of the horizontal assembly itself. In buildings of nonrated construction, the fire zone horizontal boundaries would continue to be nonfire-resistance rated; however, openings would be required to be protected by rated enclosures and/or generic flamestopping methods. Within a fire zone in a nonrated building, there are no opening protection requirements.

The two-story migration limit is extended to three stories where the building is equipped throughout with an automatic sprinkler system. Numerous sprinkler progressions and current Section 707.2, Exception 2 serve as a precedent for this provision. It should be noted that although no inherent opening protection is required for the two floor/ceiling assemblies within a three story envelope—to include exit enclosures—each fire zone having a level more than two stories above grade plane is required to have at least one exit enclosure leading to the exterior of the building or all points of the fire zone have to be within 300 feet of an exit enclosure for fire department access and staging purposes. An exit enclosure is a unique building feature. It can actually serve three distinct purposes: One, it can serve to isolate one story from another for fire migration purposes. Hence, the term, "stair shaft." Two, it can serve as an exit component which provides for a protected, and potentially unlimited length path of travel. Three, an exit enclosure can serve as a protected area for fire department access and operations. During the first Vertical Openings Study Group meeting, it was decided that all openings and penetrations should be treated equally because, "a hole in the floor is a hole in the floor." Therefore, for fire migration purposes, an exit enclosure (as well as a shaft enclosure or atrium enclosure) would be required only at fire zone boundaries. From a means of egress perspective, an exit enclosure is an exit component similar to an exit passageway or horizontal exit. That is, they are incorporated into the building design as necessary to satisfy one or more means of egress design requirements—more than likely, travel distance limitations. Since a number of intercommunicating floors are unacceptable from a fire fighting perspective, an exit enclosure is mandated for fire zones above the second story.

Other than Group H or I occupancies are permitted to have four intercommunicating floor levels provided the building is provided with a sprinkler system and the fire zone is protected by a mechanical smoke control system. Section 404 atrium provisions serve as the precedent for this migration limit.

As previously suggested, the fire and flame migration limits established in this proposal are founded on current migration provisions and are positively stated in a single table and represent a logical progression of passive and active building fire protection features.

Once a migration strategy was developed, an editorial format was created to organize various technical provisions so as to support the adopted philosophy. Given the "hole is a hole—opening is an opening" methodology, it was determined that a single section (Section 713) would contain all opening protection provisions. Accordingly, Sections 404 and 707 have been deleted in their entirety and applicable provisions incorporated in context into proposed Section 713. Exit enclosure construction requirements have been relocated from Section 1020 to Section 713. All enclosure protection requirements have been consolidated in a single location. It is interesting to note that of the 22 exceptions formerly contained in Sections 707 and 1020, 21 were eliminated due to the formal establishment of migration limits as prescribed in proposed Table 713.2.

Also, a number of key definitions were created or modified to support this system. Perhaps the most important is that the term "opening" is defined for the first time. It simply states that any breach for virtually any purpose is treated as an opening. Where the current IBC differentiates between openings and penetrations, the proposed section does not (a hole is an opening). The fundamental premise is that where openings are required to be protected, they will be either enclosed by physical construction or protected by an opening protective assembly in rated construction or enclosed or flamestopped (another new definition) in nonrated construction.

With respect to opening protective assemblies, only seven are recognized as those seven are the only formally tested protectives. They are: fire door assemblies, fire window assemblies, fire dampers, ceiling dampers, smoke dampers, through-penetration fire stops and

fire-resistant joint systems. Accordingly, opening protection goes to remedy. If the "hole" in a fire zone boundary can be mitigated by a listed opening protective assembly, migration requirements are satisfied. If not, the "hole" needs to be enclosed in accordance with Section 713.8. Additionally, each of the opening protective assembly sections has been subdivided with a consistent format: fire protection rating, testing, labeling and installation. All applicable technical requirements have been properly located within this editorial structure. This typical format allows for the objective comparison of various opening protective assembly requirements.

Another new definition worth noting is, "horizontal barrier." Currently, there are a number of vertical assemblies intended to address various structural or confinement requirements. On the horizontal plane, the "horizontal assembly" is presently the only fire-resistance rated assembly of choice. The proposed horizontal barrier is comparable to the fire barrier with openings required to be protected while the horizontal assembly is more based on type of construction requirements than fire confinement concerns. The two types of fire-resistance rated horizontal construction simplify opening protection requirement determination.

Specific technical requirements for the various enclosure and opening protective assembly options are very similar to current provisions. To account for all detailed technical provisions would take a number of pages. If one is concerned with a specific provision, it is suggested that it be copied from the current code and then entered as a search or find function in the proposed text. With this "clean sheet" document, there are countless changes made for the sake of editorial and technical continuity and user accommodation. It would be virtually impossible to address each and every change. The major points have been addressed. Hopefully, the more subtle details will appeal to common sense.

In summary, it is recognized that this is a very lengthy and comprehensive proposal submitted in a process that lends itself to incremental improvement. If the *International Building Code* is to be significantly and functionally improved, it is necessary to be more ambitious in the scrutiny of major subject areas. This proposal is the result of input by a number of nationally recognized code experts, although those individuals do not necessarily endorse this proposal at this time. Almost all concerned recognize that the current opening protective requirements are technically inconsistent and, in total, probably support no rational fire migration strategy. Opening protective technical requirements are presently difficult to determine and result in varying interpretations and applications. Similar to current code provisions, this proposal is certainly an imperfect document; however, it represents a significant improvement over those current code provisions and will serve as a foundation for subsequent revisions that will necessarily be in context. This proposal in combination with the BFP Features Study Group's similarly progressive allowable area determination proposal will significantly improve the schematic provisions of the International Building Code. Please view these proposals objectively and offer constructive vs. destructive criticism. The implementation of these concepts will greatly improve the effectiveness and usability of the IBC.

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

PART II – IBC FIRE SAFETY
Committee Action: Disapproved

Committee Reason: The committee understands that the ICC Code Technology Committee (CTC) is currently studying the reorganization of Chapter 7. The efforts of this proponent should be coordinated with the efforts of the CTC. Further, the committee felt that the technical changes within the proposed Table 715.2 required further technical justification.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

David Collins, The American Institute of Architects, representing himself, requests Approved as Modified by this public comment.

Modify proposal as follows:

702.1 Definitions. (Definitions not shown to remain unchanged)

OPENING. A breach in a building element ~~assembly~~ that is necessary for utility, egress or architectural purposes.

~~**BUILDING ASSEMBLY.** An element of building construction as indicated in Table 601. Building assemblies are comprised of one or more construction components.~~

FIRE-RESISTANCE RATING. The period of time that a building element ~~assembly~~ maintains the ability to confine a fire, continues to perform a given structural function, or both, as determined by the tests, or the methods based on tests, prescribed in Section 703.

HORIZONTAL ASSEMBLY. A fire-resistance-rated floor or roof building element ~~assembly~~ based on building type of construction requirements and which is designed to perform a given structural function.

HORIZONTAL BARRIER. A fire-resistance-rated floor building element ~~assembly~~ wherein openings are protected and which is designed to maintain the ability to confine a fire and to perform a given structural function.

SHAFT ENCLOSURE. An enclosure for an opening that serves utility purposes such as, accommodating electrical, mechanical. plumbing equipment and elevator hoistways.

EXIT ENCLOSURE. An enclosure for an opening that serves means of egress or human movement purposes such as stairways and ramps. An exit component that is separated from other interior spaces of a building or structure by fire-resistance rated construction and opening protectives, and provides for a protected path of egress travel in a vertical or horizontal direction to the exit discharge or the public way.

ATRIUM ENCLOSURE. An enclosure for an opening that serves functional or aesthetic purposes such as atria, escalators and air transfer openings.

AIR TRANSFER OPENING. An unducted opening designed to allow the movement of environmental air between two contiguous spaces.

FIRESTOP. A listed material, device or construction installed to maintain the fire-resistance rating required for a building element ~~assembly~~.

FLAMESTOP. A nonlisted material, device or construction installed to resist the free passage of flame and products of combustion in nonfire-resistance rated building elements ~~assemblies~~. Examples of flamestopping methods include, but are not limited to, filling the annular space around a penetrating item with cellulose loose-fill, rockwool or slag mineral wool insulation or other approved material.

JOINT. The linear opening in or between adjacent fire-resistance rated building elements ~~assemblies~~ that is designed to allow for independent movement of the building in any plane.

FIREBLOCKING. Building materials installed to resist the free passage of flame to other areas of the building through concealed spaces in buildings of combustible construction.

DRAFTBLOCK ~~**DRAFTSTOP**~~**.** A material~~, device~~ or construction installed to restrict the movement of air within open spaces of concealed areas ~~of a~~ in buildings of combustible construction, such as crawl spaces, floor/ceiling assemblies, roof/ceiling assemblies and attics.

FIRE AREA. The aggregate floor area enclosed and bounded by fire walls, fire barriers, horizontal barriers or exterior walls of a building.

FIRE ZONE. A fire-resistance rated or nonfire-resistance rated envelope of building construction intended to restrict the spread of fire or flame, and in which, continuity is maintained.

OPENING PROTECTIVE ASSEMBLY. A listed device installed in a building element ~~assembly~~ that is designed to confine a fire or to resist the spread of fire for a prescribed period of time. Opening protective assemblies include fire door assemblies, fire window assemblies, fire dampers, ceiling dampers, smoke dampers, through-penetration fire stops and fire-resistant joint systems.

SECTION 704
PRESCRIPTIVE FIRE RESISTANCE

SECTION 705
CALCULATED FIRE RESISTANCE

SECTION 706
EXTERIOR WALLS

706.8.2 (Supp) Protected openings. Where openings are required to be protected, fire doors and fire shutters shall comply with Section 715.6.1 and fire window assemblies shall comply with Section 715.6.2.

Exception: Opening protective assemblies are not required where the building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 and the water curtain using automatic sprinklers approved for that use.

706.9 (Supp) Joints. Joints made in or between exterior walls required by this section to have a fire-resistance rating shall comply with Section 715.6.7.

Exception: Joints in exterior walls that are permitted to have unprotected.

706.9.1 (Supp) Voids. The void created at the intersection of a floor/ceiling assembly and an exterior curtain wall assembly shall be protected in accordance with Section 715.6.7.

706.10 (Supp) Ducts. Penetration by air ducts in fire-resistance rated exterior walls required to have protected openings shall be protected in accordance with Section 715.6.3.

Exception: Foundation vents installed in accordance with this code are permitted.

SECTION 707
FIRE WALLS

707.8 Openings. (Supp) Each opening through a fire wall shall be protected in accordance with Section 715.5.2.2 and shall not exceed 156 square feet (15 m^2). The aggregate width of openings at any floor level shall not exceed 25 percent of the length of the wall.

Exceptions:

1. Openings are not permitted in party walls constructed in accordance with Section ~~705.1.1~~ 707.1.1.
2. Openings shall not be limited to 156 square feet (15 m^2) where both buildings are equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.

SECTION 708
FIRE BARRIERS

708.7 Openings. (Supp) Openings in a fire barrier shall be protected in accordance with Section 715.5.2.2. Openings shall be limited to a maximum aggregate width of 25 percent of the length of the wall, and the maximum area of any single opening shall not exceed 156 square feet (15 m^2).

Exceptions:

1. Openings shall not be limited to 156 square feet (15 m^2) where adjoining floor areas are equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.
2. Openings shall not be limited to 156 square feet (15 m^2) or an aggregate width of 25 percent of the length of the wall where the opening protective is a fire door serving an exit enclosure.
3. Openings shall not be limited to 156 square feet (15 m^2) or an aggregate width of 25 percent of the length of the wall where the opening protective assembly has been tested in accordance with ASTM E 119 or UL 263 and has a minimum fire-resistance rating not less than the fire-resistance rating of the wall.
4. Fire window assemblies permitted in atrium separation walls shall not be limited to a maximum aggregate width of 25 percent of length of the wall.

SECTION 709
FIRE PARTITIONS

709.6 Openings. Openings in a fire partition shall be protected in accordance with Section 715.5.2.2.

SECTION 710
SMOKE BARRIERS

710.5 Openings. Openings in a smoke barrier shall be protected in accordance with Section ~~715.5.2.2~~ 715.5.2.3.

Exception: In Group I-2, where doors are installed across corridors, a pair of opposite-swinging doors without a center mullion shall be installed having vision panels with fire-protection-rated glazing materials in fire-protection-rated frames, the area of which shall not exceed that tested. The doors shall be close fitting within operational tolerances, and shall not have undercuts, louvers or grilles. The doors shall have head and jamb stops, astragals or rabbets at meeting edges and shall be automatic closing by smoke detection in accordance with Section 715.6.1.5.1~~4.7.3~~. Positive-latching devices are not required.

SECTION 711
SMOKE PARTITIONS

711.5 Openings. Openings in a smoke partition shall be protected in accordance with Section 715.5.2.4.

~~**711.5.3 Self- or automatic-closing doors.** Where required elsewhere in the code, doors in smoke partitions shall be self- or automatic closing by smoke detection in accordance with Section 715.6.1.5.1.~~

~~**711.7 Ducts and air transfer openings.** The space around a duct penetrating a smoke partition shall be filled with an approved material to limit the free passage of smoke. Air transfer openings in smoke partitions shall be provided with a smoke damper complying with Section 716.3.2.~~

~~**Exception:** Where the installation of a smoke damper will interfere with the operation of a required smoke control system in accordance with Section 909, approved alternative protection shall be utilized.~~

SECTION 712
HORIZONTAL ASSEMBLIES

712.1 General. (Supp) Floor and roof assemblies required to have a fire-resistance rating shall comply with this section.

712.2 Materials. The floor and roof assemblies shall be constructed of materials consistent with those permitted ~~by~~ for the ~~building~~ type of construction of the building in accordance with Section 602.

712.3 Fire-resistance rating. (Supp) Horizontal assemblies shall have a fire-resistance rating not be less than that required by Table 601 based on the building type of construction. 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, 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 419.3.
3. Horizontal assemblies at smoke barriers constructed in accordance with Section 710.

712.3.1 Ceiling panels. Where the weight of lay-in ceiling panels used as part of a horizontal assembly is not adequate to resist an upward force of 1 lb/ft.^{2} (48 Pa), wire or other approved devices shall be installed above the panels to prevent vertical displacement under such upward force.

712.3.2 Access doors. (Supp) Access doors shall be permitted in ceilings of horizontal assemblies provided such doors are tested in accordance with ASTM E 119 or UL 263 as horizontal assemblies and labeled by an approved agency for such purpose.

712.3.3 Unusable space. In 1-hour fire-resistance-rated floor construction, the ceiling membrane is not required to be installed over unusable crawl spaces. In 1-hour fire-resistance-rated roof construction, the floor membrane is not required to be installed where unusable attic space occurs above.

712.4 Openings. (Supp) Openings in horizontal assemblies shall be protected in accordance with Section 715.3.2**.** 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 construction 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, 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 419.3.~~
~~3. Horizontal assemblies at smoke barriers constructed in accordance with Section 709.~~

SECTION 713
HORIZONTAL BARRIERS

713.1 General. Where required by other provisions of this code, horizontal barriers shall comply with this section.

713.2 Materials. Horizontal barriers shall be constructed of materials consistent with those permitted for the type of construction of the building in accordance with Section 602.

713.3 Fire-resistance rating. Horizontal barriers shall have a fire-resistance rating not less than that required by Table 601 based on the building type of construction and as required elsewhere in this code. Construction supporting a horizontal barrier shall be protected so as to provide the required fire-resistance rating of such horizontal barrier.

Horizontal barriers separating dwelling units in the same building and horizontal barriers separating sleeping units in the same building shall be a minimum of 1-hour fire-resistance-rated construction.

Exception: Dwelling unit and sleeping unit separations in buildings of Types IIB, IIIB, and VB construction shall have fire-resistance ratings of not less than 1/2 hour in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

713.3.1 Ceiling panels. Where the weight of lay-in ceiling panels used as part of a horizontal barrier is not adequate to resist an upward force of 1 lb/ft.2 (48 Pa), wire or other approved devices shall be installed above the panels to prevent vertical displacement under such upward force.

713.3.2 Access doors. Access doors shall be permitted in ceilings of horizontal barriers provided such doors are tested in accordance with ASTM E 119 or UL 263 as horizontal assemblies and labeled by an approved agency for such purpose.

713.3.3 Unusable space. In 1-hour fire-resistance-rated floor construction, the ceiling membrane is not required to be installed over unusable crawl spaces. In 1-hour fire-resistance-rated roof construction, the floor membrane is not required to be installed where unusable attic space occurs above.

713.4 Openings. Openings in horizontal barriers shall be protected in accordance with Section ~~713.3.3~~ 715.3.3.

SECTION 714
FIRE-RESISTANCE RATING OF STRUCTURAL MEMBERS

SECTION 715
PROTECTION OF OPENINGS

715.1 General. Openings in building elements ~~assemblies~~ shall be protected in accordance with the provisions of this section.

715.1.1 Unconcealed openings. Where required to be protected, openings that are not concealed within building construction shall be enclosed by fire-resistance rated construction or protected by an opening protective assembly.

Exceptions:

1. Openings totally within an individual dwelling unit and connecting four stories or less.
2. Openings in Group S-2 open and enclosed parking garages that serve only the parking structure.
3. Openings in Group A-5 occupancies that are essentially open to the outdoors.

715.1.2 Concealed openings. Openings that are concealed within building construction shall be protected in accordance with Section ~~714~~ 716.

Exception: Openings within enclosures constructed in accordance with Section 715.8.

715.2 Fire zones. Fire zones shall include those contiguous building areas ~~not~~ separated by fire walls, fire barriers, exterior walls or horizontal barriers. ~~Areas so separated shall be considered separate fire zones. Enclosures in accordance with Section 713.8 and exit passageways in accordance with Section 1021 shall not be considered separate fire zones; however, the protection of openings shall be required between such areas and the fire zones in which they are located.~~ Areas isolated by fire partitions shall not be considered separate fire zones~~; however, the protection of openings shall be required between such areas and the fire zones in which they are located~~.

Exceptions:

1. In buildings of Type IIB, IIIB or VB construction, such contiguous building areas shall be permitted to be separated by nonfire-resistance rated building elements wherein openings are protected in accordance with the provisions of Section 715.7.
2. Enclosures constructed in accordance with Section 715.8 and exit passageways constructed in accordance with Section 1021 shall not be considered separate fire zones; however, the protection of openings shall be required between such areas and the fire zones in which they are located.

Fire zones shall be permitted to extend vertically and include intercommunicating stories in accordance with Table 715.2. Except as required in Section 715.3.2, openings that are not concealed within building construction and serve the indicated number of adjacent stories are not required to be enclosed or protected provided such interconnected stories do not communicate with additional stories, other fire zones or tenant spaces in a fire event.

Exceptions: ~~Fire zones more than two stories above grade plane shall be served by at least one exit enclosure that extends to the exterior of the building or all points of the fire zone shall be within 300 feet (91,440 mm) of an exit enclosure. The primary purpose of such exit enclosure is to provide protected fire department access to upper building levels. Exit enclosures provided to satisfy means of egress design requirements shall also qualify as fire department access enclosures.~~

1. In other than Group H occupancies, unlimited intercommunicating stories are permitted where buildings comply with the provisions of Section 715.8.3.
2. A shaft enclosure is not required in a building 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 protected according to Item 2.1 or 2.2:
   - 2.1. Where the area of the floor 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. Where the 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. Noncombustible items penetrating building assemblies without a required fire-resistance rating that connect not more than three stories are permitted, provided that the annular space is protected by an approved flamestop or a listed through-penetration firestop system.
4. Duct systems constructed of approved materials in accordance with the International Mechanical Code that penetrate building assemblies without a required fire-resistance rating that connect not more than three stories are permitted, provided that the annular space is protected by an approved flamestop or a listed through-penetration firestop system.
5. Joints installed in or between walls, floor or floor/ceiling and roofs or roof/ceiling building assemblies without a required fire-resistance rating.
6. A duct is permitted to penetrate three floors or less without a fire damper at each floor, provided it meets all of the following requirements:
   - 6.1. The duct shall be contained and located within the cavity of a wall and shall be constructed of steel not less than 0.019 inch (0.48 mm) (26 gage) in thickness.
   - 6.2. The duct shall open into only one dwelling or sleeping unit and the duct system shall be continuous from the unit to the exterior of the building.
   - 6.3. The duct shall not exceed 4-inch (102 mm) nominal diameter and the total area of such ducts shall not exceed 100 square inches (0.065 m2) in any 100 square feet (9.3 m^2) of floor area.
   - 6.4. The annular space around the duct is protected with materials that prevent the passage of flame and hot gases sufficient to ignite cotton waste where subjected to ASTM E 119 or UL 263 time-temperature conditions under a minimum positive pressure differential of 0.01 inch (2.49 Pa) of water at the location of the penetration for the time period equivalent to the fire-resistance rating of the construction penetrated.
   - 6.5. Grille openings located in a ceiling of a fire-resistance- rated floor/ceiling or roof/ceiling assembly shall be protected with a listed ceiling radiation damper installed in accordance with Section 715.6.4.

~~The total height of communicating stories within a given fire zone shall not exceed 50 feet.~~ Stories, as used in this section, shall include basements, but not include balconies in Group A occupancies or mezzanines that comply with Section 505.

TABLE 715.2
ALLOWED NUMBER OF INTERCOMMUNICATING STORIES WITHIN FIRE ZONES~~a~~

Occupancy	Number of Stories	~~Sprinkler System~~[b]	~~Mechanical Smoke Control~~[a,c]
Group A, B, E, F, M, R, S or U	2	~~3~~[b]	~~4~~[c]
Group H or I	1[a]	~~1~~	~~1~~

a. Atrium openings in accordance with the provisions of Section 715.8.3 are permitted in Group I occupancies. ~~In other than Group H occupancies, unlimited intercommunicating stories are permitted where buildings comply with the provisions of Section 715.8.3.6.~~

~~b. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.~~

~~c. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 and a mechanical smoke control system in accordance with Section 909 within the applicable fire zone.~~

715.2.1 Fire-resistance rating. The fire-resistance rating of floor or floor/ceiling construction that is a portion of a fire zone shall not be less than that indicated in Table 601 based on the building type of construction. Structural members supporting floor, floor/ceiling construction that is a portion of a fire zone shall be protected so as to provide the required fire-resistance rating of the supported construction.

715.3 Floor, floor/ceiling construction. Openings in floors or floor/ceiling construction shall be protected in accordance with the provisions of this section. ~~Structural members supporting floor, floor/ceiling construction that is a portion of a fire zone shall be protected consistent with the supported construction.~~ Flexible air ducts ~~and air connectors~~ shall not pass through any fire-resistance-rated assembly. Flexible air connectors shall not pass through any floor.

715.3.1 Nonfire-resistance rated construction ~~Building assemblies~~. Openings in nonfire-resistance rated floor/ceiling construction that is not a portion of a fire zone envelope shall not require protection unless required by other provisions of this code. Openings in nonfire-resistance rated floor/ceiling construction that is a portion of a fire zone envelope shall be protected in accordance with Section 715.7 or enclosed in accordance with Section 715.8.

