Code Technology Committee
Area of Study – Balanced Fire Protection
Vertical Openings

2007/2008 Cycle
Code changes related to the CTC area of study noted above

The following are code changes related to the CTC Balanced Fire Protection – Vertical Openings Area of Study that will be considered at the 2007/2008 Code Development Hearings in Palm Springs, California.

FS118–07/08
714

Proponent: Sarah A. Rice, Schirmer Engineering

Revise as follows:

(Entire section relocated from Section 714 and renumbered to Section 704)

SECTION ~~714~~ 704
FIRE-RESISTANCE RATING OF STRUCTURAL MEMBERS

(Entire section relocated from Section 704 and renumbered to Section 705)

SECTION ~~704~~ 705
EXTERIOR WALLS

(Entire section relocated from Section 705 and renumbered to Section 706)

SECTION ~~705~~ 706
FIRE WALLS

(Entire section relocated from Section 706 and renumbered to Section 707)

SECTION ~~706~~ 707
FIRE BARRIERS

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

SECTION ~~707~~ 708
SHAFT ENCLOSURES

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

SECTION ~~708~~ 709
FIRE PARTITIONS

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

SECTION ~~709~~ 710
SMOKE BARRIERS

(Entire section relocated from Section 710 and renumbered to Section 711)

SECTION ~~710~~ 711
SMOKE PARTITIONS

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

SECTION ~~711~~ 712
HORIZONTAL ASSEMBLIES

(Entire section relocated from Section 712 and renumbered to Section 713)

SECTION ~~712~~ 713
PENETRATIONS

(Entire section relocated from Section 713 and renumbered to Section 714)

SECTION ~~713~~ 714
FIRE-RESISTANT JOINT SYSTEMS

Reason: The material contained in Section 714 Fire-resistance Rating of Structural Members is a fundamental provision applicable to all types of fire rated assemblies. It would seem to be something that the user should find right away when reading Chapter 7. As there are no references to Section 714 in any of the specific sections covering specific types of assemblies, it's relocation to the beginning of Chapter 7 seems reasonable.

The order of Chapter 7 would then be:

701	General
702	Definitions
703	Fire Resistance Ratings and Fire Tests
704	Fire Resistance Rating of Structural Members
705	Exterior Walls
706	Fire Walls
707	Fire Barriers
708	Shaft Enclosures
709	Fire Partitions
710	Smoke Barriers
711	Smoke Partitions

Etc.

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

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FS161–07/08
707

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 - 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 conforming 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 ~~or an air transfer 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. ~~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. ~~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.
++

FS162–07/08
Chapter 7

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

THESE PROPOSALS ARE ON THE AGENDA OF THE IBC GENERAL, THE IBC FIRE SAFETY AND THE IBC MEANS OF EGRESS CODE DEVELOPMENT COMMITTEES AS 3 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES

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

BUILDING ~~ELEMENT~~ ASSEMBLY (Remainder of table to remain unchanged)

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.** 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. 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 706.6 to 708.1 through 708.6 respectively without any other changes)

~~706.7~~ 708.7 Openings. 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. 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.** 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 602.2-5.

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 Sections 715 its their 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:
      3.1. The duct shall not exceed 100 square inches (0.06 m2).
      3.2. The duct shall be constructed of steel a minimum of 0.0217 inch (0.55 mm) in thickness.
      3.3. The duct shall not have openings that communicate between the corridor and adjacent spaces or rooms.
      3.4. The duct shall be installed above a ceiling.
      3.5. The duct shall not terminate at a wall register in the fire-resistance-rated wall.
      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 m2) 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
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 1/2	3/4 1/3

Exterior walls[b]	> 1 1	1 1/2 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 mm2) 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 602.2-5.

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 602.2-5.

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 602.2-5.

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 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 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.

715.8.3.6.1 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

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 imited 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.