715.3.2 Horizontal assemblies. ~~Openings~~ Penetrations, joints and ducts in horizontal assemblies that are not a portion of a fire zone envelope shall be protected in accordance with Sections 715.6.3 through 715.6.7 ~~not require protection other than as necessary to maintain the integrity of the assembly itself unless required by other provisions of this code~~.

Exception: Unless required by other provisions of this code, opening protective assemblies are not required where the fire resistive integrity of the horizontal assembly is maintained.

Other openings in horizontal assemblies are not required to be enclosed provided that interconnected stories do not communicate with additional stories, other fire zones or tenant spaces in a fire event.

Ducts and air transfer openings constructed of approved materials in accordance with the International Mechanical Code that penetrate the ceiling membrane of a fire-resistance-rated horizontal assembly shall be protected with one of the following:

1. A shaft enclosure in accordance with Section 715.8.1.
2. A listed ceiling radiation damper installed at the ceiling line where a duct penetrates the ceiling of a fire-resistance-rated floor/ceiling or roof/ceiling assembly.
3. A listed ceiling radiation damper installed at the ceiling line where a diffuser with no duct attached penetrates the ceiling of a fire-resistance-rated horizontal assembly.

~~Openings in horizontal assemblies that are a portion of a fire zone envelope shall be protected with opening protective assemblies in accordance with Sections 715.6.1 through 715.6.6 or enclosed in accordance with Sections 715.8.~~

715.3.3 Horizontal barriers. Openings in horizontal barriers shall be protected with opening protective assemblies in accordance with Sections 715.6.3~~4~~ through 715.6.7~~6~~ or enclosed in accordance with Section 715.8.

Ducts and air transfer openings constructed of approved materials in accordance with the International Mechanical Code that penetrate the ceiling membrane of a fire-resistance-rated horizontal barrier shall be protected with one of the following:

1. A shaft enclosure in accordance with Section 715.8.1.
2. A listed ceiling radiation damper installed at the ceiling line where a duct penetrates the ceiling of a fire-resistance-rated floor/ceiling or roof/ceiling assembly.
3. A listed ceiling radiation damper installed at the ceiling line where a diffuser with no duct attached penetrates the ceiling of a fire-resistance-rated horizontal barrier.

715.4 Roof, roof/ceiling construction. Openings in roofs or roof/ceiling construction shall be protected in accordance with the provisions of this section. Flexible air ducts ~~and air connectors~~ shall not pass through any fire-resistance-rated assembly. Flexible air connectors shall not pass through any ceiling.

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 construction required to be fire-resistance rated in accordance with Section 704.10.

715.5 Wall construction. Openings in fire-resistance rated wall construction shall comply with the provisions of this section. Flexible air ducts ~~and air connectors~~ shall not pass through any fire-resistance-rated assembly. Flexible air connectors shall not pass through any wall.

715.5.1 Exterior walls. Openings in bearing and nonbearing exterior walls shall be protected in accordance with Section 706.8.

715.5.2 Interior walls. Openings in bearing and nonbearing interior walls shall be protected in accordance with the provisions of this section.

715.5.2.1 Nonfire-resistance rated construction. Openings in nonfire-resistance rated interior wall construction shall not require protection.

715.5.2.2 ~~715.5.2.1~~ Fire-resistance rated building elements ~~assemblies~~. Openings in interior bearing walls required to have a fire-resistance rating by Table 601 shall not require protection other than as necessary to maintain the integrity of the assembly itself unless required by other provisions of this code.

715.5.2.3 ~~715.5.2.2~~ Fire walls, fire barriers and fire partitions. Openings in fire walls, fire barriers and fire partitions shall be protected in accordance with the provisions this section.

715.5.2.3.1 ~~715.5.2.2.1~~ Doors. Door openings shall be protected in accordance with Section 715.6.1.

715.5.2.3.2 ~~715.5.2.2.2~~ Windows. Window openings shall be protected in accordance with Section 715.6.2. Window openings in fire walls shall not be permitted.

Exceptions:

1. Fire-resistance-rated glazing tested as part of a fire-resistance-rated wall assembly in accordance with ASTM E 119 or UL 263 and labeled in accordance with Section 703.5 shall be permitted in ~~fire doors and~~ fire window assemblies in accordance with their listings.
2. Glazing protected by fire door assemblies.

715.5.2.3.3 ~~715.5.2.2.3~~ Ducts. Duct and air transfer openings shall be protected in accordance with Sections 715.6.3, 715.6.4 and 715.6.5.

Exceptions:

1. In other than Group H occupancies, fire dampers are not required in fire barriers where any of the following apply:

1. In other than Group H occupancies, in ducted HVAC systems where fire barriers have a required fire-resistance rating of 1 hour or less and are in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2. For the purposes of this exception, a ducted HVAC system shall be a duct system for conveying supply, return or exhaust air as part of the structure's HVAC system. Such a duct system shall be constructed of sheet steel not less than 26 gage thickness and shall be continuous from the air-handling appliance or equipment to the air outlet and inlet terminals.
2. In other than Group H occupancies, fire dampers are not required in fire partitions where any of the following apply:
   2.1. The fire partitions are tenant separation or corridor walls in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 and the duct is protected as a through-penetration in accordance with Section 715.6.6~~5~~.
   2.2. Tenant partitions in covered mall buildings where the fire partitions are not required to extend to the underside of the floor or roof deck above by other provisions of this code.
   2.3. The duct system is constructed of approved materials in accordance with the *International Mechanical Code* and the duct penetrating the fire partition complies with all of the following requirements:
      2.3.1. The duct shall not exceed 100 square inches (0.06 m^2).
      2.3.2. The duct shall be constructed of steel a minimum of 0.0217 inch (0.55 mm) in thickness.
      2.3.3. The duct shall not have openings that communicate between the corridor and adjacent spaces or rooms.
      2.3.4. The duct shall be installed above a ceiling.
      2.3.5. The duct shall not terminate at a wall register in the fire-resistance-rated wall.
      2.3.6. A minimum 12-inch-long (305 mm) by 0.060-inch-thick (1.52 mm) steel sleeve shall be centered in each duct opening. The sleeve shall be secured to both sides of the wall and all four sides of the sleeve with minimum 1½-inch by 1½-inch by 0.060-inch (38 mm by 38 mm by 1.52 mm) steel retaining angles. The retaining angles shall be secured to the sleeve and the wall with No. 10 (M5) screws. The annular space between the steel sleeve and the wall opening shall be filled with mineral wool batting on all sides.

715.5.2.3.4 ~~715.5.2.2.4~~ Penetrations. Through-penetrations and membrane-penetrations shall be protected in accordance with Section 715.6.6 ~~715.6.5~~.

715.5.2.3.5 ~~715.5.2.2.5~~ Joints. Joints in shall be protected in accordance with Section 715.6.7 ~~715.6.6~~.

715.5.2.4 Smoke barriers and smoke partitions. Openings in smoke barriers and smoke partitions shall be protected in accordance with the provisions this section.

715.5.2.4.1 Doors. Door openings in smoke barriers shall be protected in accordance with Section 715.6.1.

Where required elsewhere in the code, doors in smoke partitions shall be self- or automatic closing by smoke detection in accordance with Section 715.6.1.5.1.

Where required elsewhere in the code, doors in smoke partitions shall be tested in accordance with UL 1784 with an artificial bottom seal installed across the full width of the bottom of the door assembly during the test. The air leakage rate of the door assembly shall not exceed 3 cubic feet per minute per square foot [$ft^3/(min \times ft^2)$]($0.015424\ m^3/s \times m^2$) of door opening at 0.10 inch (24.9Pa) of water for both the ambient temperature test and the elevated temperature exposure test.

Doors in smoke partitions shall not include louvers.

715.5.2.4.2 Windows. Window openings in smoke barriers shall be protected in accordance with Section 715.6.2.

Windows in smoke partitions shall be sealed to resist the free passage of smoke or be automatic-closing upon detection of smoke.

715.5.2.4.3 Ducts. Duct and air transfer openings in smoke barriers shall be protected in accordance with Sections 715.6.3, 715.6.4 and 715.6.5.

The space around a duct penetrating a smoke partition shall be filled with an approved flamestop. Air transfer openings in smoke partitions shall be provided with a smoke damper complying with Section 715.6.5.

Exception: Where the installation of a smoke damper will interfere with the operation of a required smoke control system in accordance with Section 909, approved alternative protection shall be utilized.

715.5.2.4.4 Penetrations. Through-penetrations and membrane-penetrations in smoke barriers shall be protected in accordance with Section 715.6.6.

The space around penetrating itms in smoke partitions shall be filled with an approved material to limit the free passage of smoke.

715.5.2.4.5 Joints. Joints in smoke barriers shall be protected in accordance with Section 715.6.7.

Joints in smoke partitions shall be filled with an approved material to limit the free passage of smoke.

715.6 Opening protective assemblies. Opening protective assemblies required by other provisions of this code shall comply with the provisions of this section.

~~The application of any of the alternative methods listed in this section shall be based on the fire exposure and acceptance criteria specified in NFPA 252, NFPA 257 or UL 9. The required fire resistance of an opening protective shall be permitted to be established by any of the following methods or procedures:~~

~~1. Designs documented in approved sources.~~
~~2. Calculations performed in an approved manner.~~
~~3. Engineering analysis based on a comparison of opening protective designs having fire protection ratings as determined by the test procedures set forth in NFPA 252, NFPA 257 or UL 9.~~
~~4. Alternative protection methods as allowed by Section 104.11.~~

~~The application of any of the alternative methods listed in this section shall be based on the fire exposure and acceptance criteria specified in referenced test standards.~~

715.6.1 Fire door and shutter assemblies. Fire door assemblies shall comply with the provisions of this section. Fire door assemblies shall be constructed of any material or assembly of materials that conforms to the test requirements of Section ~~715.6.1.1, 1.3~~ 715.6.1.2. Fire shutters shall comply with the provisions for fire doors.

Exceptions:

1. Labeled fire door assemblies that conform to the requirements of this section or UL 10A, UL 14B and UL 14C for tin-clad fire door assemblies.
2. Floor fire door assemblies in accordance with this section.

The application of any of the alternative methods listed in this section shall be based on the fire exposure and acceptance criteria specified in NFPA 252, UL 10B or UL 10C. The required fire resistance of an opening protective shall be permitted to be established by any of the following methods or procedures:

1. Designs documented in approved sources.
2. Calculations performed in an approved manner.
3. Engineering analysis based on a comparison of opening protective designs having fire-protection ratings as determined by the test procedures set forth in NFPA 252, UL 10B or UL 10C.
4. Alternative protection methods as allowed by Section 104.11.

715.6.1.1 Fire protection rating. Fire door assemblies shall have the fire protection rating indicated in Table 715.6.1.

Exceptions:

1. Corridor door assemblies in Group I-2 occupancies shall be in accordance with Section 407.3.1.
2. Unprotected openings shall be permitted for corridors in multitheater complexes where each motion picture auditorium has at least one-half of its required exit or exit access doorways opening directly to the exterior or into an exit passageway.
3. Floor fire door assemblies used to protect openings in horizontal assemblies and horizontal barriers shall have a fire-resistance rating not less than the assembly being penetrated.

TABLE 715.6.1
FIRE DOOR ~~AND~~ FIRE ~~SHUTTER~~ PROTECTION RATINGS

TYPE OF ASSEMBLY	REQUIRED ASSEMBLY RATING (hours)	MINIMUM FIRE DOOR ~~AND~~ FIRE ~~SHUTTER~~ ASSEMBLY RATING (hours)

(Contents of table to remain unchanged)

715.6.1.2 Testing. Fire door assemblies shall be tested in accordance with NFPA 252, UL 10B or UL 10C, as specified below.

Fire door assemblies with side-hinged and pivoted swinging doors shall be tested in accordance with NFPA 252 or UL 10C. After 5 minutes into the NFPA 252 test, the neutral pressure level in the furnace shall be established at 40 inches (1016 mm) or less above the sill.

Fire door assemblies with other types of doors, including swinging elevator doors and fire shutter assemblies, shall be tested in accordance with NFPA 252 or UL 10B. The pressure in the furnace shall be maintained as nearly equal to the atmospheric pressure as possible. Once established, the pressure shall be maintained during the entire test period.

Fire door assemblies in exit enclosures and exit passageways shall have a maximum transmitted temperature rise ~~end point~~ of not more than 450°F (250° C) above ambient at the end of 30 minutes of standard fire test exposure.

Exception: The maximum transmitted temperature rise is not required in buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.

Fire door assemblies located in corridor walls or smoke-barrier walls and required to have a minimum fire protection rating of 20 minutes in accordance with Table 715.6.1 shall be tested in accordance with NFPA 252 or UL 10C without the hose stream test. Such smoke and draft control assemblies shall also be tested in accordance with UL 1784. Louvers are prohibited.

Exception: View ports that require a hole not larger than 1 inch (25 mm) in diameter through the door, have at least a 0.25-inch-thick (6.4 mm) glass disc and the holder is of metal that will not melt out where subject to temperatures of 1,700°F (927°C) shall be permitted.

Floor fire door assemblies used to protect openings in fire-resistance-rated floors shall be tested in accordance with NFPA 288 and shall achieve a fire-resistance rating not less than the assembly being penetrated.

715.6.1.3 Labeling. Fire door assemblies shall be labeled by an approved agency. The labels shall comply with NFPA 80 and shall be permanently affixed to the door or frame. The label shall be applied at the factory or location where fabrication and assembly are performed. Fire door labels shall include the name of the manufacturer, the name of the third-party inspection agency, the fire protection rating, and where required for fire doors used in exit enclosures and exit passageways, the maximum transmitted temperature end point. Fire door frames shall be labeled showing the name of the manufacturer or other identification readily traceable back to the manufacturer and the name or trademark of the third-party inspection agency~~, the fire protection rating and, where required for fire doors in exit enclosures and exit passageways by Section 715.6.1.2, the maximum transmitted temperature end point~~.

Smoke and draft control assemblies complying with UL 1784 shall be labeled and shall show the letter “S” on the fire protection rating label of the door. This marking shall indicate that the door and frame assembly are in compliance when listed or labeled gasketing is also installed.

Oversized fire door assemblies shall bear an oversized fire door label by an approved agency or shall be provided with a certificate of inspection furnished by an approved testing agency. When a certificate of inspection is furnished by an approved testing agency, the certificate shall state that the door conforms to the requirements of design, materials and construction, but has not been subjected to the fire test.

Floor fire door assemblies shall be labeled by an approved agency. The label shall be permanently affixed and shall specify the manufacturer, the test standard and the fire-resistance rating.

715.6.1.4 Installation. Fire door assemblies shall be installed in accordance in accordance with NFPA 80. Smoke and draft control assemblies shall be installed in accordance with NFPA 105.

715.6.1.5 Closing. Fire door assemblies shall be self- or automatic-closing in accordance with this section.

Exceptions:

1. Fire door assemblies located in walls separating sleeping units in Group R-1 occupancies shall be permitted without self- or automatic-closing devices.
2. The elevator car doors and the associated hoistway enclosure doors at the floor level designated for recall in accordance with Section 3003.2 shall be permitted to remain open during Phase I emergency recall operation.

Unless otherwise permitted, single fire door assemblies and both leaves of pairs of side-hinged swinging fire door assemblies shall be provided with an active latch bolt that will secure the door when it is closed.

715.6.1.5.1 Smoke-activated doors. Automatic-closing doors installed in the following locations shall be automatic-closing by the actuation of smoke detectors installed in accordance with Section 907.10 or by loss of power to the smoke detector or hold-open device. Doors that are automatic-closing by smoke detection shall not have more than a 10-second delay before the door starts to close after the smoke detector is actuated:

1. Doors installed across a corridor.
2. Doors that protect openings in exits or corridors required to be of fire-resistance-rated construction.
3. Doors that protect openings in walls that are capable of resisting the passage of smoke in accordance with Section 508.2.2.1.
4. Doors installed in smoke barriers in accordance with Section 710.5 ~~910.5~~.
5. Doors installed in fire partitions in accordance with Section 709.6.
6. Doors installed in a fire wall in accordance with Section 707.8.
7. Doors installed in shaft enclosures in accordance with Section 715.8.1.
8. Doors installed in refuse and laundry chutes and access and termination rooms in accordance with Section 715.8.1.2.3.
9. Doors installed in the walls for compartmentation of underground buildings in accordance with Section 405.4.2.
10. Doors installed in the elevator lobby walls of underground buildings in accordance with Section 405.4.3.
11. Doors installed in smoke partitions in accordance with Section 711.5 ~~911.5~~.

715.6.1.5.2 Fire shutters and steel fire doors. Vertical sliding or vertical rolling steel fire door assemblies in openings through which pedestrians travel shall be heat activated or activated by smoke detectors with alarm verification.

Where fire shutters of the rolling type are installed, such shutters shall include approved automatic-closing devices.

Where fire shutters of the swinging type are installed in exterior openings, not less than one row in every three vertical rows shall be arranged to be readily opened from the outside, and shall be identified by distinguishing marks or letters not less than 6 inches (152 mm) high.

715.6.1.6 Glazing. Fire-protection-rated glazing shall be permitted in fire door assemblies in accordance with NFPA 80.

Fire-protection-rated glazing in fire door assemblies located in fire walls are prohibited.

Exception: Where serving as a horizontal exit, a self-closing swinging fire door assembly shall be permitted to have a vision panel of not more than 100 square inches (0.065 m^2) without a dimension exceeding 10 inches (254 mm).

Fire-protection-rated glazing shall not be installed in fire door assemblies having a 1½-hour fire protection rating intended for installation in fire barriers.

Exception: Glazing not more than 100 square inches (0.065 m^2) in area.

Fire-protection-rated glazing in excess of 100 square inches (0.065 m^2) shall be permitted in fire door assemblies used in exit enclosures and exit passageways when tested as components of the door assemblies and not as glass lights, and shall have a maximum transmitted temperature rise of 450◦F (250◦C) in accordance with Section 715.6.1.2.

Exception: The maximum transmitted temperature rise ~~end point~~ is not required in buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.

Fire-protection-rated glazing in used in 20 minute fire door assemblies in corridors and smoke barriers ~~smoke and draft control assemblies~~ shall have a minimum fire-protection rating of 20 minutes and shall be exempt from the hose stream test. Glazing material in any other part of the door assembly, including transom lites and sidelites, shall be tested in accordance with NFPA 257 or ~~and~~ UL 9, including the hose stream test, in accordance with Section 715.6.2.

715.6.1.6.1 Labeling. Fire-protection-rated glazing in fire door assemblies shall be labeled by an approved agency. The labels shall comply with NFPA 80 and shall be permanently affixed to the glazing. The label shall be applied at the factory or location where fabrication and assembly are performed. For fire-protection-rated glazing, the label shall include the name of the manufacturer, the test standard and shall

bear the following four-part identification: “D – H or NH – T or NT – XXX.” “D” indicates that the glazing shall be used in fire door assemblies and that the glazing meets the fire containment requirements of the NFPA 252 ~~257~~ and UL 10B or UL 10C ~~9~~. “H” shall indicate that the glazing meets the hose stream requirements of the test standard. “NH” shall indicate that the glazing does not meet the hose stream requirements of the test. “T” shall indicate that the glazing meets the temperature requirements of Section 715.6.1.2. “NT” shall indicate that the glazing does not meet the temperature requirements of Section 715.6.1.2. The placeholder “XXX” shall specify the fire-protection-rating period, in minutes, as tested.

715.6.1.6.2~~4~~ Installation. Wired glass used in fire door assemblies shall comply with Table 715.6.~~2.~~1. Other fire-protection-rated glazing shall comply with the size limitations of NFPA 80.

Approved fire-protection-rated glazing used in fire door assemblies in elevator and exit enclosures shall be so located as to furnish clear vision of the passageway or approach to the elevator, ramp or stairway.

Fire-protection-rated glazing installed in fire door assemblies or fire window assemblies in areas subject to human impact in hazardous locations shall comply with Chapter 24.

TABLE 715.6.1 ~~715.6.2.1~~
LIMITING SIZES OF WIRED GLASS PANELS

(Contents of table to remain unchanged)

715.6.2 Fire window assemblies. Fire window assemblies shall comply with the provisions of this section.

Exception: Glazing tested as part of a fire-resistance-rated wall assembly in accordance with ASTM E 119.

Fire window assemblies shall be limited to fire partitions in accordance with Section 708 and fire barriers utilized in the applications set forth in Sections 706.3.6 and 706.3.8 where the fire-resistance rating does not exceed 1 hour.

The total area of windows shall not exceed 25 percent of the area of a common wall with any room.

Glazing installed in fire door assemblies shall comply with Section 715.6.1.6.

The application of any of the alternative methods listed in this section shall be based on the fire exposure and acceptance criteria specified in NFPA 257 or UL 9. The required fire resistance of an opening protective shall be permitted to be established by any of the following methods or procedures:

1. Designs documented in approved sources.
2. Calculations performed in an approved manner.
3. Engineering analysis based on a comparison of opening protective designs having fire-protection ratings as determined by the test procedures set forth in NFPA 257 or UL 9.
4. Alternative protection methods as allowed by Section 104.11.

715.6.2.1 Fire protection rating. Fire window assemblies shall have the fire protection rating indicated in Table 715.6.2. Metal mullions that exceed a nominal height of 12 feet (3658 mm) shall be protected with materials to afford the same fire-resistance rating as required for the wall construction in which the fire window assembly is located.

Exceptions:

1. Steel window frame assemblies of 0.125-inch (3.2 mm) minimum solid section or of not less than nominal 0.048-inch-thick (1.2 mm) formed sheet steel members fabricated by pressing, mitering, riveting, interlocking or welding and having provision for glazing with ¼-inch (6.4 mm) wired glass where securely installed in the building construction and glazed with ¼-inch (6.4 mm) labeled wired glass shall be deemed to meet the requirements for a ¾-hour fire window assembly. Wired glass panels shall conform to the size limitations set forth in Table 715.6.2.1.
2. Fire window assemblies in 0.5-hour fire-resistance-rated partitions are permitted to have a 20 minute fire protection rating.

TABLE 715.6.2
FIRE WINDOW ASSEMBLY FIRE PROTECTION RATINGS

(Contents of table to remain unchanged)

715.6.2.2 Testing. Fire window assemblies shall be tested in accordance with NFPA 257 and UL 9.

NFPA 257 or ~~and~~ UL 9 shall evaluate fire window assemblies under positive pressure. Within the first 10 minutes of a test, the pressure in the furnace shall be adjusted so at least two-thirds of the test specimen is above the neutral pressure plane, and the neutral pressure plane shall be maintained at that height for the balance of the test.

Nonsymmetrical glazing systems in fire partitions, fire barriers or in exterior walls with a fire separation distance of 5 feet (1524 mm) or less in accordance with Section 704 shall be tested with both faces exposed to the furnace, and the assigned fire protection rating shall be the shortest duration obtained from the two tests conducted in compliance with NFPA 257 or ~~and~~ UL 9.

715.6.2.3 Labeling. Fire windows shall be labeled by an approved agency. The labels shall comply with NFPA 80 and shall be permanently affixed to the glazing. The label shall be applied at the factory or location where fabrication and assembly are performed. Fire window labels shall include the name of the manufacturer, the test standard and shall bear the following two-part identification: “OH – XXX.” “OH” indicates that the glazing meets both the fire containment and the hose-stream requirements of NFPA 257 and UL 9. “XXX” represents the fire-protection rating period, in minutes, as tested.

715.6.2.4 Installation. Glazing other than wired glass in fire window assemblies shall be fire-protection-rated glazing installed in accordance with and complying with the size limitations set forth in NFPA 80.

Fire window assemblies shall be installed in approved frames in a fixed position or be automatic-closing.

715.6.3 Fire dampers. Fire dampers shall comply with the provisions of this section.

Exceptions:

1. Openings in fire barriers and shaft enclosures where the penetrations are ~~included as part of a fire-resistance-rated wall assembly~~ tested in accordance with ASTM E 119 as part of a fire-resistance-rated wall assembly**.**
2. Where ducts are used as part of an approved smoke control system in accordance with Section 909 and where the use of a fire damper would interfere with the operation of a smoke control system.

Where a building assembly is required to have both fire dampers and smoke dampers, combination fire/smoke dampers or a fire damper and a smoke damper shall be required.

Fire dampers for hazardous exhaust duct systems shall comply with the *International Mechanical Code*.

715.6.3.1 Fire protection rating. Fire dampers shall have the fire protection rating indicated in Table 715.6.3.

TABLE 715.6.3
FIRE DAMPER FIRE PROTECTION RATINGS

(Contents of table to remain unchanged)

715.6.3.2 Testing. Fire dampers shall be tested in accordance with UL 555. Combination fire/smoke dampers shall be tested in accordance with both UL 555 and UL 555S.

715.6.3.3 Labeling. Fire dampers shall be listed and labeled by an approved agency.

Only fire dampers labeled for use in dynamic systems shall be installed in heating, ventilation and air-conditioning systems designed to operate with fans on during a fire event.

715.6.3.4 Installation. The fire damper actuating device shall meet one of the following requirements:

1. The operating temperature shall be approximately 50°F (10°C) above the normal temperature within the duct system, but not less than 160°F (71°C).
2. The operating temperature shall be not more than 286°F (141°C) where located in a smoke control system complying with Section 909.
3. Where a combination fire/smoke damper is located in a smoke control system complying with Section 909, the operating temperature rating shall be approximately 50°F (10°C) above the maximum smoke control system designed operating temperature, or a maximum temperature of 350°F (177°C). The temperature shall not exceed the UL 555S degradation test temperature rating for a combination fire/smoke damper.

Fire dampers shall be provided with an approved means of access, which is large enough to permit inspection and maintenance of the damper and its operating parts. The access openings shall not reduce the fire-resistance rating of the building assembly. Access points shall be permanently identified on the exterior by a label having letters not less than 0.5 inch (12.7 mm) in height reading: FIRE DAMPER or FIRE/SMOKE DAMPER. Access doors in ducts shall be tight fitting and suitable for the required duct construction.

Fire dampers and combination fire/smoke dampers located within air distribution and smoke control systems shall be installed in accordance with the requirements of this section, the manufacturer's installation instructions and the dampers' listing.

715.6.4 Ceiling radiation dampers. Ceiling radiation dampers shall comply with the provisions of this section and the applicable provisions of Section 715.6.3.

Exception: Ceiling radiation dampers are not required where either of the following applies:

1. Where tests in accordance with ASTM E 119 have shown that ceiling radiation dampers are not necessary in order to maintain the fire-resistance rating of the assembly.
2. Where exhaust duct penetrations are protected in accordance with Section 715.6.6 ~~715.6.5~~, are located within the cavity of a wall and do not pass through another dwelling unit or tenant space.

715.6.4.1 Fire protection rating. Ceiling radiation dampers shall be installed in accordance with their listing.

715.6.4.2 Testing. ~~Ceiling radiation dampers shall be tested in accordance with UL 555C. Ceiling radiation dampers shall be tested in accordance with UL 555C and installed in accordance with the manufacturer's installation instructions and listing.~~ Ceiling radiation dampers shall be tested either in accordance with UL 555C or as part of a fire-resistance rated floor-ceiling or roof/ceiling assembly in accordance with ASTM E 119 or UL 263. Ceiling radiation damper shall be installed in accordance with the details listed in the fire-resistance rated assembly and the manufacturer's installation instructions and the listing.

715.6.4.3 Labeling. Ceiling radiation dampers shall be listed and labeled by an approved agency.

715.6.4.4 Installation. Ceiling radiation dampers located within air distribution and smoke control systems shall be installed in accordance with the requirements of this section, the manufacturer's installation instructions and the dampers' listing.

715.6.5 Smoke dampers. Smoke dampers shall comply with the provisions of this section. Where a building assembly is required to have both fire dampers and smoke dampers, combination fire/smoke dampers or a fire damper and a smoke damper shall be required.

715.6.5.1 Leakage rating. Smoke damper leakage ratings shall not be less than Class II. Elevated temperature ratings shall not be less than 250°F (121°C).

715.6.5.2 Testing. Smoke dampers shall comply with the requirements of UL 555S. Combination fire/smoke dampers shall comply with the requirements of both UL 555 and UL 555S.

715.6.5.3 Labeling. Smoke dampers shall be listed and bear the label of an approved testing agency indicating compliance with the referenced standards in this section.

715.6.5.4 Installation. Smoke dampers and combination fire/smoke dampers located within air distribution and smoke control systems shall be installed in accordance with the requirements of this section, the manufacturer's installation instructions and the dampers' listing.

Smoke dampers shall close upon actuation of a listed smoke detector or detectors installed in accordance with Section 907.10 and one of the following methods, as applicable:

1. Where a smoke damper is installed within a duct, a smoke detector shall be installed in the duct within 5 feet (1524 mm) of the smoke damper with no air outlets or inlets between the detector and the damper. The smoke detector shall be listed for the air velocity, temperature and humidity anticipated at the point where it is installed. Other than in mechanical smoke control systems, smoke dampers shall be closed upon fan shutdown where local smoke detectors require a minimum velocity to operate.
2. Where a smoke damper is installed above doors in a smoke barrier, a spot-type detector listed for releasing service shall be installed on either side of the smoke barrier door opening.
3. Where a smoke damper is installed within an air transfer ~~unducted~~ opening in a wall, a spot-type detector listed for releasing service shall be installed within 5 feet (1524 mm) horizontally of the smoke damper.
4. Where a smoke damper is installed in a corridor wall or ceiling, the damper shall be permitted to be controlled by a smoke detection system installed in the corridor.
5. Where a smoke damper is installed within areas served by a heating, ventilation and air-conditioning (HVAC) system and a total-coverage smoke detector system is provided, smoke dampers shall be permitted to be controlled by the smoke detection system.

Smoke dampers shall be provided with an approved means of access, which is large enough to permit inspection and maintenance of the damper and its operating parts. The access openings shall not reduce the fire-resistance rating of the building assembly. The access shall not affect the integrity of fire-resistance-rated building assemblies. Access points shall be permanently identified on the exterior by a label having letters not less than 0.5 inch (12.7 mm) in height reading: SMOKE DAMPER or FIRE/SMOKE DAMPER. Access doors in ducts shall be tight fitting and suitable for the required duct construction.

A listed smoke damper designed to resist the passage of smoke shall be provided at each point a duct or air transfer opening penetrates a fire barrier or fire wall that serves as a horizontal exit.

A listed smoke damper designed to resist the passage of smoke shall be provided at each point a duct or air transfer opening penetrates a corridor enclosure required to have ~~smoke and draft control doors~~ a minimum fire protection rating of 20 minutes in accordance with Section 713.6.1.2.

Exceptions:

1. Smoke dampers are not required where the building is equipped throughout with an approved smoke control system in accordance with Section 909, and smoke dampers are not necessary for the operation and control of the system.
2. Smoke dampers are not required in corridor penetrations where the duct is constructed of steel not less than 0.019 inch (0.48 mm) in thickness and there are no openings serving the corridor.

A listed smoke damper designed to resist the passage of smoke shall be provided at each point a duct or air transfer opening penetrates a smoke barrier.

Exception: Smoke dampers are not required where the openings in ducts are limited to a single smoke compartment and the ducts are constructed of steel.

A listed smoke damper designed to resist the passage of smoke shall be provided at each point that an air transfer opening penetrates a smoke partition

Exception: Where the installation of a smoke damper will interfere with the operation of a required smoke control system in accordance with Section 909, approved alternate protection shall be utilized.

715.6.6 ~~715.6.5~~ Through-penetration and membrane-penetration fire stops. Through-penetration or membrane-penetration fire stops shall comply with the provisions of this section. ~~Through-penetrations or membrane-penetrations in fire-resistance-rated building assemblies, that are not smoke barriers, shall be shall tested in accordance with ASTM E 814 or UL 1479 with a minimum positive pressure differential of 0.01 inch (2.49 Pa) of water, or shall comply with any of the alternative methods listed in Sections 715.6.5.1 through 715.6.5.9. The tested system shall have a minimum one hour F-rating or a rating equal to the required rating of the building assembly penetrated if such assembly has a fire resistance rating greater than one hour.~~

715.6.6.1 Rating. Penetrations into or through fire-resistance-rated wall assemblies shall have an F-rating of not less than the required rating of the building assembly penetrated. Penetrations into or through fire-resistance-rated horizontal assemblies or horizontal barriers shall have an F-rating and a T-rating of not less than 1 hour, but not less than the required rating of the building assembly penetrated. Where walls or partitions are required to have a fire-resistance rating or floor/ceiling assemblies are required to have a minimum 1-hour fire-resistance rating, recessed fixtures shall be installed such that the required fire resistance will not be reduced.

Penetration protection of smoke barriers shall also comply with the air leakage requirement of Section 715.6.6.2 ~~910.6~~.

Exceptions:

1. Penetrations of nonfire resistance rated horizontal fire zone envelope assemblies are permitted to comply with the provisions of this section or section 715.7.1.
2. Penetrations tested as part of a fire-resistance-rated wall assembly in accordance with ASTM E 119 or UL 263.
3. Floor penetrations contained and located within the cavity of a wall do not require a T- rating.

715.6.6.1.1 ~~715.6.6.1~~ Through-penetrations of a single concrete floor ~~penetrations~~ by ~~(metal pipe or tube).~~ Through-penetrations in a single fire-resistance rated concrete floor by steel, ferrous or copper conduits, pipes, tubes or vents with a maximum 6-inch (152 mm) nominal diameter, where the annular space is protected with ~~provided the~~ concrete, grout or mortar is installed the full thickness of the floor or the thickness required to maintain the fire-resistance rating. The penetrating items shall not be limited to the penetration of a single concrete floor, provided the area of the opening through each floor does not exceed 144 square inches (92 900 mm^2).

715.6.6.1.2 ~~715.6.6.2~~ Through-penetrations of single horizontal assemblies or horizontal barriers by ~~fire-resistance-rated floor penetrations (metal pipe or tube).~~ Through-penetrations by steel, ferrous or copper conduits, pipes, tubes or vents or concrete or masonry items through a single ~~fire-resistance-rated floor~~ horizontal assembly or horizontal barrier where the annular space is protected with materials that prevent the passage of flame and hot gases sufficient to ignite cotton waste when subjected to ASTM E 119 or UL 263 time-temperature fire conditions under a minimum positive pressure differential of 0.01 inch (2.49 Pa) of water at the location of the penetration for the time period equivalent to the fire-resistance rating of the construction penetrated. Through-penetrating items with a maximum 6-inch (152 mm) nominal diameter shall not be limited to the penetration of a single ~~fire-resistance-rated floor~~ horizontal assembly or horizontal barrier, provided the aggregate area of the openings through the assembly does not exceed 144 square inches (92 900 mm2) in any 100 square feet (9.3 m^2) of floor area.

715.6.6.1.3 Membrane-penetrations of horizontal assemblies or horizontal barriers by metal pipe or tube. Membrane-penetrations of a maximum 2-hour fire-resistance rated horizontal assemblies or horizontal barriers by steel, ferrous or copper conduits, pipes, tubes or vents, or concrete or masonry items are permitted where the aggregate area of the openings through the membrane shall not exceed 100 square inches (64 500 mm^2) in any 100 square feet (9.3 m^2) of ceiling area in assemblies tested without penetrations and the annular space is protected as follows:

1. The material used to fill the annular space shall prevent the passage of flame and hot gases sufficient to ignite cotton waste when subjected to ASTM E 119 or UL 263 time-temperature fire conditions under a minimum positive pressure differential of 0.01 inch (2.49 Pa) of water at the location of the penetration for the time period equivalent to the fire-resistance rating of the assembly penetrated.
2. The material used to fill the annular space shall prevent the free passage of fames and the products of combustion.

715.6.6.1.4 ~~715.6.6.3~~ Through-penetrations and membrane-penetrations of fire-resistance-rated wall assemblies by ~~penetrations (metal pipe or tube).~~ Penetrations by steel, ferrous or copper pipes, tubes or conduits, are permitted provided the annular space between the penetrating item and the fire-resistance-rated wall is protected as follows:

1. In concrete or masonry walls where the penetrating item is a maximum 6-inch (152 mm) nominal diameter and the area of the opening through the wall does not exceed 144 square inches (0.0929 m^2), concrete, grout or mortar is permitted where it is installed the full thickness of the wall or the thickness required to maintain the fire-resistance rating; or
2. The material used to fill the annular space shall prevent the passage of flame and hot gases sufficient to ignite cotton waste when subjected to ASTM E 119 or UL 263 time-temperature fire conditions under a minimum positive pressure differential of 0.01 inch (2.49 Pa) of water at the location of the penetration for the time period equivalent to the fire-resistance rating of the construction penetrated.

~~**715.6.6.4 Floor assembly membrane penetrations (metal pipe or tube).** Membrane penetrations of a maximum 2-hour fire-resistance-rated horizontal assembly or horizontal barrier by steel, ferrous or copper conduits, pipes, tubes or vents, or concrete or masonry items where the annular space is protected 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 mm^2) in any 100 square feet (9.3 m^2) of ceiling area in assemblies tested without penetrations.~~

715.6.6.1.5 ~~715.6.6.5~~ Membrane-penetrations of horizontal assemblies or horizontal barriers by listed electrical boxes ~~penetrations~~. Membrane-penetrations by listed electrical boxes of any material are permitted 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 (3.1 mm) unless listed otherwise.

715.6.6.1.6 Membrane-penetrations of horizontal assemblies or horizontal barriers by protected electrical boxes of any size or type. 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 fire-resistance-rated horizontal assemblies or horizontal barriers and are installed in accordance with the instructions include in the listing.

715.6.6.1.7 ~~715.6.6.6~~ Membrane-penetrations of fire-resistance-rated wall assemblies by listed electrical boxes ~~membrane penetrations~~. Membrane-penetrations of a fire-resistance rated assembly membrane by listed electrical boxes of any material are permitted 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 wall membrane and the box shall not exceed 1/8 inch (3.1 mm) unless listed otherwise. Such boxes on opposite sides of the wall or partition shall be separated as follows:

1. By a horizontal distance of not less than 24 inches (610 mm);
2. By solid fireblocking in accordance with Section 717.2.1;
3. By protecting both boxes with listed putty pads; or
4. By other listed materials and methods.
5. ~~The annular space created by the penetration of a fire sprinkler, provided it is covered by a metal escutcheon plate.~~

715.6.6.1.8 ~~715.6.6.7 Steel electrical box~~ Ceiling membrane ~~floor~~ penetrations of horizontal assemblies or horizontal barriers by steel electrical boxes. Ceiling membrane penetrations of maximum 2-hour fire-resistance-rated horizontal assemblies or horizontal barriers by steel electrical boxes that do not exceed 16 square inches (10 323 mm^2) in area, are permitted provided the aggregate area of such penetrations does not exceed 100 square inches (44 500 mm^2) in any 100 square feet (9.29 m^2) of ceiling area, and the annular space between the ceiling membrane and the box does not exceed 1/8 inch (3.12 mm).

715.6.6.1.9 ~~715.6.6.8 Steel electrical box~~ Membrane ~~wall~~ penetrations of fire-resistance-rated wall assemblies by steel electrical boxes. Membrane-penetrations of ~~an assembly membrane of~~ maximum ~~two~~2-hour fire-resistance-rated walls and partitions ~~are permitted~~ by steel electrical boxes that do not exceed 16 square inches (0.0103 m^2) in area are permitted, provided the aggregate area of the openings through the membrane does not exceed 100 square inches (0.0645 m^2) in any 100 square feet (9.29 m^2) of wall area. The annular space between the wall membrane and the box shall not exceed 1/8 inch (3.1 mm). Such boxes on opposite sides of the wall or partition shall be separated by one of the following:

1. By a horizontal distance of not less than 24 inches (610 mm);
2. By a horizontal distance of not less than the depth of the wall cavity where the wall cavity is filled with cellulose loose-fill, rockwool or slag mineral wool insulation;
3. By solid fireblocking in accordance with Section 717.2.1;
4. By protecting both outlet boxes with listed putty pads; or
5. By other listed materials and methods.

715.6.6.1.10 Membrane penetrations of fire-resistance-rated wall assemblies by protected electrical boxes of any size or type. Membrane penetrations by electrical boxes of any size or type, which have been listed as part of a wall opening protective material system for use in fire-resistance-rated assemblies and are installed in accordance with the instructions include in the listing.

715.6.6.1.11 Membrane penetrations of fire-resistance-rated wall assemblies by boxes other than electrical boxes. Membrane penetrations by boxes other than electrical boxes provided such penetrating items and the annular space between the wall membrane and the box are protected by an approved membrane penetration firestop system installed as tested in accordance with ASTM E 1479 or UL 1479, with a minimum positive pressure differential of 0.01 inch (2.49 PA) of water, and shall have an F and T rating of not less than the required fire-resistance rating of the wall penetrated and be installed in accordance with their listing.

715.6.6.1.12 ~~715.6.6.9~~ Sprinkler head penetrations. The annular space created by the penetration of a fire sprinkler head is permitted to be protected by a metal escutcheon plate that completely covers the annular space.

715.6.6.2 Testing. Through-penetrations or membrane-penetrations in fire-resistance-rated building assemblies shall be shall tested in accordance with ASTM E 814 or UL 1479 with a minimum positive pressure differential of 0.01 inch (2.49 Pa) of water, or shall comply with any of the alternative methods listed in Sections 715.6.6.1.1 through 715.6.6.1.12.

Penetrations in smoke barriers shall be tested in accordance with the requirements of UL 1479 for air leakage. The air leakage rate of the penetration assembly shall not exceed 5.0 cfm per square foot (0.025 m^3 / s × m^2) of penetration opening at 0.30 inch (7.47 Pa) of water for both the ambient temperature and elevated temperature tests.

715.6.6.3 ~~715.6.5.10~~ Installation. Noncombustible penetrating items shall not connect to combustible items beyond the point of firestopping unless it can be demonstrated that the integrity of the fire-resistance rated building assembly is maintained.

Where sleeves are used, they shall be securely fastened to the building assembly penetrated. The space between the item contained in the sleeve and the sleeve itself and any space between the sleeve and the assembly penetrated shall be protected in accordance with the applicable provisions of Section 715.6.6~~5~~. Insulation and coverings on or in the penetrating item shall not penetrate the building assembly unless the specific material used has been tested as part of the assembly in accordance with this section.

715.6.7 Fire-resistant joint systems. Fire-resistant joint systems shall comply with the provisions of this section. Joints in or between fire-resistance-rated building assemblies shall be protected by a fire-resistant joint system.

Exception: Fire-resistant joint systems shall not be required for joints in the following locations:

1. Floors within a single dwelling unit.
2. Floors within malls.
3. Mezzanine floors.
4. Walls that are permitted to have unprotected openings.
5. Roofs where openings are permitted.
6. Control joints not exceeding a maximum width of 0.625 inch (15.9 mm) and tested in accordance with ASTM E 119 or UL263.

715.6.7.1 Fire-resistance ~~protection~~ rating. Fire-resistant joint systems shall be designed to resist the passage of fire for a time period not less than the required fire-resistance rating of the building assembly in or between which it is installed.

715.6.7.2 Testing. Fire-resistant joint systems shall be tested in accordance with the requirements of either ASTM E 1966 or UL 2079. Nonsymmetrical wall joint systems shall be tested with both faces exposed to the furnace, and the assigned fire-resistance rating shall be the shortest duration obtained from the two tests. Where evidence is furnished to show that the wall was tested with the least fire-resistant side exposed to the furnace, subject to approval by the building official, the wall need not be subjected to tests from the opposite side.

Exception: For exterior walls with a horizontal fire separation distance greater than 5 feet (1524 mm), the joint system shall be required to be tested for interior fire exposure only.

Fire-resistant joint systems in smoke barriers shall be tested in accordance with the requirements of UL 2079 for air leakage. The air leakage rate of the joint shall not exceed 5 cfm per lineal foot (0.00775 m^3/slm) of joint at 0.30 inch (7.47 Pa) of water for both the ambient temperature and elevated temperature tests.

715.6.7.3 Installation. Fire-resistant joint systems shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to accommodate expected building movements and to resist the passage of flame and hot gases.

715.6.7.4 Exterior curtain wall/floor intersection. Where fire resistance-rated floor or floor/ceiling assemblies are required, voids created at the intersection of the exterior curtain wall assemblies and such floor assemblies shall be sealed with an approved material or system to prevent the interior spread of fire. Such material or systems shall be securely installed and capable of preventing the passage of flame and hot gases sufficient to ignite cotton waste where subjected either to ASTM E 119 or UL 263 time-temperature fire conditions under a minimum positive pressure differential of 0.01 inch (0.254 mm) of water column (2.5 Pa) or installed as tested in accordance with ASTM E 2307 for the time period at least equal to the fire-resistance rating of the floor assembly. Height and fire-resistance requirements for curtain wall spandrels shall comply with Section 706.9.

715.6.7.5 Spandrel wall. Height and fire-resistance requirements for curtain wall spandrels shall comply with Section 706.9. Where Section 706.9 does not require a fire-resistance-rated spandrel panel, the requirements of Section 715.6.7.4 shall still apply to the intersection between the spandrel wall and the floor.

715.7 Nonfire-resistance-rated fire zone opening protection. Openings in nonfire-resistance rated floor/ceiling construction that is a portion of a fire zone envelope shall be protected in accordance with this section or enclosed in accordance with Sections 715.8.

715.7.1 Penetrating items. Through-penetrations ~~membrane~~ or membrane-penetrations in or between floor or floor/ceiling building assemblies shall be protected by an approved flamestop or a listed through-penetration firestop system.

715.7.2 Construction joints. Joints installed in or between floor or floor/ceiling building assemblies shall be protected by an approved flamestop or a listed fire-resistant joint system.

715.7.3 Ducts. Ducts shall be constructed of sheet steel not less than 0.019 inch (0.48 mm) (26 gage) in thickness. The annular space around the duct shall not exceed 1/8 inch (3.1 mm) and shall be filled with an approved flamestop ~~cellulose loose fill, rockwool or slag mineral wool insulation or other approved material~~. Or, ducts shall be protected with a listed fire damper.

715.7.4 Flamestops. Where required by other provisions of this code, flamestops shall be constructed of ~~protected with~~ materials that prevent the passage of flame and hot gases; however, need not comply to ASTM E 119 or UL 263 time-temperature fire conditions.

715.8 Enclosures. Shaft enclosures, exit enclosures and atrium enclosures required by other provisions of this code shall comply with the provisions of this section.

715.8.1 Utility openings. Except as permitted in Sections 715.1.1 and 715.2, openings in floor/ceiling construction for elevators, dumbwaiters, or other hoistways; refuse and laundry chutes and plumbing, electrical, HVAC or other equipment shall be enclosed by a shaft enclosure constructed in accordance with this section. Elevator, dumbwaiter and other hoistway enclosures shall be also be constructed in accordance with Chapter 30.

> **Exception:** A shaft enclosure is not required for approved masonry chimneys, where annular space protection is provided at each floor level in accordance with Section ~~717.2.5~~ 716.2.5.

A shaft enclosure containing a refuse chute or laundry chute shall not be used for any other purpose and shall originate and terminate in rooms in accordance with Section 715.8.1.2.3.

> **Exception:** Chutes serving, and contained within, a single dwelling unit.

Refuse chutes shall not terminate in an incinerator room.

715.8.1.1 Materials. Shaft enclosures shall be constructed of materials consistent with those permitted for the type of construction of the building in accordance with Section 602.

715.8.1.2 Construction. Shaft enclosures shall be constructed as fire barriers in accordance with Section 708 or horizontal barriers in accordance with Section 711, or both.

715.8.1.2.1 Bottom enclosure. Shaft enclosures that do not extend to the bottom of the building or structure shall comply with one of the following:

1. They shall be enclosed at the lowest level with construction of the same fire-resistance rating as the lowest floor through which the enclosure passes, but not less than the rating required for the shaft enclosure.
2. They shall terminate in a room having a use related to the purpose of the utility opening. The room shall be separated from the remainder of the building by fire barriers constructed in accordance with Section 708 or horizontal assemblies constructed in accordance with Section 711, or both. The fire-resistance rating and protectives shall be at least equal to the protection required for the shaft enclosure.
3. They shall be protected by approved fire dampers installed in accordance with their listing at the lowest floor level within the shaft enclosure.

Exceptions:

1. The fire-resistance-rated room separation is not required, provided there are no openings in the shaft enclosure to the interior of the building except at the bottom. The bottom of the shaft enclosure shall be closed off around the penetrating items with materials permitted by Section 714.3.1 for draftstopping, or the room shall be provided with an approved automatic fire suppression system.
2. A shaft enclosure containing a refuse chute or laundry chute shall not be used for any other purpose and shall terminate in a room protected in accordance with Section 715.8.1.2.3.
3. The fire-resistance-rated room separation and the protection at the bottom of the shaft are not required provided there are no combustibles in the shaft and there are no openings or other penetrations through the shaft enclosure to the interior of the building.

715.8.1.2.2 Top enclosure. Shaft enclosures that do not extend to the underside of the roof sheathing, slab or deck of the building shall be enclosed at the top with a horizontal barrier having the same fire-resistance rating as the topmost floor through which the shaft enclosure passes, but not less than the fire-resistance rating required for the shaft enclosure.

Openings in a horizontal barrier at the top of a shaft enclosure shall be protected with opening protective assemblies in accordance with Sections 715.6.3 through 715.6.7.

715.8.1.2.3 Access and termination rooms. Access and termination rooms shall comply with the provisions of this section. Where applicable, termination rooms shall also comply with the provisions of Section 508.2. Access and termination rooms shall be constructed as fire barriers in accordance with Section 708 or horizontal barriers in accordance with Section 711, or both and shall have a fire-resistance ratings of not less 1 hour. Access and termination rooms shall be equipped with an automatic sprinkler system installed in accordance with Section 903.2.10.2.

715.8.1.2.4 Elevator lobbies. An enclosed elevator lobby shall be provided at each floor where an elevator shaft enclosure connects more than three stories. The lobby shall separate the elevator shaft enclosure doors from each floor by fire partitions equal to the fire-resistance rating of the corridor and the required opening protection. Elevator lobbies shall have at least one means of egress complying with Chapter 10 and other provisions within this code.

Exceptions:

1. Enclosed elevator lobbies are not required at the street floor, provided the entire street floor is equipped with an automatic sprinkler system in accordance with Section 903.3.1.1.
2. Elevators not required to be located in a shaft enclosure in accordance with Section 715.2 are not required to have enclosed elevator lobbies.
3. Where additional doors are provided at the hoistway opening in accordance with Section 3002.6. Such doors shall be tested in accordance with UL 1784 without an artificial bottom seal.
4. In other than Group I-2 and I-3 occupancies, and buildings having occupied floors located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access, enclosed elevator lobbies are not required where the building is protected by an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.
5. Smoke partitions shall be permitted in lieu of fire partitions to separate the elevator lobby at each floor where the building is equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.
6. Enclosed elevator lobbies are not required where the elevator hoistway is pressurized in accordance with Section 715.8.1.3.4.1.

715.8.1.2.4.1 Pressurization alternative. Shaft enclosure pressurization is permitted to be provided in lieu of required elevator lobbies. The pressurization system shall comply with this section.

Elevator hoistways shall be pressurized to maintain a minimum positive pressure of 0.04 inches of water (9.96 Pa) and a maximum positive pressure of 0.06 inches of water (14.94 Pa) with respect to adjacent occupied space on all floors. This pressure shall be measured at the midpoint of each hoistway door, with all elevator cars at the floor of recall and all hoistway doors on the floor of recall open and all other hoistway doors closed. The opening and closing of hoistway doors at each level must be demonstrated during this test. The supply air intake shall be from an outside, uncontaminated source located a minimum distance of 20 feet (6096 mm) from any air exhaust system or outlet.

Fan systems located within the building and duct systems that are part of the pressurization system shall be protected with the same fire-resistance rating as required for the elevator shaft enclosure. The fan system shall be equipped with a smoke detector that will automatically shut down the fan system when smoke is detected within the system. A separate fan system shall be used for each elevator hoistway. The supply air intake shall be from an outside, uncontaminated source located a minimum distance of 20 feet (6096 mm) from any air exhaust system or outlet. The supply fan shall either be adjustable with a capacity of at least 1,000 cfm (.4719 m^3/s) per door, or that specified by a registered design professional to meet the requirements of a designed pressurization system. The pressurization system shall be provided with standby power from the same source as other required emergency systems for the building. The shaft enclosure pressurization system shall be activated upon activation of the building fire alarm system or upon activation of the elevator lobby smoke detectors.

715.8.1.3 Fire-resistance rating. Shaft enclosures shall have a fire-resistance rating of not less than 1 hour where connecting less than four stories and not less than 2 hours where connecting four stories or more. Shaft enclosures shall have a fire-resistance rating not less than the floor/ceiling assembly penetrated, but need not exceed 2 hours.

Exception: Where exterior walls serve as a part of a shaft enclosure, such walls shall comply with the requirements of Section 706 for exterior walls and the fire-resistance-rated shaft enclosure requirements shall not apply.

715.8.1.4 Openings. Openings in shaft enclosures shall be protected with opening protective assemblies in accordance with Section 715.5.2.2 for fire barriers.

Exceptions:

1. Fire dampers are not required in shafts where:
   1.1. Steel exhaust subducts are extended at least 22 inches (559 mm) vertically in exhaust shafts, provided there is a continuous airflow upward to the outside; or
   1.2. The penetrations are in parking garage exhaust or supply shafts that are separated from other building shafts by not less than 2-hour fire-resistance-rated construction.
2. In Group B and R occupancies equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1, smoke dampers are not required in shafts where:
   2.1. ~~Kitchen, clothes dryer,~~ Bathroom and toilet room exhaust openings are installed with steel exhaust subducts, having a wall thickness of at least 0.019 inch (0.48 mm); and
   2.2. Subducts extend at least 22 inches (559 mm) vertically; and
   2.3. An exhaust fan is installed at the upper terminus of the shaft that is, powered continuously in accordance with Section 909.11, so as to maintain a continuous upward airflow to the outside.

3. Smoke dampers are not required in exhaust or supply shafts in parking garages that are separated from other building shafts by not less than 2-hour fire-resistance-rated construction.
4. Smoke dampers are not required in shafts where ducts are used as part of an approved mechanical smoke control system designed in accordance with Section 909 and where the smoke damper will interfere with the operation of the smoke control system.
5. Fire damper and combination fire/smoke dampers are not required in kitchen and clothes dryer exhaust system when installed in accordance with the *International Mechanical Code*.

Openings other than those necessary for the utility purpose of the shaft shall not be permitted in shaft enclosures.

Openings into refuse or laundry chutes shall not be located in means of egress corridors. Heat-activated closing devices shall be permitted between refuse or laundry chutes and their termination rooms.

715.8.2 Egress openings. Except as permitted in Sections 715.1.1 and 715.2, openings in floor/ceiling construction for interior means of egress stairways and ramps shall be enclosed by an exit enclosure constructed in accordance with this section.

Exceptions:

1. Means of egress stairways as required by Section 410.5.4 are not required to be enclosed.
2. Stairways in Group I-3 occupancies, as provided for in Section 408.3.6, are not required to be enclosed.

715.8.2.1 Materials. Exit enclosures shall be constructed of materials consistent with those permitted for the type of construction of the building in accordance with Section 602.

715.8.2.2 Construction. Exit enclosures shall be constructed as fire barriers in accordance with Section 708 or horizontal barriers in accordance with Section 711, or both.

Exterior walls of an exit enclosure shall comply with the requirements of Section 706. Where nonrated walls or unprotected openings enclose the exterior of the stairway and the walls or openings are exposed by other parts of the building at an angle of less than 180 degrees (3.14 rad), the building exterior walls within 10 feet (3048 mm) horizontally of a nonrated wall or unprotected opening shall have a fire-resistance rating of not less than 1 hour. Openings within such exterior walls shall be protected by opening protectives having a fire protection rating of not less than 3/4 hour. This construction shall extend vertically from the ground to a point 10 feet (3048 mm) above the topmost landing of the stairway or to the roof line, whichever is lower.

715.8.2.3 Fire-resistance rating. Exit enclosures shall have a fire-resistance rating of not less than 1 hour where connecting less than four stories and not less than 2 hours where connecting four stories or more. Exit enclosures shall have a fire-resistance rating not less than the floor/ceiling assembly penetrated, but need not exceed 2 hours.

715.8.2.4 Openings. Openings in exit enclosures shall be protected with opening protective assemblies in accordance with Section 715.5.2.2 for fire barriers.

Openings in exit enclosures shall be limited to those necessary for exit access to the enclosure from normally occupied spaces and for egress from the exit enclosure.

Exceptions:

1. Unprotected exterior openings as permitted in Section 706.8.
2. Service areas as permitted in Section 402.4.6.

Openings into or through an exit enclosure are prohibited except for required exit doors, equipment and ductwork necessary for independent pressurization, sprinkler piping, standpipes, electrical raceways for fire department communication systems and electrical raceways serving the exit enclosure and terminating at a steel box not exceeding 16 square inches (0.010 m^2). Such openings shall be protected in accordance with Section 715.6.6~~5~~. There shall be no penetrations or communication openings, whether protected or not, between adjacent exit enclosures.

Equipment and ductwork for exit enclosure ventilation shall comply with one of the following items:

1. Such equipment and ductwork shall be located exterior to the building and shall be directly connected to the exit enclosure by ductwork enclosed in construction as required for shafts.
2. Where such equipment and ductwork is located within the exit enclosure, the intake air shall be taken directly from the outdoors and the exhaust air shall be discharged directly to the outdoors, or such air shall be conveyed through ducts enclosed in construction as required for shafts.
3. Where located within the building, such equipment and ductwork shall be separated from the remainder of the building, including other mechanical equipment, with construction as required for shafts.

In each case, openings into the fire-resistance-rated construction shall be limited to those necessary for maintenance and operation and shall be protected by opening protective assemblies in accordance with Section 715.8.1.4 for shaft enclosures.

Exit enclosure ventilation systems shall be independent of other building ventilation systems.

Elevators shall not open into an exit enclosure.

Fire door assemblies in exit enclosures shall comply with Section 715.6.1.2.

715.8.3 Architectural openings. Except as permitted in Sections 715.1.1 and 715.2, openings in floor/ceiling construction for aesthetic or functional purposes, to include escalators, shall be enclosed by an atrium enclosure constructed in accordance with this section. An atrium is permitted to be of unlimited height in stories based on the building type of construction when complying with the provisions of this section.

The floor of the atrium shall not be used for other than low fire hazard uses and only approved materials and decorations in accordance with the *International Fire Code* shall be used in the atrium space.

Exception: The atrium floor area is permitted to be used for any approved use where the individual space is provided with an automatic sprinkler system in accordance with Section 903.3.1.1.

715.8.3.1 Materials. Atrium enclosures shall be constructed of materials consistent with those permitted for the type of construction of the building in accordance with Section 602.

715.8.3.2 Construction. Atrium enclosures shall be constructed as fire barriers in accordance with Section 708 or horizontal barriers in accordance with Section 711, or both.

715.8.3.3 Fire-resistance rating. Atrium enclosures shall have a fire-resistance rating of not less than 1 hour.

Exceptions:

1. A glass wall forming a smoke partition where automatic sprinklers are spaced 6 feet (1829 mm) or less along both sides of the separation wall, or on the room side only if there is not a walkway on the atrium side, and between 4 inches and 12 inches (102 mm and 305 mm) away from the glass and designed so that the entire surface of the glass is wet upon activation of the sprinkler system without obstruction. The glass shall be installed in a gasketed frame so that the framing system deflects without breaking (loading) the glass before the sprinkler system operates.
2. A glass-block wall assembly in accordance with Section 2110 and having a ¾-hour fire protection rating.
3. The adjacent spaces of any three floors of the atrium shall not be required to be separated from the atrium where such spaces are included in the design of the smoke control system.

715.8.3.4 Openings. Openings in atrium enclosures shall be protected with opening protective assemblies in accordance with Section 715.5.2.2 for fire barriers.

Exception: Fire window assemblies permitted in atrium enclosure walls shall not be limited to a maximum aggregate width of 25 percent of length of the wall.

~~**715.8.3.5 Escalators.** An enclosure is not required in a building 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 protected according to Item 2.1 or 2.2:~~

~~1. Where the area of the floor 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. Where the 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 1/2 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 therefrom.~~

~~**715.8.3.6 Unlimited height in stories.** An atrium is permitted to be of unlimited height in stories based on the building type of construction when complying with the provisions of this section.~~

715.8.3.5 ~~**715.8.3.6.1**~~ **Automatic sprinkler system.** An approved automatic sprinkler system shall be installed throughout the entire building.

Exceptions:

1. That area of a building adjacent to or above the atrium need not be sprinklered provided that portion of the building is separated from the atrium portion by not less than a 2-hour ~~fire-resistance-rated~~ fire barriers constructed in accordance with Section 708 or horizontal barriers constructed in accordance with Section 711, or both.
2. Where the ceiling of the atrium is more than 55 feet (16 764 mm) above the floor, sprinkler protection at the ceiling of the atrium is not required.

715.8.3.6 ~~**715.8.3.6.2**~~ **Smoke control system.** A smoke control system shall be installed in accordance with Section 909.

Exception: Smoke control is not required for atriums that only connect two stories in Group I occupancies.

715.8.3.7 ~~**715.8.3.6.3**~~ **Standby power.** Equipment required to provide smoke control shall be connected to a standby power system in accordance with Section 909.11.

715.8.3.8 ~~**715.8.3.6.4**~~ **Interior finish.** The interior finish of walls and ceilings of the atrium shall not be less than Class B with no reduction in class for sprinkler protection.

715.8.3.9 ~~**715.8.3.6.5**~~ **Travel distance.** In other than the lowest level of the atrium, where the required means of egress is through the atrium space, the portion of means of egress travel distance within the atrium space shall not exceed 200 feet (60 960 mm).

SECTION 716
CONCEALED SPACES

SECTION 717
FIRE-RESISTANCE REQUIREMENTS FOR PLASTER

SECTION 718
THERMAL- AND SOUND-INSULATING MATERIALS

Commenter's Reason: FS162-07/08 was born as an initiative within the ICC Code Technology Committee. It was recognized that various opening and penetration requirements for horizontal assemblies were inconsistent and difficult for users to properly determine. In December of 2006, a Vertical Openings Study Group was appointed to research the issue and develop recommendations. The study group quickly went to work and decided that a "clean sheet" approach was in order. This total overhaul would include a general reorganization of Chapter 7 subject areas (sections); development of appropriate terminology and definitions so as to establish a "system" of opening protection requirements; a reorganization of applicable technical requirements so as to editorially support that system; and, the statement of the allowable fire migration limits in tabular form as opposed to the current inference through countless exceptions.

A draft Chapter 7 quickly emerged. It fundamentally contained all of the objectives of the study group. During a couple of study group meetings, details of the proposal were negotiated. As the August 20, 2007 submittal deadline for 07/08 code development cycle proposals drew near, it was apparent that a majority of study group members would not be able to support a consensus proposal. Two study group members felt that the draft to that point was fundamentally sound and could be perfected during the public comment cycle for inclusion in the 2009 Edition of the International Building Code. The latest revised study group draft at that time was submitted as a code change proposal and assigned to the IBC Fire Safety Code Development Committee as Item FS162-07/08.

The item was heard at the code development hearings in March of 2008. Considerable floor testimony criticized both editorial and technical aspects of the proposal. Opponent testimony included:

- Criticism that the "clean sheet" approach was too broad and that a more methodical, incremental approach should be taken, i.e., a piece by piece approach.
- Questions relative to the technical basis for the proposed migration limits, which were based on varying combinations of passive and active fire protection method.
- Doubt that the requirements for opening protective assemblies provide an adequate level of protection for horizontal assemblies installed solely for structural (Table 601) purposes even though opening enclosure requirements have been eliminated by exception.

While some Fire Safety Committee members expressed ~~a~~ concern with the three- and four-story fire migration limits contained in the proposal, the majority of committee members agreed that there is a need for comprehensive repair of the Chapter 7 opening protection requirements. Many lauded the effort and agreed with the clean sheet approach taken by FS162. During committee discussion many committee members expressed a concern that the proposal was not endorsed by the ICC Code Technology Committee (CTC) and further stated that such a wide-ranging initiative should originate from the CTC, not the Code Development Committee (CDC). FS162-07/08 was disapproved by a vote of 9-4. The published IBC Fire Safety committee action states, "The committee understands that the ICC Code Technology Committee (CTC) is currently studying the reorganization of Chapter 7. The efforts of this proponent should be coordinated with the efforts of the CTC. Further, the committee felt that the technical changes within the proposed Table 715.2 required further technical justification." To be within three votes of approval was very encouraging and indicated a desire by the code development committee to effect significant improvement in the IBC.

Since the Palm Springs hearings, the Vertical Openings Study Group has continued work on Item FS162-07/08. Numerous editorial and technical adjustments have been made based on the comments received by the study group. Most significantly, the progressive—and somewhat controversial—tabular fire migration limits have been reduced to a maximum of two stories. With that adjustment, exceptions have been added to acknowledge those instances where the IBC currently allows for greater intra-story migration. Additionally, a provision requiring opening protection assemblies in a fire-resistance-rated horizontal assembly that is not a portion of a fire zone envelope was added. Also, the structural support of horizontal assemblies was added. These modifications essentially maintain the technical/philosophical status quo with the current IBC. Countless other revisions have been made as well. Some terms have been modified for purposes of clarity and consistency. Building assemblies have been changed to building elements. Draftstopping has been changed to draftblocking. Examples of flamestopping methods have been included in the definition of flamestop. Numerous technical provisions have been improved, such as, the alternative firestopping methods listed in Sections 715.6.6.1.1 through 715.6.6.1.12. Smoke barrier and smoke partition charging requirements have been included in Section 715.5.2.4.1. Many specific opening protective assembly technical requirements have been reviewed and corrected or clarified for the purposes of technical accuracy. Fundamental fire zone provisions contained in Section 715.2 have been simplified. All of these modifications, and many others, are the result of constructive comments by study group members as well as other interested parties.

Despite the fact that the proposal had been modified to address all constructive criticism, on May 20, 2008 the CTC Vertical Openings Study Group voted to discontinue work on Item FS162 in favor of developing a new proposal. This action was based on the realization that due to internal differences of technical opinion, it was unlikely that study group unanimity could be achieved on FS162. On May 22, 2008, the IBC Code Technology Committee also voted not to support Item FS162.

The public comment being offered has attempted to address the comments and concerns voiced by both the IBC Fire Safety Code Development Committee and floor testimony in Palm Springs. Suggested adjustments in Table 715.2 have been made. Unfortunately, the proposal has proven to be too controversial with those opposed to this clean sheet concept.

Although one and a half years may not seem like much time in code development terms, a considerable amount of effort by a diverse group of individuals has resulted in a viable and necessary improvement in a fundamental chapter of the International Building Code. This proposal represents an initiative intended to clarify the system used in the code for the determination of appropriate protection requirements for openings in horizontal assemblies so as to encourage consistent interpretations and applications of applicable provisions. The format and organization presented in this code change represents a significant improvement over current highly fragmented and disjoined opening protection requirements.

It is hoped that 2/3 of the voting members will recognize the need for quantum improvement in this tremendously important area of the IBC and also recognize the considerable effort by many recognized experts in the field of fire migration. Inclusion of this system in the 2009 Edition of the IBC will greatly enhance the usability of current provisions while providing a format that will accommodate future developments in the area of fire migration.

Final Action: AS AM AMPC____ D

FS162-07/08, Part III
1020.1 through 1020.5.1 (NEW), 1021.4, 1021.5 and 1022.3

Proposed Change as Submitted:

Proponent: Gregory R Keith, Professional heuristic Development, representing The Boeing Company and Ron Clements, Chesterfield County, Virginia

PART III – IBC MEANS OF EGRESS

1. Delete Section 1020 in its entirety and substitute as follows:

SECTION 1020
EXIT ENCLOSURES

1020.1 General. Exit enclosures serving as a means of egress component in a means of egress system shall comply with the provisions of this section. An exit enclosure shall not be used for any purpose other than means of egress. An exit enclosure shall discharge directly to the exterior of a building or into an exit passageway that discharges directly to the exterior of the building.

Exception: An exit enclosure shall be permitted to egress through areas on the level of discharge or vestibules as permitted by Section 1024.

1020.2 Construction. Exit enclosures shall be constructed in accordance with Section 713.8.2.

1020.3 Discharge barrier. A stairway in an exit enclosure shall not continue below the level of exit discharge unless an approved barrier is provided at the level of exit discharge to prevent persons from unintentionally continuing into levels below. Directional exit signs shall be provided as specified in Section 1011.

1020.4 Story level identification signs. A sign shall be provided at each floor landing in interior exit enclosures connecting more than three stories designating the floor level, the terminus of the top and bottom of the exit enclosure and the identification of the stair or ramp. The signage shall also state the story of, and the direction to the exit discharge and the availability of roof access from the enclosure for the fire department. The sign shall be located 5 feet (1524 mm) above the floor landing in a position that is readily visible when the doors are in the open and closed positions. Story level identification signs in tactile characters complying with ICC A117.1, shall be located at each story level landing adjacent to the door leading from the enclosure into the corridor to identify the floor level.

1020.4.1 Signage requirements. Story level identification signs shall comply with all of the following requirements:

1. The signs shall be a minimum size of 18 inches (457 mm) by 12 inches (305 mm).
2. The letters designating the identification of the stair enclosure shall be a minimum of 1 1/2 inches (38 mm) in height.
3. The number designating the floor level shall be a minimum of 5 inches (127 mm) in height and located in the center of the sign.
4. All other lettering and numbers shall be a minimum of 1 inch (22 mm) in height.
5. Characters and their background shall have a nonglare finish. Characters shall contrast with their background, with either light characters on a dark background or dark characters on a light background.

1020.5 Smokeproof enclosures. In buildings required to comply with Section 403 or 405, each of the exit enclosures of a building that serves stories where the floor surface is located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access or more than 30 feet (9144 mm) below the level of exit discharge serving such floor levels shall be a smokeproof enclosure or pressurized stairway in accordance with Section 909.20.

1020.5.1 Enclosure access. Access to the stairway within a smokeproof enclosure shall be by way of a vestibule or an open exterior egress balcony.

Exception: Pressurized stairways complying with the provisions of Section 909.20.5.

2. Revise as follows:

1021.4 Openings ~~and penetrations~~. ~~Exit passageway opening protectives shall be in accordance with the requirements of Section 715.~~ Except as permitted in Section 402.4.6, openings in exit passageways other than unexposed exterior openings shall be limited to those necessary for exit access to the exit passageway form normally occupied spaces and for egress from the exit passageway.

~~1021.5 Penetrations.~~ ~~Penetrations into and~~ Openings into or through an exit passageway are prohibited except for required exit doors, equipment and ductwork necessary for independent pressurization, sprinkler piping, standpipes, electrical raceways for fire department communication and electrical raceways serving the exit passageway and terminating at a steel box not exceeding 16 square inches (0.010 m^2). Such ~~penetrations~~ openings shall be protected in accordance with Section ~~712~~ 713.6. There shall be no ~~penetrations or~~ intercommunicating openings, whether protected or not, between adjacent exit passageways.

Where interior exit enclosures are extended to the exterior of a building by an exit passageway, the door assembly from the exit enclosure to the exit passageway shall be protected by a ~~fire door~~ smoke and draft control assembly conforming to the requirements ~~in~~ of Section ~~715.4~~ 713.6.1. Fire door assemblies in exit passageways shall comply with Section 715.4.4.

Elevators shall not open into an exit passageway.

1022.3 Openings ~~protectives~~. Fire doors in horizontal exits shall be self-closing or automatic-closing when activated by a smoke detector in accordance with Section ~~715.4.7.3~~ 713.6.1.5.1. Doors, where located in a cross-corridor condition, shall be automatic-closing by activation of a smoke detector installed in accordance with Section ~~715.4.7.3~~ 713.6.1.5.1.

Reason: Please do not be intimidated by the length of this proposal. It represents a broad based initiative to improve the *International Building Code* in a very important area: the protection of openings intended to restrict the vertical movement of fire. Prior to technical discussions, I would like to provide a brief history as regards this proposal. Late last year, The Boeing Company approached the ICC Code Technology Committee and shared a concern about how opening and penetration requirements for horizontal assemblies were inconsistent and difficult for users to properly determine. To illustrate the point, it was noted that Section 713.1 would require that joints installed in a fire-resistance rated floor/ceiling assembly be protected with an approved fire-resistant joint system, while Section 1020.1 would permit an open convenience stairway within the same floor/ceiling assembly. 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. The CTC agreed with the concern and appointed a Vertical Openings Study Group to research the matter. The Study Group was constituted of diverse members from the public and private sectors. The Study Group met only twice; however, produced a "clean sheet" discussion draft that completely overhauled many Chapter 7 definitions and technical provisions. It also developed a fire and flame migration strategy that included a compartmentation concept. Current opening protective technical requirements were examined and reorganized in an effort to be more understandable by designers and code enforcement officials alike. A consistent format was created throughout the document to enhance user friendliness. Although a considerable amount of quality work had been accomplished in a relatively short period of time, the Study Group members could not achieve accord on acceptable migration limits. Some Study Group members felt that in light of arguably liberal allowable areas—especially in sprinklered buildings—that more conservative and complete compartmentation was necessary to compensate for current allowable areas. The Study Group decided to slow down and validate the strategy assumptions based on current exceptions to opening protection requirements. Unfortunately, this detailed study would sufficiently delay the project to where it would not be completed prior to the 2007/2008 code development submittal deadline.

Meanwhile, another CTC Study Group (BFP Features) was investigating the subject of allowable heights and areas. That group had met on numerous occasions and appeared to be mired in a comparison of the current IBC allowable heights and areas to those permitted in the legacy or former model codes. At a recent Features meeting in Chicago (August 1-3, 2007), that Study Group decided to take a "clean sheet" approach to the issue and developed a fire flow driven allowable area determination procedure based on a compartmentation concept. There were two primary premises with their approach. First, have low fire flow and allowable area thresholds to as to encourage the installation of an automatic sprinkler system early in design development. Secondly, create some necessary passive redundancy to the active fire protection features by establishing a number of relatively small fire compartments—especially in the so-called "lesser types of construction." By way of example, current IBC provisions would allow for up to approximately 174,000 square feet of gross Group F-1 area in a sprinklered building of Type IIB construction. Given the lack of inherent fire-resistance rated construction, the only compartmentation is achieved by way of fragmented vertical openings provisions. In comparison, the Type IIB, sprinklered, Group F-1 maximum compartment size would be approximately 32,000 square feet according to the progressive Features' approach. A major difference from current allowable area determination methods is that the "fire compartment" is an amorphous space that can include any number of stories as may be permitted based on the occupancy classification and type of construction under consideration. Under this system, the story-by-story determination of total allowable building area is a thing of the past. During the Features Study Group discussion it was emphasized that there were three volumetric entities: Buildings, fire compartments and fire zones. Buildings define the total allowable area. Fire compartments are generally limited as to individual area. Fire zones are subcompartments within fire compartments and serve to define the vertical migration limits within a given fire compartment. On numerous occasions, the Features Study Group referenced the Vertical Openings Study Group's thinking as completely compatible with their evolving concept and did not attempt to influence the Vertical Openings Group in any way. The BFP Features Study Group intends to submit their progressive allowable area proposal in this code development cycle. Given the close philosophical and technical relationship between the Features' proposal and the Vertical Openings discussion draft, it is imperative that the draft be submitted during the same code development cycle. It is somewhat likely that some of the reservations expressed by the Vertical Openings Study Group members concerning the proposed migration limits might be lessened given the Features group's fairly conservative approach to allowable area determination. It should be noted that although the two proposals would greatly complement each other, they are mutually exclusive can individually stand on their own merit.

As previously mentioned, this proposal is a “clean sheet” document intended to fairly completely overhaul IBC opening protection provisions. There are three major features to the proposal. First, it directly states a fire and flame migration strategy in its Table 713.2. Secondly, it provides a logical format to organize applicable technical provisions that will enhance usability by code practitioners. Lastly, specific technical requirements were reviewed for applicability and compatibility with the migration strategy and each other.

As regards the stated fire and flame migration strategy, this proposal takes a different tack than does the current IBC. Presently, the fundamental IBC premise with respect to the protection of openings in floor/ceiling assemblies—be they fire-resistance rated or nonfire-resistance rated—is that no unprotected openings are permitted.

The reality is, however, that there are numerous exceptions that permit unprotected openings in floor/ceiling assemblies based on any one of a number of variables. The point being that these exceptions, become the rule and collectively define an implied vertical migration strategy. This proposal provides for an incremental migration strategy based on the collective intent of the multitude of current exceptions. The stated strategy is that for other than Group H and I occupancies, a two-story migration of fire and flame is acceptable. 2006 Sections 707.2, Exception 7 and 1020.1, Exceptions 1, 8 and 9, among others, serve as the precedent for this approach. It should be noted that the basic fire zone philosophy is that fire zone boundaries (both vertical and horizontal) have complete protection of openings. Within fire zones, the only protection of openings required for floor/ceiling assemblies would be those necessary to maintain the fire resistive integrity of a rated horizontal assembly. The lack of coordination between current opening protective requirements results in a “Swiss cheese” migration strategy. This proposal promotes an “all or nothing” philosophy that provides for a logical, predicable and dependable migration boundary.

It must also be understood that fire zones intended to restrict the upward movement of fire or flame, can occur in buildings of both rated and nonrated construction types. While the fire compartment provides for a fire-resistance rated boundary, regardless of the type of construction, fire zones within fire compartments are constructed with building assemblies that are consistent with the building type of construction. As previously mentioned, the fire zone achieves its integrity through the protection of openings consistent with the inherent fire-resistance rating requirements for the building floor/ceiling assemblies. In fire-resistance rated construction, fire zone horizontal boundaries are protected by rated enclosures and/or listed opening protective assemblies. Within a fire zone in a rated building, no enclosures would be required and the only openings required to be protected would be those necessary to maintain the fire resistive integrity of the horizontal assembly itself. In buildings of nonrated construction, the fire zone horizontal boundaries would continue to be nonfire-resistance rated; however, openings would be required to be protected by rated enclosures and/or generic flamestopping methods. Within a fire zone in a nonrated building, there are no opening protection requirements.

The two-story migration limit is extended to three stories where the building is equipped throughout with an automatic sprinkler system. Numerous sprinkler progressions and current Section 707.2, Exception 2 serve as a precedent for this provision. It should be noted that although no inherent opening protection is required for the two floor/ceiling assemblies within a three story envelope—to include exit enclosures—each fire zone having a level more than two stories above grade plane is required to have at least one exit enclosure leading to the exterior of the building or all points of the fire zone have to be within 300 feet of an exit enclosure for fire department access and staging purposes. An exit enclosure is a unique building feature. It can actually serve three distinct purposes: One, it can serve to isolate one story from another for fire migration purposes. Hence, the term, “stair shaft.” Two, it can serve as an exit component which provides for a protected, and potentially unlimited length path of travel. Three, an exit enclosure can serve as a protected area for fire department access and operations. During the first Vertical Openings Study Group meeting, it was decided that all openings and penetrations should be treated equally because, “a hole in the floor is a hole in the floor.” Therefore, for fire migration purposes, an exit enclosure (as well as a shaft enclosure or atrium enclosure) would be required only at fire zone boundaries. From a means of egress perspective, an exit enclosure is an exit component similar to an exit passageway or horizontal exit. That is, they are incorporated into the building design as necessary to satisfy one or more means of egress design requirements—more than likely, travel distance limitations. Since a number of intercommunicating floors are unacceptable from a fire fighting perspective, an exit enclosure is mandated for fire zones above the second story.

Other than Group H or I occupancies are permitted to have four intercommunicating floor levels provided the building is provided with a sprinkler system and the fire zone is protected by a mechanical smoke control system. Section 404 atrium provisions serve as the precedent for this migration limit.

As previously suggested, the fire and flame migration limits established in this proposal are founded on current migration provisions and are positively stated in a single table and represent a logical progression of passive and active building fire protection features.

Once a migration strategy was developed, an editorial format was created to organize various technical provisions so as to support the adopted philosophy. Given the “hole is a hole—opening is an opening” methodology, it was determined that a single section (Section 713) would contain all opening protection provisions. Accordingly, Sections 404 and 707 have been deleted in their entirety and applicable provisions incorporated in context into proposed Section 713. Exit enclosure construction requirements have been relocated from Section 1020 to Section 713. All enclosure protection requirements have been consolidated in a single location. It is interesting to note that of the 22 exceptions formerly contained in Sections 707 and 1020, 21 were eliminated due to the formal establishment of migration limits as prescribed in proposed Table 713.2.

Also, a number of key definitions were created or modified to support this system. Perhaps the most important is that the term “opening” is defined for the first time. It simply states that any breach for virtually any purpose is treated as an opening. Where the current IBC differentiates between openings and penetrations, the proposed section does not (a hole is an opening). The fundamental premise is that where openings are required to be protected, they will be either enclosed by physical construction or protected by an opening protective assembly in rated construction or enclosed or flamestopped (another new definition) in nonrated construction.

With respect to opening protective assemblies, only seven are recognized as those seven are the only formally tested protectives. They are: fire door assemblies, fire window assemblies, fire dampers, ceiling dampers, smoke dampers, through-penetration fire stops and fire-resistant joint systems. Accordingly, opening protection goes to remedy. If the “hole” in a fire zone boundary can be mitigated by a listed opening protective assembly, migration requirements are satisfied. If not, the “hole” needs to be enclosed in accordance with Section 713.8. Additionally, each of the opening protective assembly sections has been subdivided with a consistent format: fire protection rating, testing, labeling and installation. All applicable technical requirements have been properly located within this editorial structure. This typical format allows for the objective comparison of various opening protective assembly requirements.

Another new definition worth noting is, “horizontal barrier.” Currently, there are a number of vertical assemblies intended to address various structural or confinement requirements. On the horizontal plane, the “horizontal assembly” is presently the only fire-resistance rated assembly of choice. The proposed horizontal barrier is comparable to the fire barrier with openings required to be protected while the horizontal assembly is more based on type of construction requirements than fire confinement concerns. The two types of fire-resistance rated horizontal construction simplify opening protection requirement determination.

Specific technical requirements for the various enclosure and opening protective assembly options are very similar to current provisions. To account for all detailed technical provisions would take a number of pages. If one is concerned with a specific provision, it is suggested that it be copied from the current code and then entered as a search or find function in the proposed text. With this “clean sheet” document, there are countless changes made for the sake of editorial and technical continuity and user accommodation. It would be virtually impossible to address each and every change. The major points have been addressed. Hopefully, the more subtle details will appeal to common sense.

In summary, it is recognized that this is a very lengthy and comprehensive proposal submitted in a process that lends itself to incremental improvement. If the *International Building Code* is to be significantly and functionally improved, it is necessary to be more ambitious in the scrutiny of major subject areas. This proposal is the result of input by a number of nationally recognized code experts, although those individuals do not necessarily endorse this proposal at this time. Almost all concerned recognize that the current opening protective requirements are technically inconsistent and, in total, probably support no rational fire migration strategy. Opening protective technical requirements are presently difficult to determine and result in varying interpretations and applications. Similar to current code provisions, this proposal is certainly an imperfect document; however, it represents a significant improvement over those current code provisions and will serve as a foundation for subsequent revisions that will necessarily be in context. This proposal in combination with the BFP Features Study Group's similarly progressive allowable area determination proposal will significantly improve the schematic provisions of the International Building Code. Please view these proposals objectively and offer constructive vs. destructive criticism. The implementation of these concepts will greatly improve the effectiveness and usability of the IBC.

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

PART III – IBC MEANS OF EGRESS
Committee Action: **Disapproved**

Committee Reason: The reference in Section 1020.2 should be Section 715.8.2. Some of the current exceptions are not present in the proposed language. This should be brought back after the Code Technologies Committee has completed their work on this issue.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

David Collins, The American Institute of Architects, representing himself, requests Approval as Submitted.

Commenter's Reason: FS162-07/08 was born as an initiative within the ICC Code Technology Committee. It was recognized that various opening and penetration requirements for horizontal assemblies were inconsistent and difficult for users to properly determine. In December of 2006, a Vertical Openings Study Group was appointed to research the issue and develop recommendations. The study group quickly went to work and decided that a "clean sheet" approach was in order. This total overhaul would include a general reorganization of Chapter 7 subject areas (sections); development of appropriate terminology and definitions so as to establish a "system" of opening protection requirements; a reorganization of applicable technical requirements so as to editorially support that system; and, the statement of the allowable fire migration limits in tabular form as opposed to the current inference through countless exceptions.

A draft Chapter 7 quickly emerged. It fundamentally contained all of the objectives of the study group. During a couple of study group meetings, details of the proposal were negotiated. As the August 20, 2007 submittal deadline for 07/08 code development cycle proposals drew near, it was apparent that a majority of study group members would not be able to support a consensus proposal. Two study group members felt that the draft to that point was fundamentally sound and could be perfected during the public comment cycle for inclusion in the 2009 Edition of the International Building Code. The latest revised study group draft at that time was submitted as a code change proposal and assigned to the IBC Fire Safety Code Development Committee as Item FS162-07/08.

The item was heard at the code development hearings in March of 2008. Considerable floor testimony criticized both editorial and technical aspects of the proposal. Opponent testimony included:

- Criticism that the "clean sheet" approach was too broad and that a more methodical, incremental approach should be taken, i.e., a piece by piece approach.
- Questions relative to the technical basis for the proposed migration limits, which were based on varying combinations of passive and active fire protection method.
- Doubt that the requirements for opening protective assemblies provide an adequate level of protection for horizontal assemblies installed solely for structural (Table 601) purposes even though opening enclosure requirements have been eliminated by exception.

While some Fire Safety Committee members expressed ~~a~~ concern with the three- and four-story fire migration limits contained in the proposal, the majority of committee members agreed that there is a need for comprehensive repair of the Chapter 7 opening protection requirements. Many lauded the effort and agreed with the clean sheet approach taken by FS162. During committee discussion many committee members expressed a concern that the proposal was not endorsed by the ICC Code Technology Committee (CTC) and further stated that such a wide-ranging initiative should originate from the CTC, not the Code Development Committee (CDC). FS162-07/08 was disapproved by a vote of 9-4. The published IBC Fire Safety committee action states, "The committee understands that the ICC Code Technology Committee (CTC) is currently studying the reorganization of Chapter 7. The efforts of this proponent should be coordinated with the efforts of the CTC. Further, the committee felt that the technical changes within the proposed Table 715.2 required further technical justification." To be within three votes of approval was very encouraging and indicated a desire by the code development committee to effect significant improvement in the IBC.

Since the Palm Springs hearings, the Vertical Openings Study Group has continued work on Item FS162-07/08. Numerous editorial and technical adjustments have been made based on the comments received by the study group. Most significantly, the progressive—and somewhat controversial—tabular fire migration limits have been reduced to a maximum of two stories. With that adjustment, exceptions have been added to acknowledge those instances where the IBC currently allows for greater intra-story migration. Additionally, a provision requiring opening protection assemblies in a fire-resistance-rated horizontal assembly that is not a portion of a fire zone envelope was added. Also, the structural support of horizontal assemblies was added. These modifications essentially maintain the technical/philosophical status quo with the current IBC. Countless other revisions have been made as well. Some terms have been modified for purposes of clarity and consistency. Building assemblies have been changed to building elements. Draftstopping has been changed to draftblocking. Examples of flamestopping methods have been included in the definition of flamestop. Numerous technical

provisions have been improved, such as, the alternative firestopping methods listed in Sections 715.6.6.1.1 through 715.6.6.1.12. Smoke barrier and smoke partition charging requirements have been included in Section 715.5.2.4.1. Many specific opening protective assembly technical requirements have been reviewed and corrected or clarified for the purposes of technical accuracy. Fundamental fire zone provisions contained in Section 715.2 have been simplified. All of these modifications, and many others, are the result of constructive comments by study group members as well as other interested parties.

Despite the fact that the proposal had been modified to address all constructive criticism, on May 20, 2008 the CTC Vertical Openings Study Group voted to discontinue work on Item FS162 in favor of developing a new proposal. This action was based on the realization that due to internal differences of technical opinion, it was unlikely that study group unanimity could be achieved on FS162. On May 22, 2008, the IBC Code Technology Committee also voted not to support Item FS162.

The public comment being offered has attempted to address the comments and concerns voiced by both the IBC Fire Safety Code Development Committee and floor testimony in Palm Springs. Suggested adjustments in Table 715.2 have been made. Unfortunately, the proposal has proven to be too controversial with those opposed to this clean sheet concept.

Although one and a half years may not seem like much time in code development terms, a considerable amount of effort by a diverse group of individuals has resulted in a viable and necessary improvement in a fundamental chapter of the International Building Code. This proposal represents an initiative intended to clarify the system used in the code for the determination of appropriate protection requirements for openings in horizontal assemblies so as to encourage consistent interpretations and applications of applicable provisions. The format and organization presented in this code change represents a significant improvement over current highly fragmented and disjoined opening protection requirements.

It is hoped that 2/3 of the voting members will recognize the need for quantum improvement in this tremendously important area of the IBC and also recognize the considerable effort by many recognized experts in the field of fire migration. Inclusion of this system in the 2009 Edition of the IBC will greatly enhance the usability of current provisions while providing a format that will accommodate future developments in the area of fire migration.

Final Action: AS AM AMPC____ D

FS165-07/08, Part II

803.8 (New)

THIS CODE CHANGE WILL BE HEARD ON THE IFC PORTION OF THE HEARING ORDER.

NOTE: PART I DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA. PART I IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY FOLLOWING ALL OF PART II.

Proposed Change as Submitted:

Proponent: Jim Lathrop, Koffel Associates, Inc., representing Bobrick

PART II – IFC

Add new text as follows:

803.8 High Density Polyethylene (HDPE). Where high density polyethylene is used as an interior finish it shall comply with Section 803.1.2. (Supp) of the IBC

Reason: HDPE is a thermoplastic that when it burns gives off considerable energy and produces a pooling flammable liquids fire. Recent full scale room-corner tests using NFPA 286 have demonstrated a significant hazard. These tests had to be terminated prior to the standard 15 minute duration due to flashover occurring, yet there was still much of the product left to burn. Extensive flammable liquid pool fires occurred during the tests. Yet this same material when tested in accordance with the tunnel test, ASTM E-84, is often given a FSI of 25 or less. However the resulting test is so intense some labs will not test HDPE partitions in their tunnel due to the damage it can do to the tunnel. This proposal will assure that when using HDPE partitions they will be formulated in such a manner to reduce the hazard that they present. Following is some of the data from one of the NFPA 286 tests: Peak HRR (excl burner) 1733 kW; Total Heat Released (excl. burner) 121 MJ; Peak Heat Flux to the floor 35.2 kW/m^2; Peak Avg Ceiling Temp 805^{o}C, 1481^{o}F

Cost Impact: NFPA 286 is a more expensive test than is ASTM E-84 however it yields usable data that ASTM E-84 does not, and the test arrangement is more representative of how the product is used.

PART II – IFC
Committee Action: **Approved as Submitted**

Committee Reason: This change identifies a known interior finish hazard, provides retroactive regulation of it and is consistent with the action taken by the IBC-FS Committee.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Lawrence G. Perry, representing Building Owners and Managers Association (BOMA) International, requests Disapproval.

Commenter's Reason: This retroactive portion of this proposal should be disapproved.
This proposal seeks to prohibit the use of, and would therefore require the removal of, any interior finish made of HDPE, unless it can be proven they have been tested in accordance with NFPA 286. Regardless of the performance of this material, a blanket prohibition, with unknown impact on existing facilities, has not been justified for all buildings of all occupancies, whether sprinklered or not. It is unclear what mechanism could reasonably be used if this provision stands. How would a local jurisdiction assess every interior finish in their jurisdiction, to determine how many are made of HDPE, and how many have not been tested per NFPA 286? If there is adequate substantiation (based on tests dealing only with toilet partitions) to warrant this additional requirement on this material in new buildings (whether sprinklered or not), then part 1 can be approved, but imposing this retroactively has not been justified.

Final Action: AS AM AMPC____ D

NOTE: PART I REPRODUCED FOR INFORMATIONAL PURPOSES ONLY – SEE ABOVE

FS165-07/08, PART I – IBC FIRE SAFETY

Add new text as follows:

803.9 High Density Polyethylene (HDPE). Where high density polyethylene is used as an interior finish it shall comply with Section 803.1.2. (Supp)

(Renumber subsequent sections)

Reason: HDPE is a thermoplastic that when it burns gives off considerable energy and produces a pooling flammable liquids fire. Recent full scale room-corner tests using NFPA 286 have demonstrated a significant hazard. These tests had to be terminated prior to the standard 15 minute duration due to flashover occurring, yet there was still much of the product left to burn. Extensive flammable liquid pool fires occurred during the tests. Yet this same material when tested in accordance with the tunnel test, ASTM E-84, is often given a FSI of 25 or less. However the resulting test is so intense some labs will not test HDPE partitions in their tunnel due to the damage it can do to the tunnel. This proposal will assure that when using HDPE partitions they will be formulated in such a manner to reduce the hazard that they present. Following is some of the data from one of the NFPA 286 tests; Peak HRR (excl burner) 1733 kW; Total Heat Released (excl. burner) 121 MJ; Peak Heat Flux to the floor 35.2 kW/m^2; Peak Avg Ceiling Temp 805^{o}C, 1481^{o}F

Cost Impact: NFPA 286 is a more expensive test than is ASTM E-84 however it yields usable data that ASTM E-84 does not, and the test arrangement is more representative of how the product is used.

PART I – IBC FIRE SAFETY
Committee Action: **Approved as Modified**

803.9 High Density Polyethylene (HDPE). Where high density polyethylene is used as an interior finish it shall comply with the requirements of Section 803.1.2. (Supp)

Committee Reason: The committee agreed that these products are being used and there performance is critical to public health and safety; therefore these products should be regulated and this proposal is appropriate. The modification results in more enforceable language.

Assembly Action: **None**

FS166-07/08, Part II
IFC 803.8 (New)

THIS CODE CHANGE WILL BE HEARD ON THE IFC PORTION OF THE HEARING ORDER.

NOTE: PART I DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA. PART I IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY FOLLOWING ALL OF PART I I.

Proposed Change as Submitted:

Proponent: James Lathrop, Koffel Associates, Inc., representing Bobrick

PART II – IFC

Add a new text as follows:

803.8 High Density Polyethylene (HDPE). Where high density polyethylene is used for toilet room privacy partitions, the partitions shall comply with Section 803.1.2. (Supp) of the IBC

Reason: (IBC-FS and IFC) This proposal limits the HDPE restrictions to only HDPE used as toilet room privacy partitions. Although we believe that the use of HDPE should be regulated by NFPA 286 regardless of where the partition is used, we acknowledge that the testing done was on toilet room privacy partitions and this proposal will give the committee the opportunity to so limit it should they desire.

HDPE is a thermoplastic that when it burns gives off considerable energy and produces a pooling flammable liquids fire. Recent full scale room-corner tests using NFPA 286 have demonstrated a significant hazard. These tests had to be terminated prior to the standard 15 minute duration due to flashover occurring, yet there was still much of the product left to burn. Extensive flammable liquid pool fires occurred during the tests. Yet this same material when tested in accordance with the tunnel test, ASTM E-84, is often given a FSI of 25 or less. However the resulting test is so intense some labs will not test HDPE partitions in their tunnel due to the damage it can do to the tunnel. This proposal will assure that when using HDPE partitions they will be formulated in such a manner to reduce the hazard that they present. Following is some of the data from one of the NFPA 286 tests: Peak HRR (excl burner) 1733 kW; Total Heat Released (excl. burner) 121 MJ; Peak Heat Flux to the floor 35.2 kW/m^2; Peak Avg Ceiling Temp 805^{o}C, 1481^{o}F

Cost Impact: NFPA 286 is a more expensive test than is ASTM E-84 however it yields usable data that ASTM E-84 does not, and the test arrangement is more representative of how the product is used.

PART II – IFC
Committee Action: **Approved as Submitted**

Committee Reason: This change highlights a known interior finish and construction hazard which is often overlooked in the inspection process and provides retroactive regulation of it.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Lawrence G. Perry, Building Owners and Managers Association (BOMA) International, requests Disapproval.

Commenter's Reason: This proposal should be disapproved. In Palm Springs, the Fire Safety Committee disapproved the portion applicable to new buildings, while the Fire Code Committee approved the retroactive requirements for existing buildings. This inconsistency is unacceptable.

This proposal seeks to prohibit the use of, and would therefore require the removal of, toilet partitions made of HDPE, unless they have been tested in accordance with NFPA 286. Regardless of the performance of this material, a blanket prohibition, with unknown impact on existing facilities, has not been justified for all buildings of all occupancies, whether sprinklered or not. It is unclear what mechanism could reasonably used if this provision stands. How would a local jurisdiction assess every toilet partition in their jurisdiction, to determine how many are made of HDPE, and how many have not been tested per NFPA 286?

Final Action: AS AM AMPC____ D

NOTE: PART I REPRODUCED FOR INFORMATIONAL PURPOSES ONLY – SEE ABOVE

FS166-07/08, PART I – IBC FIRE SAFETY

Add a new text as follows:

803.9 High Density Polyethylene (HDPE). Where high density polyethylene is used for toilet room privacy partitions, the partitions shall comply with Section 803.1.2. (Supp)

(Renumber subsequent sections)

Reason: Same as Part II.

PART I – IBC FIRE SAFETY
Committee Action: **Disapproved**

Committee Reason: Based on the proponent's request, which was based on the committee's actions taken on FS165-07/08.

Assembly Action: **None**

FS168-07/08
803.11.4

Proposed Change as Submitted:

Proponent: Douglas H. Evans, PE, Clark County, NV, representing Department of Development Services

Revise as follows:

803.11.4 (Supp) Materials. An interior wall or ceiling finish that is not more than 0.25 inch (6.4 mm) thick shall be applied directly against a noncombustible backing.

Exceptions:

1. ~~Class A materials, in accordance with Section 803.1.1 or 803.1.2.~~ Non-combustible materials.
2. Materials where the qualifying tests were made with the material suspended or furred out from the noncombustible backing.

Reason: Taking into account how the E 84 test is performed, this code allowance has no basis in physics. Most thin combustible materials take on the burning characteristics of their substrate. In the E 84 furnace, thin combustible materials are held in place with chicken wire on top of one-quarter inch metal rods two feet on center down the length of the furnace. As tested, the substrate is the noncombustible lid of the furnace. The fire dynamics issue has to do with mass to surface burning ratio. The more surface, and less mass, exposed to oxygen and heat, the more apt a material is to burn (dust explosions are one example). As such, many thin combustible materials can obtain a Class A rating, but may readily burn when they have no substrate and are exposed to an ignition source. The paper on drywall is one such example.

An additional concern is the potential for adverse interaction with sprinklers. If a fire originates between four heads, when the heat plume impinges on the thin combustible ceiling, there is no assurance that sprinklers in the plane of the membrane will activate prior to the membrane deteriorating. If the membrane degrades from the heat, the heat will enter the void above the membrane and the sprinklers protecting the void will activate. Sprinklers above the membrane will then pre-wet the membrane and the sprinkler piping penetrating the membrane. This situation may allow the fire to spread below the membrane.

Cost Impact: It is unlikely this subject impacts most interior finish installations, but for those impacted, the cost of construction will increase.

Committee Action: **Approved as Submitted**

Committee Reason: The committee agreed that the term “non-combustible” was more appropriate for exception #1 to Section 803.11.4 based on the fact that some materials that can qualify as Class A materials really are not intended to be under the scope of this exception because they may readily burn if not installed on a noncombustible backing.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Sam W. Francis, American Forest & Paper Association (AF&PA), requests Disapproval.

Commenter's Reason: The proponent of FS168-08/09 has confused the “installation requirements” with the “test methods”. In this proposal, the proponent talks about how the ceiling of the E84 furnace becomes the noncombustible surface and how that gives misleading results. He also describes the E84 test protocol which permits thin material to be held in place by “chicken wire supported by 1/4 inch rods” in the tunnel. E84 clearly only allows this to happen for thin materials which will not be attached to a substrate. However, the main paragraph of this section calls for the material to “be “applied directly against a noncombustible backing.”

Further evidence that the proponent is confused about the relocated section is his reference to the wire-and-rods attachment in an E84 test tunnel. Excerpted from the E84 standard:

“X1.8 Thin Membranes X1.8.1 Single-layer membranes or thin laminates consisting of a limited number of similar or dissimilar layers **not intended for adherence to another surface** may be supported on poultry netting placed on steel rods in accordance with X1.1.2.2 and X1.1.2.3. Netting shall be 20-gage, 2-in.(51-mm) hexagonal galvanized steel poultry netting conforming to Specification A390. If so tested, the specimen shall be additionally tested, bonded to a substrate representative of a field installation."

The paragraph which is proposed for amendment states that the material must be attached to a noncombustible backing when tested in accordance with E84. E84 prohibits the use of wire-and-rods mounting for materials intended to be attached to some substrate and therefore could not be performed using this protocol.

The proponent describes the application of a “membrane” installed beneath sprinklers which is, in his example, burned off quickly. Section 803.11clearly states that these materials are to be installed attached to noncombustible material. If that is done, how then is it (the noncombustible backing) supposed to burn off?

Additionally, there is no loss record offered to demonstrate that the current requirements have resulted in problems. Absent any fundamental flaw in the current requirements, this proposal should be Denied. In point of fact, if the problems are in the test methods cited in the proponent's reason statement, it should be taken up at the ASTM committee E05, not changed in the IBC.

Two years ago, in code change proposal FS 160-06/07, which reorganized the provisions addressing this topic and which is shown below, Dr. Hirschler said, in his reason statement, that the change makes no alteration to the technical content of the section. Instead, it made clear that three test methods are referenced and when each test method is to be used. Principally, this change was to make the requirements for foam plastics and textiles more clear. As can be seen below, Section 803.11.4 was unaltered. It makes clear what the installation requirements are for finish materials to be applied to fire-resistance rated walls, ceilings or structural elements. As previously stated above, the proponent has confused the "installation requirements" with the test method.

Secondly, there is no loss record offered to demonstrate that the current requirements have resulted in problems. Absent any fundamental flaw in the current requirements, this should be denied. In point of fact, if the problems are in the test methods, that should be taken up at the ASTM committee, not here.

FS 160-06/-7 (excerpted below)

~~803.4~~ 803.11 Application of interior finish materials to fire-resistance rated structural elements. Where these interior finish materials are applied on walls, ceilings or structural elements required to have a fire-resistance rating or to be of noncombustible construction, they shall comply with the provisions of this section.

~~803.4.1~~ 803.11.1 Direct attachment and furred construction. Where walls and ceilings are required by any provision in this code to be of fire-resistance-rated or noncombustible construction, the interior finish material shall be applied directly against such construction or to furring strips not exceeding 1.75 inches (44 mm) applied directly against such surfaces. The intervening spaces between such furring strips shall comply with one of the following:

1. be filled with material that is inorganic or non combustible,
2. be filled with material that meets the requirements of a or Class A material in accordance with Section 803.1.1 or 803.1.2 or
3. shall be fireblocked at a maximum of 8 feet (2438 mm) in any direction in accordance with Section 717.

~~803.4.2~~ 803.11.2 Set-out construction. Where walls and ceilings are required to be of fire-resistance-rated or noncombustible construction and walls are set out or ceilings are dropped distances greater than specified in Section 803.11.1 803.4.1, Class A finish materials, in accordance with Section 803.1.1 or 803.1.2, shall be used except where interior finish materials are protected on both sides by an automatic sprinkler system or attached to noncombustible backing or furring strips installed as specified in Section 803.11.1 803.4.1. The hangers and assembly members of such dropped ceilings that are below the main ceiling line shall be of noncombustible materials, except that in Type III and V construction, fire-retardant- treated wood shall be permitted. The construction of each set-out wall shall be of fire-resistance-rated construction as required elsewhere in this code.

~~803.4.3~~ 803.11.3 Heavy timber construction. Wall and ceiling finishes of all classes as permitted in this chapter that are installed directly against the wood decking or planking of Type IV construction or to wood furring strips applied directly to the wood decking or planking shall be fireblocked as specified in Section ~~803.4.1~~ 803.11.1.

~~803.4.4~~ 803.11.4 Materials. An interior wall or ceiling finish that is not more than 0.25 inch (6.4 mm) thick shall be applied directly against a noncombustible backing.

Exceptions:

1. Class A materials, in accordance with Section 803.1.1 or 803.1.2.
2. Materials where the qualifying tests were made with the material suspended or furred out from the noncombustible backing.

Final Action: AS AM AMPC____ D

FS174-07/08, Part I

1404.9

Proposed Change as Submitted:

Proponent: Marcelo M. Hirschler, GBH International, representing American Fire Safety Council

PART I – IBC FIRE SAFETY

Revise as follows:

1404.9 Vinyl siding. Vinyl siding shall be certified and labeled as conforming to the requirements of ASTM D 3679 by an approved quality control agency.

Exception: Backed vinyl siding.

Reason: A product has been brought into the market, known as "backed vinyl siding", which has a vinyl (PVC) siding front and a foam plastic insulation backing. The backing is normally polystyrene foam insulation. The fire performance of polystyrene foam insulation is such that it has long been decided that it should not be used exposed in the built environment, without a thermal barrier. The fire test in ASTM D 3679-2004, for vinyl siding, is ASTM D 635 (or UL 94 HB). That test serves purely as a quality control tool for a material with good fire performance, such as vinyl siding. However, ASTM D 635 is an inappropriate fire test for either polystyrene foam or for a combined product that is composed of vinyl siding and polystyrene foam.

A standard specification needs to be developed for "backed vinyl siding" before it is allowed on the built environment. At present the building code states, in section 1405.13.1, when referring to the installation of vinyl siding, that "The siding shall be applied over sheathing or materials listed in Section 2304.6." Those materials are contained in Table 2304.6, namely: wood boards, fiberboard, wood structural panel, M-S "Exterior Glue" and M-2 "Exterior Glue" particleboard, gypsum sheathing, gypsum wallboard and reinforced cement mortar.

A proposal has been made to the ASTM committee D20, on plastics, subcommittee D20.24, on plastic building products, for a revision of ASTM D 3679 to add "backed vinyl siding" into the standard specification. The proposal recommends the following two changes that are detrimental to fire safety: (a) that the same specification address the actual vinyl siding and the backed vinyl siding and (b) that the backing material be tested on its own to ASTM E 84 (Steiner tunnel) and that it be required to meet simply a 75 flame spread index (the flame spread index for Class B). The fire performance of rigid PVC is inevitably very different from that of a combination of rigid PVC and polystyrene foam, and building products must be tested as used, namely the combination should be the product to be tested, because it has long been shown that independent testing of individual components of a composite product can give a misleading indication of the fire performance of the composite. It should also be noted that foam plastic insulation meeting a Class B is only allowed in the built environment when it is covered by a thermal barrier or otherwise protected, as described in Chapter 26 and in Chapter 8. Vinyl siding is not an adequate thermal barrier.

Backed vinyl siding should have a separate standard specification, that includes all the proper requirements and should not be included in the specification for vinyl siding. In the proposed revised ASTM D 3679 specification, there are separate provisions for the vinyl and the backing, of various kinds, showing that this is a distinctly different product from normal vinyl siding.

Key proposed changes to sections of ASTM D 3679:

1. Scope

1.1 This specification establishes requirements and test methods for the materials, dimensions, warp, shrinkage, impact strength, expansion, appearance, and windload resistance of extruded single-wall vinyl siding and backed vinyl siding ~~manufactured from rigid (unplasticized) PVC compound~~ . Methods of indicating compliance with this specification are also provided.

1.7 Unless otherwise specified, backed vinyl siding shall be tested with the backing in place.

3.2.1 Backed vinyl siding - a vinyl cladding product sold with manufacturer-installed backing material as an integral part of the cladding product. The vinyl cladding portion of backed vinyl siding meets the definition of vinyl siding. Backed vinyl siding is intended to be installed only with the integral backing.

4. Materials and Manufacture

4.1 The vinyl ~~siding~~ shall be made of one or more layers of poly (vinyl chloride) (PVC) compound. Any layers of materials other than poly (vinyl chloride) (PVC) compound shall be kept to less than 20% by volume.

4.3 The poly (vinyl chloride) siding material, when tested in accordance with Test Method D 635, shall not exceed an average extent of burn of 4 in. (100 mm), with an average time of burn not to exceed 10 s. A minimum sample thickness of 0.035 in. (0.9 mm) is required.

4.4 For backed vinyl siding, the backing shall have a Flame Spread Index not greater than 75 and a Smoke Developed Index not greater than 450 when tested separately under method E84.

5. Physical Requirements

5.0 The provisions of 5.1 through 5.6 apply only to the vinyl cladding, exclusive of any backing material. Where necessary to perform testing, any backing material shall be removed.

5.11 Windload Resistance—The siding panel(s) shall be able to withstand a minimum static test pressure of 15.73 lbf/ft^2 (753 Pa) when tested in accordance with 6.14. Backed siding shall be able to withstand a minimum test pressure of 30.58 lbf/ft^2 (2093 Pa) when tested in accordance with 6.14. If the manufacturer of backed siding provides documentation to support compensation for pressure equalization, the test pressure shall be determined from Annex A1 using the documented pressure equalization factor.

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

PART I – IBC FIRE SAFETY

Committee Action: **Disapproved**

Committee Reason: The committee was concerned that there was no definition of "backed vinyl siding" and that the exception seemed to exempt backed vinyl siding from all code requirements. Lastly, the committee felt that a reference to Chapter 26 should be included assuming that the backing material is typically foam plastic material.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Marcelo M. Hirschler, GBH International, representing American Fire Safety Council, requests Approved as Modified by this public comment.

Modify proposal as follows:

SECTION 1402
DEFINITIONS

Backed vinyl siding. A vinyl cladding product sold with manufacturer-installed foam plastic backing material as an integral part of the cladding product. The vinyl cladding portion of backed vinyl siding meets the definition of vinyl siding.

1404.9 Vinyl siding. Vinyl siding shall be certified and labeled as conforming to the requirements of ASTM D 3679 by an approved quality control agency.

~~**Exception:** Backed vinyl siding.~~

1404.10 Backed vinyl siding. Backed vinyl siding shall be certified and labeled as conforming to the requirements in Sections 1404.10.1 through **1404.10.3** by an approved quality control agency.

1404.10.1 Physical requirements. The physical requirements of backed vinyl siding shall comply with the requirements of Section 5 of ASTM D 3679.

1404.10.2 Foam plastic backing. The foam plastic backing shall comply with the requirements of Section 2603 of this code.

1404.10.3 Flame spread and smoke developed indices. The backed vinyl siding system shall have a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested as an assembly in the maximum thickness intended for use in accordance with ASTM E 84 or UL 723.

(Renumber subsequent sections)

Commenter's Reason: A product known as "backed vinyl siding" has a vinyl (PVC) siding front and a foam plastic insulation (normally polystyrene foam insulation) backing. The fire test in ASTM D 3679, for vinyl siding, is a very small scale Bunsen burner test, ASTM D 635 (or UL 94 HB). That test is excellent as a quality control tool for a material with good fire performance, such as vinyl siding. However, ASTM D 635 is an inappropriate fire test for either polystyrene foam or for a combined product that is composed of vinyl siding and polystyrene foam.

A standard specification should have been developed for "backed vinyl siding" before it was allowed for use. Unfortunately, no such standard specification exists yet and "backed vinyl siding" is being approved based on ASTM D 3679. This is not safe. When a proposal was made, by the vinyl siding industry, to add "backed vinyl siding" into the ASTM D 3679 standard specification, that change was opposed by the membership. Therefore, the code change recommends the following:

(1) Backed vinyl siding must meet the same physical requirements as vinyl siding,
(2) The foam backing material must comply with all the requirements of be subjected to a fire test on its own, like all foam plastic materials are required to do, to ASTM E 84 (Steiner tunnel), with a 75 flame spread index (Class B). This is being done by using the requirements of section 2603 of the IBC (which includes section 2603.4.1.10, with the specific requirements for siding backer board).
(3) The entire backed vinyl siding product (with all components) must also meet a fire test, with the requirements for a Class B in the ASTM E 84 fire test. This will ensure that the performance of the entire product is understood, since the product contains three components: vinyl siding, foam plastic backing and adhesive glue (which can also severely affect the fire performance).

The definition proposed for "backed vinyl siding" was generated by the Vinyl Siding Institute", as part of their effort to develop a standard specification for the product.

It is very important that those backed vinyl siding products that do not meet these safety requirements not be permitted to continue being used simply based on an evaluation report and a specification for vinyl siding without the backing. Vinyl siding is not an adequate thermal barrier.

Final Action: AS AM AMPC____ D

FS174-07/08, Part II
R703.11

Proposed Change as Submitted:

Proponent: Marcelo M. Hirschler, GBH International, representing American Fire Safety Council

PART II – IRC BUILDING/ENERGY

Revise as follows:

R703.11 Vinyl siding. Vinyl siding shall be certified and labeled as conforming to the requirements of ASTM D 3679 by an approved quality control agency.

Exception: Backed vinyl siding.

Reason: A product has been brought into the market, known as "backed vinyl siding", which has a vinyl (PVC) siding front and a foam plastic insulation backing. The backing is normally polystyrene foam insulation. The fire test in ASTM D 3679-2004, for vinyl siding, is ASTM D 635 (or UL 94 HB). That test serves purely as a quality control tool for a material with good fire performance, such as vinyl siding. However, ASTM D 635 is an inappropriate fire test for either polystyrene foam or for a combined product that is composed of vinyl siding and polystyrene foam. A standard specification needs to be developed for "backed vinyl siding" before it is allowed on the built environment. At present the residential code allows the installation of vinyl siding over "foam plastic sheathing into stud" but the vinyl siding itself needs to meet the ASTM D 3679 standard specification and Table R703.4 describes some support requirements and section R314.5.7 describes when foam plastic insulation siding backer board is permitted to be used without a thermal barrier. Section R314.5.7 specifies a maximum thickness of the foam plastic insulation, a maximum potential heat and that the foam plastic meet comply with one of the following: (1) be separated from the building by at least 2 inches of mineral fiber insulation, or (2) comply with one of the large scale fire tests, such as the NFPA 286 room corner test or (3) be installed over existing exterior wall finish in conjunction with re-siding.

A proposal has been made to the ASTM committee D20, on plastics, subcommittee D20.24, on plastic building products, for a revision of ASTM D 3679 to add "backed vinyl siding" into the standard specification. The proposal recommends the following two changes that are detrimental to fire safety: (a) that the same specification address the actual vinyl siding and the backed vinyl siding and (b) that the backing material be tested on its own to ASTM E 84 (Steiner tunnel) and that it be required to meet simply a 75 flame spread index (the flame spread index for Class B). The fire performance of rigid PVC is inevitably very different from that of a combination of rigid PVC and polystyrene foam, and building products must be tested as used, namely the combination should be the product to be tested, because it has long been

shown that independent testing of individual components of a composite product can give a misleading indication of the fire performance of the composite. It should also be noted that foam plastic insulation meeting a Class B is only allowed in the building code environment when it is covered by a thermal barrier or otherwise protected, as described in Chapter 26 and in Chapter 8 of the IBC. Vinyl siding is not an adequate thermal barrier.

Backed vinyl siding should have a separate standard specification, that includes all the proper requirements and should not be included in the specification for vinyl siding. In the proposed revised ASTM D 3679 specification, there are separate provisions for the vinyl and the backing, of various kinds, showing that this is a distinctly different product from normal vinyl siding.

Key proposed changes to sections of ASTM D 3679:

1. Scope

1.1 This specification establishes requirements and test methods for the materials, dimensions, warp, shrinkage, impact strength, expansion, appearance, and windload resistance of extruded single-wall vinyl siding and backed vinyl siding ~~manufactured from rigid (unplasticized) PVC compound~~ . Methods of indicating compliance with this specification are also provided.

1.7 Unless otherwise specified, backed vinyl siding shall be tested with the backing in place.

3.2.1 Backed vinyl siding - a vinyl cladding product sold with manufacturer-installed backing material as an integral part of the cladding product. The vinyl cladding portion of backed vinyl siding meets the definition of vinyl siding. Backed vinyl siding is intended to be installed only with the integral backing.

4. Materials and Manufacture

.1 The vinyl ~~siding~~ shall be made of one or more layers of poly(vinyl chloride) (PVC) compound. Any layers of materials other than poly (vinyl chloride) (PVC) compound shall be kept to less than 20% by volume.

4.3 The poly (vinyl chloride) siding material, when tested in accordance with Test Method D 635, shall not exceed an average extent of burn of 4 in. (100 mm), with an average time of burn not to exceed 10 s. A minimum sample thickness of 0.035 in. (0.9 mm) is required.

4.4 For backed vinyl siding, the backing shall have a Flame Spread Index not greater than 75 and a Smoke Developed Index not greater than 450 when tested separately under method E84.

5. Physical Requirements

5.0 The provisions of 5.1 through 5.6 apply only to the vinyl cladding, exclusive of any backing material. Where necessary to perform testing, any backing material shall be removed.

5.11 Windload Resistance—The siding panel(s) shall be able to withstand a minimum static test pressure of 15.73 lbf/ft^2 (753 Pa) when tested in accordance with 6.14. Backed siding shall be able to withstand a minimum test pressure of 30.58 lbf/ft^2 (2093 Pa) when tested in accordance with 6.14. If the manufacturer of backed siding provides documentation to support compensation for pressure equalization, the test pressure shall be determined from Annex A1 using the documented pressure equalization factor.

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

PART II – IRC B/E
Committee Action: Disapproved

Committee Reason: This proposal creates redundancy because the foam plastic backing is already referenced in Section R314. Industry is working on a standard for vinyl siding that includes the backing. The proponent needs to bring this back when the standard is completed.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Marcelo M. Hirschler , GBH International, representing American Fire Safety Council, requests Approved as Modified by this public comment.

Modify proposal as follows:

CHAPTER 2
DEFINITIONS

Backed vinyl siding. A vinyl cladding product sold with manufacturer-installed foam plastic backing material as an integral part of the cladding product. The vinyl cladding portion of backed vinyl siding meets the definition of vinyl siding.

R703.11 Vinyl siding. Vinyl siding shall be certified and labeled as conforming to the requirements of ASTM D 3679 by an approved quality control agency.

~~**Exception:** Backed vinyl siding.~~

R703.11.1 Installation. Vinyl siding, soffit and accessories shall be installed in accordance with the manufacturer's installation instructions.

R703.12. Backed vinyl siding. Backed vinyl siding shall be certified and labeled as conforming to the requirements in Sections R703.12.1 through R703.12.3 by an approved quality control agency.

R703.12.1 Physical requirements. The physical requirements of backed vinyl siding shall comply with the requirements of Section 5 of ASTM D 3679.

R703.12.2 Foam plastic backing. The foam plastic backing shall comply with the requirements of Section R314 of this code.

R703.12.3 Flame spread and code developed indices. The backed vinyl siding system shall have a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested as an assembly in the maximum thickness intended for use in accordance with ASTM E 84 or UL 723.

Commenter's Reason: A product known as "backed vinyl siding" has a vinyl (PVC) siding front and a foam plastic insulation (normally polystyrene foam insulation) backing. The fire test in ASTM D 3679, for vinyl siding, is a very small scale Bunsen burner test, ASTM D 635 (or UL 94 HB). That test is excellent as a quality control tool for a material with good fire performance, such as vinyl siding. However, ASTM D 635 is an inappropriate fire test for either polystyrene foam or for a combined product that is composed of vinyl siding and polystyrene foam.

A standard specification should have been developed for "backed vinyl siding" before it was allowed for use. Unfortunately, no such standard specification exists yet and "backed vinyl siding" is being approved based on ASTM D 3679. This is not safe. When a proposal was made, by the vinyl siding industry, to add "backed vinyl siding" into the ASTM D 3679 standard specification, that change was opposed by the membership. Therefore, the code change recommends the following:

(1) Backed vinyl siding must meet the same physical requirements as vinyl siding,
(2) The foam backing material must comply with all the requirements of be subjected to a fire test on its own, like all foam plastic materials are required to do, to ASTM E 84 (Steiner tunnel), with a 75 flame spread index (Class B). This is being done by using the requirements of section R314 of the IRC (which includes section R314.5.7, with the specific requirements for foam backer board).
(3) The entire backed vinyl siding product (with all components) must also meet a fire test, with the requirements for a Class B in the ASTM E 84 fire test. This will ensure that the performance of the entire product is understood, since the product contains three components: vinyl siding, foam plastic backing and adhesive glue (which can also severely affect the fire performance).

The definition proposed for "backed vinyl siding" was generated by the Vinyl Siding Institute", as part of their effort to develop a standard specification for the product.

It is very important that those backed vinyl siding products that do not meet these safety requirements not be permitted to continue being used simply based on an evaluation report and a specification for vinyl siding without the backing. Vinyl siding is not an adequate thermal barrier.

Final Action: AS AM AMPC____ D

FS176-07/08

1402.1 (New), 1404.11 (New), 1404.11.1 (New), 1404.11.2 (New), 1405.18 (New), 1405.18.1 (New), Chapter 35 (New)

Proposed Change as Submitted:

Proponent: Marcelo M. Hirschler, GBH International, representing American Fire Safety Council

1. Add new definition as follows:

POLYPROPYLENE SIDING. A shaped material, made principally from polypropylene homopolymer, or copolymer, which in some cases may contain fillers and/or reinforcements, that is used to clad exterior walls of buildings.

2. Add new text as follows:

1404.11 Polypropylene siding. Polypropylene siding shall be certified and labeled as conforming to the requirements of ASTM D 7254 by an approved quality control agency and shall meet the requirements of Sections 1404.11.1 or 1404.11.2.

1404.11.1 Flame spread index. The polypropylene siding material shall exhibit a flame spread index of no more than 200 and shall not generate flaming drips when tested in accordance with ASTM E 84 or UL 723 with a test specimen that is either self-supporting by its own structural characteristics or held in place by added supports along the test specimen surface.

1404.11.2 Heat release. The polypropylene siding material shall exhibit a peak rate of heat release not exceeding 400 kW/m^2 when tested in accordance with ASTM E 1354 at an incident heat flux of 50 kW/m^2, in the horizontal orientation and at the thickness intended for use.

1405.18 Polypropylene siding. Polypropylene siding conforming to the requirements of this section and complying with 1404.11 shall be permitted on exterior walls of buildings of Type V construction located in areas where the basic wind speed specified in Chapter 16 does not exceed 100 miles per hour (45 m/s) and the building height is less than or equal to 40 feet (12 192 mm) in Exposure C. Where construction is located in areas where the basic wind speed exceeds 100 miles per hour (45 m/s), or building heights are in excess of 40 feet (12 192 mm), tests or calculations indicating compliance with Chapter 16 shall be submitted. Polypropylene siding shall be secured to the building so as to provide weather protection for the exterior walls of the building.

1405.18.1 Application. The siding shall be applied over sheathing or materials listed in Section 2304.6. Siding shall be applied to conform with the water-resistive barrier requirements in Section 1403. Siding and accessories shall be installed in accordance with approved manufacturer's instructions. Unless otherwise specified in the approved manufacturer's instructions, nails used to fasten the siding and accessories shall have a minimum 0.313-inch (7.9 mm) head diameter and 0.125-inch (3.18 mm) shank diameter.

The nails shall be corrosion resistant and shall be long enough to penetrate the studs or nailing strip at least 0.75 inch (19 mm). Where the siding is installed horizontally, the fastener spacing shall not exceed 16 inches (406 mm) horizontally and 12 inches (305 mm) vertically. Where the siding is installed vertically, the fastener spacing shall not exceed 12 inches (305 mm) horizontally and 12 inches (305 mm) vertically.

3. Add standard to Chapter 35 as follows:

ASTM

D 7254-07 Standard Specification for Polypropylene (PP) Siding

Reason: Polypropylene siding is being used in combustible construction although the IBC does not permit it. Therefore, it is important to regulate the use of polypropylene siding in a way that it can be used safely. A new standard specification has been issued for polypropylene siding, ASTM D 7254. The specification addresses many of the key requirements for the material. Unfortunately the fire test requirement in ASTM D 7254 is not explicit enough in that it does not explain that testing using ASTM E 84 (Steiner tunnel) for materials that are to be used exposed should ensure that the material stays in place during the test. The standards committee responsible for the ASTM E 84 fire test (ASTM E05) decided that this issue should be addressed in the code rather than in the standard itself. Polypropylene that has not been appropriately fire retarded will release abundant amount of heat, much more than other combustible sidings permitted by the code, such as wood siding or vinyl (PVC) siding.

When tested in the cone calorimeter, ASTM E 1354, under the same conditions, it was found that non fire retarded polypropylene exhibits a peak heat release rate of 1509 kW/m^2, while a non fire retarded PVC material exhibits a peak heat release rate of 183 kW/m^2, and a Douglas fir material exhibits a peak heat release rate of 221 kW/m^2. Such a very high heat release rate is unacceptable for a siding material.

Recent fire tests were also conducted in the Steiner tunnel, ASTM E 84, on a rigid PVC material 0.06 in. thick and it exhibited a flame spread index of 10, while a fire retarded polypropylene material 0.15 in. thick exhibited a flame spread index of 50. This is a very adequate value, in view of the fact that the polypropylene material remained in place during the ASTM E 84 test and did not generate flaming drips.

This shows that it is possible to use fire retarded polypropylene materials that give very adequate flame spread values and also very adequate heat release values. Consequently, polypropylene siding should only be used when it is shown to exhibit the appropriate fire performance.

ASTM E 1354, cone calorimeter, is a test that is already referenced in the ICC family of codes in both the IFC and the IBC, in both cases with the same pass-fail criteria used here. In the IFC the test is being used for plastic materials in large wastebaskets (section 808.1) and in the IBC it is used for plastic materials in children's playgrounds (section 402.11.1).

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

This code change was heard by the IBC Structural Code Development Committee.

Analysis: Review of proposed new standard ASTM D7254-07 indicated that, in the opinion of ICC Staff, the standard did comply with ICC standards criteria.

Committee Action: **Disapproved**

Committee Reason: The committee felt that there was a lack of substantiation for the heat release limitations. Further, the committee agreed that these requirements appear to go beyond what is currently be done by industry (flame spread and heat release). Therefore, the committee disapproved this change.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Marcelo M. Hirschler, GBH International, representing American Fire Safety Council, requests Approved as Modified by this public comment.

Modify proposal as follows:

1404.11 Polypropylene siding. Polypropylene siding shall be certified and labeled as conforming to the physical requirements of ASTM D 7254 by an approved quality control agency and ~~shall meet the~~ as meeting the fire safety requirements of Sections 1404.11.1 or 1404.11.2.

1404.11.1 Flame spread index. The polypropylene siding material shall exhibit a flame spread index of no more than 200 ~~and shall not generate flaming drips~~ when tested in accordance with ASTM E 84 or UL 723 with a test specimen that is either self-supporting by its own structural characteristics or held in place by added supports along the test specimen surface. The listing shall indicate that the material does not generate flaming drips during the test.

1404.11.2 Heat release ~~The polypropylene siding material shall exhibit a peak rate of heat release not exceeding 400 kW/m^2 when tested in accordance with ASTM E 1354 at an incident heat flux of 50 kW/m^2, in the horizontal orientation and at the thickness intended for use~~. A 4 foot by 8 foot section of polypropylene siding material shall exhibit a maximum heat release rate not exceeding 100 kW when tested in accordance with UL 1975.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: There are several reasons for the need for this proposal. Polypropylene siding is a material that will burn very vigorously when exposed to a very small ignition source. In fact, polypropylene is one of the plastics materials (together with polyethylene) that exhibit the highest level of heat release of all plastics. When polypropylene burns it releases about 7 times as much heat as wood and much more heat than foam plastics. Therefore, polypropylene siding should not be allowed to simply replace wood siding without added fire safety requirements. ASTM D 7254 alone does not have adequate fire safety requirements for polypropylene siding.

The committee felt that using a small scale test, such as ASTM E 1354, was inappropriate, and therefore a larger scale test (UL 1975) is being recommended here; that is the same test used for foam plastic materials in kiosks and in exhibit booths and in plastic signs. The pass/fail criterion of 150 kW is used for foam plastic signs in malls. When polypropylene siding that has not been properly fire retarded and/or reinforced with cellulose or wood or fibers is tested in the Steiner tunnel test (ASTM E 84) a puddle is quickly formed on the floor from the molten polypropylene material and no valid test result with ceiling flame spread is obtained.

It is important to note also that polypropylene siding and vinyl siding look very much alike, even though vinyl siding has excellent fire performance. Vinyl siding is made of rigid PVC and is required to meet only a small mild fire test (ASTM D 635 or UL 94 HB) in its specification. That is perfectly appropriate if it is indeed vinyl siding as the fire test is simply a quality control tool.

It is of interest that only one company, Nailite, has an evaluation report for polypropylene siding (namely NER 580, reissued in December 2005, long before ASTM D 7254, the specification for polypropylene siding, was developed). On the other hand, many companies have evaluation reports for vinyl siding and many companies sell vinyl siding, including some that do not advertise that fact. This leads to the potential for confusion in the marketplace.

Final Action: AS AM AMPC____ D

FS179-07/08
1405.5.2

THIS CODE CHANGE WILL BE HEARD ON THE IBC STRUCTURAL PORTION OF THE HEARING ORDER.

Proposed Change as Submitted:

Proponent: Charles B. Clark, Jr., Brick Industry Association, representing Masonry Alliance for Codes and Standards

Revise as follows:

1405.5.2 (Supp) Seismic requirements. Anchored masonry veneer located in Seismic Design Category C, D, E or F shall conform to the requirements of Section 6.2.2.10 of ACI 530/ASCE 5/ TMS 402. ~~Anchored masonry veneer located in Seismic Design Category D shall also conform to the requirements of Section 6.2.2.10.3.3 of ACI 530/ ASCE 5/ TMS 402.~~

Reason: To allow anchored masonry veneer located in Seismic Design Category D to be constructed in accordance with the Building Code Requirements for Masonry Structures (ACI 530/ ASCE 5/ TMS 402) which does not require joint reinforcement and mechanical attachment of anchors to the reinforcement.

This code change deals with anchored masonry veneer constructed in Seismic Design Category D. The current text in the IBC was introduced in the last code cycle and requires compliance with Section 6.2.2.10.3.3 of ACI 530/ ASCE 5/ TMS 402. This section requires anchored masonry veneer to include joint reinforcement and mechanical attachment of anchors to the reinforcement. This code change would remove these requirements from applying to veneer in Seismic Design Category D.

Opposition to this code change in previous code cycles (refer to S130-04/05 and FS177-06/07) has requested that tests be conducted which would demonstrate that these details are not necessary for anchored masonry veneer constructed in Seismic Design Category D. Such testing is currently underway. This code change is submitted with the understanding that data from these tests will be available for review prior to the hearing of the code change.

As with the previous code change proposals, we continue to assert that requiring anchored masonry veneer in Seismic Design Category D to include joint reinforcement and mechanical attachment of anchors to the reinforcement is totally unfounded for the following reasons:

1. TECHNICAL – There is no research, testing or analysis to support changing the ACI 530/ASCE 5/TMS 402 provisions. If the standard's provisions were changed, they would result in the most restrictive code provisions for anchored masonry veneer in the world. No other nation in the world requires masonry veneer to be detailed in this manner. Canada, not understanding why it's U.S. neighbor could even think of imposing such requirements, sponsored shake-table testing to investigate and concluded that they were not necessary. No research, testing or analysis has ever been put forward that would substantiate these more restrictive provisions.

However, there IS technical research, testing and analysis that supports the anchored masonry veneer provisions of ACI 530/ASCE 5/TMS 402. In particular, the following research paper and testing are of significance:

McGinley, M., Bennett, R., Johnson, E., "Effects of Horizontal Joint Reinforcement on the Seismic Behavior of Masonry Veneers," *6th International Masonry Conference*, November, 2002.

Turek, Ventura, "Out-of-Plane Shake-Table Testing of Brick Veneer With and Without Wire Joint Reinforcement," The University of British Columbia, June, 2002.

2. LIFE SAFETY – There is research testing to support that changing the detailing provisions for anchored masonry veneer in Seismic Design Category D in ACI 530/ASCE 5/TMS 402 is detrimental, not beneficial, to the performance of the veneer under seismic loading. Research shows that the horizontal joint reinforcement required for Seismic Design Category D actually facilitates the cracking of the veneer at the joint where it is included. If it is included, it can become a life safety issue.

3. CONSENSUS STANDARD – The Building Code Requirements for Masonry Structures (ACI 530/ASCE 5/TMS 402) is a consensus standard overseen by three organizations. These provisions are written under an ANSI-accredited, balanced process to ensure their objectivity.

For these reasons, we urge the body to adopt this modification returning the anchored masonry veneer provisions to those found in ACI 530/ASCE 5/TMS 402.

Bibliography:
McGinley, M., Bennett, R., Johnson, E., "Effects of Horizontal Joint Reinforcement on the Seismic Behavior of Masonry Veneers," *6th International Masonry Conference*, November, 2002.
McEwen, William, Wibowo, A., Adebar, P., Anderson, D., Effect of Veneer Joint Reinforcement on Brick Tie Embedment, *Ninth Canadian Masonry Symposium*, June, 2001.
Turek, Ventura, "Out-of-Plane Shake-Table Testing of Brick Veneer With and Without Wire Joint Reinforcement," The University of British Columbia, June, 2002.

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

Committee Action: **Disapproved**

Committee Reason: The testing that would support the proposed removal of the masonry veneer requirement for Seismic Design Category D is only partially complete at this time. The committee prefers to wait until that testing is complete and those results are made available before approving this proposal.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Charles B. Clark, Jr., Brick Industry Association, representing Masonry Alliance for Codes and Standards, requests Approval as Submitted.

Commenter's Reason: This Public Comment is filed anticipating the availability of test results that will support the removal of the current requirement to install horizontal joint reinforcement in anchored masonry veneer when constructed in Seismic Design Category D. The completion of such tests and the availability of the results of these tests were cited by the Structural Committee as the sole reason for their recommendation of disapproval. It is hoped that such test results will be available by the Final Action Hearings for consideration.

Final Action: AS AM AMPC____ D

FS196-07/08
2602, 2612 (New)

Proposed Change as Submitted:

Proponent: Jesse J. Beitel, Hughes Associates, Inc., representing American Composites Manufacturers Association

1. Delete without substitution:

SECTION 2602
DEFINITIONS

~~**REINFORCED PLASTIC, GLASS FIBER.** Plastic reinforced with glass fiber having not less than 20 percent of glass fibers by weight.~~

2. Add new definitions as follows:

SECTION 2602
DEFINITIONS

FIBER REINFORCED POLYMER. A polymeric composite material consisting of reinforcement fibers impregnated with a fiber-binding polymer which is then molded and hardened.

FIBERGLASS REINFORCED POLYMER. A polymeric composite material consisting of glass reinforcement fibers impregnated with a fiber-binding polymer which is then molded and hardened.

3. Add new text as follows:

SECTION 2612
FIBER REINFORCED POLYMER AND FIBERGLASS REINFORCED POLYMER

2612.1 General. The provisions of this section shall govern the requirements and uses of fiber reinforced polymer or fiberglass reinforced polymer in and on buildings and structures.

2612.2 Labeling and identification. Packages and containers of fiber reinforced polymer or fiberglass reinforced polymer and their components delivered to the job site shall bear the label of an approved agency showing the manufacturer's name, the product listing, product identification and information sufficient to determine that the end use will comply with the code requirements.

2612.3 Interior finish. Fiber reinforced polymer or fiberglass reinforced polymer used as interior finish shall comply with Chapter 8.

2612.4 Decorative materials and trim. Fiber reinforced polymer or fiberglass reinforced polymer used as decorative materials or trim shall comply with Section 806.

2612.5 Light transmitting materials. Fiber reinforced polymer or fiberglass reinforced polymer used as light transmitting materials shall comply with Sections 2606 through 2611 as required for the specific application.

2612.6 Exterior use. Fiber reinforced polymer or fiberglass reinforced polymer shall be permitted to be installed on the exterior walls of buildings of any type of construction when they meet the requirements of Sections 2603.5 and is fire-blocked in accordance with Section 717. The fiber reinforced polymer or the fiberglass reinforced polymer shall be designed for uniform live loads as required in Table 1607.1 as well as for snow loads, wind loads and earthquake loads as specified in Sections 1608, 1609 and 1613 respectively.

Exceptions:

1. When all of the following conditions are met:
   - 1.1. When the area of the fiber reinforced polymer or the fiberglass reinforced polymer does not exceed 20% of the respective wall area, the fiber reinforced polymer or the fiberglass reinforced polymer shall have a flame-spread index of 25 or less or when the area of the fiber reinforced polymer or the fiberglass reinforced polymer does not exceed 10% of the respective wall area, the fiber reinforced polymer or the fiberglass reinforced polymer shall have a flame-spread index of 75 or less. The flame-spread index requirement shall not be required for coatings or paints having a thickness of less than 0.036 inch (0.9 mm) that are applied directly to the surface of the fiber reinforced polymer or the fiberglass reinforced polymer
   - 1.2. Fireblocking complying with Section 717.2.6 shall be installed.
   - 1.3. The fiber reinforced polymer or the fiberglass reinforced polymer shall be installed directly to a noncombustible substrate or be separated from the exterior wall by one of the following materials: corrosion-resistant steel having a minimum base metal thickness of 0.016 inch (0.41 mm) at any point, Aluminum having a minimum thickness of 0.019 inch (0.5 mm) or other approved noncombustible material.
   - 1.4. The fiber reinforced polymer or the fiberglass reinforced polymer shall be designed for uniform live loads as required in Table 1607.1 as well as for snow loads, wind loads and earthquake loads as specified in Sections 1608, 1609 and 1613 respectively.
2. When installed on buildings that are 40 feet (12,190 mm) or less above grade, the fiber reinforced polymer or the fiberglass reinforced polymer shall meet the requirements of Section 1406.2 and shall comply with all of the following conditions:
   - 2.1. Where the fire separation distance is 5 feet (1524 mm) or less, the area of the fiber reinforced polymer or the fiberglass reinforced polymer shall not exceed 10% of the wall area Where the fire separation distance is greater than 5 feet (1524 mm) there shall be no limit on the area of the exterior wall coverage using fiber reinforced polymer or the fiberglass reinforced polymer.

2.2. The fiber reinforced polymer or the fiberglass reinforced polymer shall have a flame-spread index of 200 or less. The flame-spread index requirement shall not be required for coatings or paints having a thickness of less than 0.036 inch (0.9 mm) that are applied directly to the surface of the fiber reinforced polymer or the fiberglass reinforced polymer

2.3. Fireblocking complying with Section 717.2.6 shall be installed.

2.4. The fiber reinforced polymer or the fiberglass reinforced polymer shall be designed for uniform live loads as required in Table 1607.1 as well as for snow loads, wind loads and earthquake loads as specified in Sections 1608, 1609 and 1613 respectively.

Reason: The composites industry, material suppliers and manufacturers are working together to introduce FRP composites into the International Building Code. This activity is being conducted under the auspices of the American Composites Manufacturers Association (ACMA), by a collective group of companies focused on the building and construction market. The proposed code change to the IBC in this submittal will help building officials recognize FRP composites and ensure they are being properly used in building construction.

ACMA, headquartered in Arlington, VA is the national trade association representing the composites Industry. ACMA is the world's largest composites trade association, with more than 850 member companies, comprising manufacturers, materials and equipment suppliers, distributors, consultants, academia, end-users and other industry stakeholders. Formed in 1979 to provide education and support for composites fabricators and their suppliers in the successful operation of their businesses, ACMA continues to offer leading-edge services that are instrumental in regulatory compliance and formulation, education, training, market development and expansion.

Fiber reinforced polymer (FRP) composites are materials consisting of reinforcement fibers (natural or man-made) impregnated with a fiber-binding polymer (thermoset or thermoplastic) and are then molded and hardened into the intended shape. The reinforcement fibers (such as boron, glass, carbon, aramid) impart strength and stiffness to the composite, while the polymer resin matrix bind the fibers, providing bulk stiffness and protects them from environmental exposure. Common terms associated with FRP composites include fiberglass or fiber reinforced plastic, GFRP (glass fiber) or CFRP (carbon fiber).

Since the mid-1950s, FRP has been adapted to building and construction uses. In historical sequence, these applications have appeared as opaque and translucent (light transmitting) sheet panels; space frame skin structures; structural forms for concrete; sandwich panel structures; and most recently a variety of highly-configured load-bearing and non-load bearing components. Since the early 1990's, FRP composites are being used to externally strengthen concrete and masonry buildings, as well as providing seismic strengthening to beams, columns, slabs, and walls.

Typical FRP architectural products are manufactured in an open mold. The mold surface, which imparts the finished appearance to the completed part, is first coated with a pigmented, specially formulated, durable polyester coating known as gel coat. Various plies of resin saturated fiber reinforcements are added by a technique known as hand lamination or by using spray equipment. Both processes deposits fibers and catalyzed resin onto the gel coated mold surface. The material is then hand compacted by hand rollers and is usually cured at room temperature.

Additives and various fillers, incorporated in the composites enable fabricators to provide finished products with special properties such as resistance to ultra-violet radiation, enhanced fire performance, corrosion-resistance, and color.

Principal markets served by the composites industry are architectural/construction such as replication of historic building ornamentation, bathware, marine, automotive/transportation, corrosion resistant products (tanks and piping) and many others. These products are increasingly being used as building materials and responsible Code guidance is imperative.

This proposed code change provides two definitions, one a generic definition for Fiber Reinforced Polymer and one for a Fiberglass Reinforced Polymer which is a subset of the generic definition. Both are included since both could be used in the applications under consideration. These definitions are industry standard descriptions for these types of materials.

The proposal also adds a new section to Chapter 26 that is specifically written for FRP. The proposal will require that the FRP be labeled and identified in a manner similar to the existing requirements for foam plastic insulation. This requirement will provide assurance to the Code Official that the product in the field is the same as that tested for compliance.

Proposal Sections 2612.3.through 2612.5 provide requirements wherein the FRP must meet existing Code requirements for materials to be used in these specific applications. No changes in required tests, usage, etc. are made for the FRP versus other materials used for these applications.

Section 2612.6 provides new requirements that specifically address the use of the FRP on the exterior of buildings. This Section would allow the FRP to be used on the exterior of buildings of all Types of Construction when it meets specific requirements.

The general charging requirements are that the FRP meet the requirements of Section 2603.5, the requirements for fireblocking per Section 717 and other structural requirements. Section 2603.5 addresses the use of foam plastics in exterior walls of all Types of Construction. By using the requirements in this Section, the FRP must meet tests such as NFPA 285 (Multi-story fire test), NFPA 268 (Radiant Heat test) and have Class A Flame-spread and Smoke-developed Indices as well as meeting other requirements specified in Section 2603.5. As with foam plastics, if a material can meet these requirements, it can be used as an exterior wall covering on buildings of any Type of Construction.

There are two exceptions to the general requirements. The first is for when the FRP is used as building ornamentation such as cornices. An example of this is provided in the picture below (The cornice is FRP installed on a masonry wall). This set of requirements limits the size of the ornamentation and its Flame-spread Index based on the percentage of the material on the wall. The area restrictions are based potential applications and the philosophy that when larger amounts of materials are installed, the fire properties shall be more restrictive. Requirements are also provided whereby the FRP shall be installed over noncombustible surfaces, fireblocking is required and the design of the installation meets required structural conditions. This set of requirements provides assurances that the materials to be used in this application are appropriate for use and do not create any undue hazard.

The second exception recognizes that the FRP can be used on building up to a height of 40 feet in a manner consistent with other combustible exterior wall coverings. Additionally limits with respect to fire separation distance are also provided in a manner similar to that for MCM panels. Further requirements for fireblocking and structural considerations have also been included.

In summary, this proposal provides recognition of FRP for many building applications and includes appropriate requirements to allow their use in a manner intended by the Code.

Cost Impact: The code change proposal will increase the cost of construction.

Committee Action: **Approved as Submitted**

Committee Reason: The committee indicated that the proposed requirements for fiber reinforced polymer and fiberglass reinforced polymer are technically accurate and complete. The products are also currently widely in use. Therefore the proposed provisions for fiber reinforced polymer and fiberglass reinforced polymer are an appropriate addition to the code.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

Jesse J. Beitel, Hughes Associates, Inc., representing American Composite Manufacturers Association, requests Approved as Modified by this public comment.

Modify proposal as follows:

2612.6 Exterior use. Fiber reinforced polymer or fiberglass reinforced polymer shall be permitted to be installed on the exterior walls of buildings of any type of construction when they meet the requirements of Sections 2603.5 and is fire-blocked in accordance with Section 717. The fiber reinforced polymer or the fiberglass reinforced polymer shall be designed for uniform live loads as required in Table 1607.1 as well as for snow loads, wind loads and earthquake loads as specified in Sections 1608, 1609 and 1613 respectively.

Exceptions:

1. When all of the following conditions are met:
   - 1.1. ~~When the area of the fiber reinforced polymer or the fiberglass reinforced polymer does not exceed 20% of the respective wall area, the fiber reinforced polymer or the fiberglass reinforced polymer shall have a flame spread index of 25 or less or when the area of the fiber reinforced polymer or the fiberglass reinforced polymer does not exceed 10% of the respective wall area, the fiber reinforced polymer or the fiberglass reinforced polymer shall have a flame spread index of 75 or less.~~ When the fiber reinforced polymer or the fiberglass reinforced polymer does not exceed an aggregate total of 20% of the area of the specific wall to which it is attached, no single architectural element exceeds 10% of the area of the specific wall to which it is attached, and no contiguous set of architectural elements exceed 10% of the area of the specific wall to which they are attached, the fiber reinforced polymer or the fiberglass reinforced polymer shall have a flame-spread index of 25 or less. The flame-spread index requirement shall not be required for coatings or paints having a thickness of less than 0.036 inch (0.9 mm) that are applied directly to the surface of the fiber reinforced polymer or the fiberglass reinforced polymer
   - 1.2. Fireblocking complying with Section 717.2.6 shall be installed.
   - 1.3. The fiber reinforced polymer or the fiberglass reinforced polymer shall be installed directly to a noncombustible substrate or be separated from the exterior wall by one of the following materials: corrosion-resistant steel having a minimum base metal thickness of 0.016 inch (0.41 mm) at any point, Aluminum having a minimum thickness of 0.019 inch (0.5 mm) or other approved noncombustible material.
   - 1.4. The fiber reinforced polymer or the fiberglass reinforced polymer shall be designed for uniform live loads as required in Table 1607.1 as well as for snow loads, wind loads and earthquake loads as specified in Sections 1608, 1609 and 1613 respectively.

2. When installed on buildings that are 40 feet (12,190 mm) or less above grade, the fiber reinforced polymer or the fiberglass reinforced polymer shall meet the requirements of Section 1406.2 and shall comply with all of the following conditions:
   2.1. Where the fire separation distance is 5 feet (1524 mm) or less, the area of the fiber reinforced polymer or the fiberglass reinforced polymer shall not exceed 10% of the wall area Where the fire separation distance is greater than 5 feet (1524 mm) there shall be no limit on the area of the exterior wall coverage using fiber reinforced polymer or the fiberglass reinforced polymer.
   2.2. The fiber reinforced polymer or the fiberglass reinforced polymer shall have a flame-spread index of 200 or less. The flame-spread index requirement shall not be required for coatings or paints having a thickness of less than 0.036 inch (0.9 mm) that are applied directly to the surface of the fiber reinforced polymer or the fiberglass reinforced polymer
   2.3. Fireblocking complying with Section 717.2.6 shall be installed.
   2.4. The fiber reinforced polymer or the fiberglass reinforced polymer shall be designed for uniform live loads as required in Table 1607.1 as well as for snow loads, wind loads and earthquake loads as specified in Sections 1608, 1609 and 1613 respectively.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The proposed modification is in response to testimony given at the Code Hearings in Palm Springs. Testimony was given that there were concerns over the issue of "large amounts of fuel loading" in any given area on the exterior wall. The proposed modification addresses those concerns. In essence, while a total of 20% of the wall surface can have the fiber reinforced polymer installed on it, this modification will require that the fiber reinforced polymer be limited to discrete areas of not more than 10% of the area of the wall. This 10% limitation applies not only to a single architectural element but it also applies to a group of elements such that if they are touching, the grouping cannot exceed 10%. By this modification, the area of the fiber reinforced polymer elements must be less than 10% of the wall area, be noncontiguous and thus separation fo the elements is provided. This modification addresses the concerns that the 20% aggregate total would be in a single area. By adopting this modification, the concerns over" large amounts of fuel loading" on the exterior wall are alleviated.

Also, the industry has removed the Section whereby materials with a Class B flame spread are allowed and only materials with a Class A flame spread can be used on the exterior of wall in this Exception. By this modification, the industry has addressed concerns over the combustibility of these materials.

Public Comment 2:

Douglas Evans, Clark County Department of Development Services, requests Disapproval.

Robert Allen Schroeder, Schroeder Fire Inc., representing himself, requests Disapproval.

Marvin Stewart, Ram Mutual Insurance Company, requests Disapproval.

Maureen Traxler, City of Seattle, WA, Department of Planning and Development, requests Disapproval.

Commenter's Reason: (Evans) The new requirements/allowances provide a reasonable start for a future code change, but also contain a number of aspects that make it unacceptable as written.

First of all, and the main reason to reject the entire section, is that this new section only applies to a limited special interest group. It only addresses reinforced polymers. If reinforced polymers are acceptable for recognition as specified, all polymers should be. As such, this section should be revised to recognize all plastics or deleted completely.

Secondly, and technically most important, both of the exceptions to Section 2612.6 allow an unacceptable increase in the combustibility of exterior facades. Without the exceptions, the base section provides a level of protection in accordance with existing code allowances.

ASTM E 84 is not an appropriate test to ensure plastics provide the level of protection intended by code for the proposed applications. The ignition source used for ASTM E 84 is substantially less than the exposure required for EIFS under Section 2603.5 (which is intended to simulate a fully involved room fire projecting out of a window onto the exterior façade). It has been demonstrated a number of times that polymers only formulated to pass the E 84 test will typically not pass more rigorous tests.

In addition, some polymers create flaming droplets and pool fires on the floor of the E 84 furnace. Installing such materials over locations where exits discharge would not be prudent.

Exception 1 allows up to 20% of the respective wall area of any type of construction to be covered with these materials when they have a flame-spread index of 25 or less (or up to 10% with a flame-spread index not exceeding 75). Twenty percent (and even 10%) of the respective wall area can constitute one extremely large continuous fuel package that can allow fire on an exterior façade to propagate unchecked.

In addition, new Section 2616 does not provide guidance to restrict the thickness of these materials. The photo included with FS196 in Volume 1 of the "Proposed Changes" shows a cornice projecting from an exterior wall at least 5 feet. Although the "area" of polymer to exterior wall may not exceed the 10 or 20 percent limitation, the extent of projection (thickness) can create a substantial combustible load on an exterior façade any height above grade and also needs to be limited.

As written, this allowance includes exterior facades of high-rise buildings that may be out of reach of fire department hose lines. A façade fire out of reach of standard fire-fighting operations creates a hazard to occupants of the building, the building itself and the emergency responders trying to keep it from propagating. This certainly does not reflect the intent of code and cannot be allowed to be incorporated into the 2009 IBC.

Exception 2 to the new Section 2612.6 refers to Section 1406.2. The exception to 1406.2 refers back to Chapter 26. These types of circular references create confusion and make it unclear which section governs. As such, it's not clear if these polymers are required to meet the ignition resistance testing of NFPA 268.

Furthermore, Ex.2 of the new Section 2612.6 allows the entire wall to be covered with such materials when the fire separation distance exceeds 5 feet and the material has a flame-spread index not exceeding 200. As described above, the E 84 test is inappropriate for such materials. In addition, this allowance does not require reinforced polymers to meet the requirements of Table 1406.2.1.2 that apply to other similar applications. As such, reinforced polymers are not assured to provide the level of protection presently expected by code.

Although the 10% limitation specified in Ex.2.1 appears to correlate with 1406.2.2 for architectural trim, it's clear that the proposed use is not intended to be limited to trim.

Both Exceptions 1.1 and 2.2 of the new Section 2612 allow coatings less than 0.036 of an inch thick to be applied to the reinforced polymer without additional testing. This recognition is reflected in Chapter 8 and was initially intended to apply to wall paper, paint and similar materials that have been shown to not adversely affect surface burning characteristics. With a combustible substrate, such as reinforced polymers, combustible coatings, such as other non-fire-retardant-treated polymers, may adversely affect the burning characteristics of the composite assembly. Without additional testing, the burning characteristics of the assembly cannot be known.

The Report of Public Hearings indicates the one of the reasons the committee supported approval of FS196 was that "the products are currently widely in use." The floor discussion indicated that these products have been installed outside of the limitations of the code for years. Just because an application has been installed "illegally" is not a reason to revise the code. These non-compliant installations in no way indicate that these materials provide the level of protection intended by code.

In summary, it may be reasonable to retain the new Section 2612 if it was revised to apply to all polymers and both exceptions were deleted. Otherwise, this new section allows for a potentially unsafe condition to building occupants, increases the risk to property and places unreasonable demands on firefighting personnel. As such, the committee's recommendation should be overturned and these allowances deleted.

Commenter's Reason: (Schroeder) Background: I have been involved in the fire protection field since 1972; first as a firefighter, then a fire protection engineering specialist, a fire investigator and finally a fire and materials scientist. I have been analyzing the effects of burning materials for 30+ years and trained under this country's finest professors and practitioners. The proposed external and continued internal use of Class C, fire spread less than 200, FRP and fiber binding polymers based upon the unrealistic test results of the 60 year old E-84 Tunnel Test is unthinkable.

The "real world" fire performance of these materials (Class C, FS 75 – 200 only) when compared to their Tunnel Test results is a chasm as wide as the Grand Canyon. Flash-over is guaranteed when a room is partially or fully lined with these materials. In fact, flash-over will happen when the FRP is run through a corner screening test where only two, 2 foot by 8 foot high sheets are abutted in a corner and set afire with a small plastic garbage bag filled with wax paper cups and paper napkins. I can make these claims because I have personally conducted full scale testing of the Class A and Class C FRP wall treatments over the last 20 years. I have also commissioned E-84 Tunnel Tests for the same materials. From a performance assessment basis, we (building officials, designers, material specifiers, fire protection engineers) should not be dependent upon a test designed to compare wood products in the now age of plastics. The former UBC 8-2 corner testing of wall treatments is the only means to accurately assess the subject material's fire performance.

A second means of assessing a material's fire performance is its actual field experience. How has it burned or not burned in settings where it is commonly found? Once again, this answer is painfully clear if those examining the remains of a fire event are seeking the "Whys and How's" concerning the fire spread, levels of damage sustained vs. the size of the incipient fire, the secondary levels of smoke damage and finally, what the fire fighters experienced while battling the blaze.

In examining the post-fire scene, the remains of FRP wall covering are all too often consumed. Looking around the burned out space commonly lined with gypsum wallboard, the question often arises, what was in here to cause such damage? If the investigator doesn't ask about the interior finish, the question goes unanswered. Most fire investigators, fire fighters and insurance people are not conversant in the seemingly arcane subject of interior fire spread. Witness the events of recent past including but not limited to The Station in Rhode Island, the Hamlet N.C. chicken proceeding plant, Wayne Farms processing plant fire in Georgia, Oscar Meyer Foods in Davenport, Iowa, Jackson Labs in Arcadia, Maine. In all cases, the wall treatment products were in plain sight. Some of these products (most notably FRP wall treatment) had been tested (E-84) and classified as complying Class C materials. In the food processing plant fires, a common observation was the impact of the extreme levels of black sooty smoke both during the fire suppression operations and after in the damage clean-up efforts.

Fighting an interior FRP wall treatment fire is a challenge at best. The early development of thick black sooty smoke makes finding the seat of the fire especially in a commercial building nearly impossible. "Watch for where the fire is breaching the roof "is a common means of attack. Entering into a black maze is very scary. As a result, those fires involving measurable amounts of FRP wall treatments during their early stages often become big fires with huge damage costs due in large part to the conditions encountered by the first responding fire crews. The economic loss that can be directly associated with the firefighters inability to get to the seat of these fires due to heavy smoke conditions borne of the burning FRP is mindboggling. I've seen a good number of plants, commercial businesses, agricultural facilities and even a small college close as a result of FRP wall treatment fueled fire. Had these same fires occurred where Class A FRP wall treatments existed, the damages directly related to these materials would have been negligible. The facility downtime to clean-up and reconstruct after the fire events would have been greatly reduced. The efforts fighting these fires would have been light years easier and far less risky.

You may ask why a test that regulators have been relying upon for decades (the E-84 Tunnel Test) **can't be trusted** to help evaluated a material's fire performance? Good question. In the case of plastics be it polyurethane foam, polystyrene foams, fiberglass reinforced composites, fiberglass reinforced plastic wall treatments (FRP's) the answer is:

- the material configuration in the test chamber (mounted to the ceiling…horizontal) not on the walls as it is principally used
- application of flame to the underside horizontal surface causing some thermal plastic based materials to melt ahead of the flame front and thus drop out of the way and not measuring their real world contribution
- the draw of the tunnel's exhaust fan improving the combustion efficiency of the material (smoke levels measured less than 450) and not allowing for the real world effects of the hot gas layer pyrolizing the fuel, turning it into un-burnt pyrolizates (smoke) and chocking the burning efficiency of the developing fire. From a fire fighter's stand point, this is where the black smoke maze comes from.

The Proposed Change:

The proposed change allows a significant expansion in code allowances for installing combustible materials on the exterior of buildings (of any construction type and height). Placing what could be very significant quantities (thousands of pounds) of Class C plastic on the exterior of a building represents a huge reduction in fire safety.

This proposal was written by the very industry that is selling this product – the proverbial wolf watching the hen house. It may limit the total area of exterior FRP, but doesn't limit thickness, weight, or the formation of combustible concealed spaces that run the length of the building.

It appears that the Committee's technical justification for accepting this change was that it is "technically accurate and complete". No technical justification was submitted by the proponent, so the proposed regulation for exterior installation is simply a guess at what will work.

Allowing proposal to move forward goes against firesafety in buildings by:

- Putting what could be a huge mass of combustible plastic on the exterior or any building at any height (including above the height that can be fought by the fire department).
- Will allow burning materials to rain down on buildings and people below.
- Places concentrated fuel loads where sprinklers can't reach.
- Risks overwhelming fire sprinkler protection by allowing fire to enter building through multiple locations, setting off too many sprinklers.
- Allows an expansion in permitted uses of plastic materials with no testing to back up the proposed regulation. Are the proposed limits adequate? Who knows…

- Proposal represents incomplete regulation. Not limiting mass of combustibles, formation of concealed spaces, configuration, sprinkler protection, etc.
- Allows concentrated fuel on the exterior of the building where firefighters will need to take great risk to fight the fire.

Recommendations:

Reject code provisions. Require submission of testing to demonstrate safety of proposed changed. Form a balanced committee to review testing and proposed reduction in fire safety.

And finally, begin to address the underlying question plaguing the assessment of building materials and treatments for their fire safe characteristics…the adequacy and appropriateness of the 60+ year old E-84 Tunnel Test. It may be ok for wood but it's fails to address the real world fire characteristics of plastic/ polymer based materials.

Commenter's Reason: (Stewart) It appears that the proposed change would allow Class C (C30) FRP to be used "interior". (2612.1 General)

As a full time fire investigator in the insurance industry for over 23 years, I must ardently object to any changes that would allow Class C FRP to be used interior in ANY structure for ANY use. The flame spread and smoke issues with this product have cost millions of dollars and lives in excess of what would have been, had a proper wall interior finish been used

We see the result of this products use, primarily in agriculture buildings. When the Class C product is used as an interior finish, we can expect to see a total loss of both buildings and livestock. When the Class A product is used, at least the fire departments have a fighting chance to save the structure and the animals.

Our company can supply you with multiple examples of the flame spread and smoke issues if needed.

I would also state that I have seen numerous examples of exterior flame spread caused by this product, and do not believe it should be allowed exterior either.

Overall from a fire investigator and Insurance Company stand point, we do not feel this product should be allowed in arty form in the building code. It is a life safety issue (both human and livestock) as well as a huge dollar loss factor in our industry.

Commenter's Reason: (Traxler) Our most serious objection to this proposal is the immense expansion in the use of combustible materials on the exterior of buildings. According to proposed Section 2612.6 exception 2, a 40-story building would be allowed to be entirely covered with material having a flame spread of 200. The proponents provided no justification of any kind for treating this material differently than other plastics.

Proposed Section 2612.6 is difficult to interpret. For example, exception 1.1 requires a maximum flame spread of 25, but Section 2603.5 which is referenced in the charging language already contains that requirement. There's no mention of smoke development, which Section 2603.5 limits to 450. So does exception 1.1 mean the material isn't required to comply with smoke development? Is the exception intended to negate the whole of the charging paragraph except for the 4 specific items (so the material isn't required to comply with any of 2603.5)? How is the required fireblocking to be constructed? Section 717.2 tells where to install fireblocking in combustible construction, but doesn't address noncombustible buildings.

This proposal needs much more refinement before it is ready to be adopted into the Building Code. In addition to the difficulties described above, the proposed language contains redundancies, requiring compliance with provisions that are required in other code sections, such as live loads and interior finish requirements.

Final Action: AS AM AMPC____ D