

**CTC Meeting # 22
December 1 – 2, 2011
Vertical Openings SG report**

Code change proposal #1: Reorganize Sections 711, 712 and 714.

SECTION 711 FLOOR AND ROOF ASSEMBLIES HORIZONTAL ASSEMBLIES

711.1 General. ~~Floor and roof assemblies required to have a fire-resistance rating~~ Horizontal assemblies shall comply with Section 711.2 ~~this section~~. Nonfire-resistance-rated floor and roof assemblies shall comply with Section 711.3 ~~714.4.2~~.

711.2 Horizontal assemblies. Horizontal assemblies shall comply with Sections 711.2.1 through 711.2.6.

711.2.1 711.2 Materials. ~~The floor and roof~~ Assemblies shall be of materials permitted by the building type of construction.

711.2.2 711.4 Continuity. Assemblies shall be continuous without vertical openings, penetrations or joints except as permitted by this section and Sections ~~712.2, 714.4, 715, 1009.3 and 1022.1~~. Skylights and other penetrations through a fire-resistance-rated roof deck or slab are permitted to be unprotected, provided that the structural integrity of the fire-resistance-rated roof assembly is maintained. Unprotected skylights shall not be permitted in roof assemblies required to be fire-resistance-rated in accordance with ~~Section 705.8.6~~.

(remainder of section unchanged)

711.2.3 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 509 provided the required fire-resistance rating does not exceed 1 hour.

2. Horizontal assemblies at the separations of dwelling units and sleeping units as required by Section 420.3.
3. Horizontal assemblies at smoke barriers constructed in accordance with Section 709.

711.2.4 711.3 Fire-resistance rating. The fire-resistance rating of ~~floor and roof~~ horizontal assemblies shall comply with Sections 711.2.4.1 through 711.2.4.6 but shall not be less than that required by the building type of construction.

711.2.4.1 Separating mixed occupancies. Where the ~~floor-horizontal~~ assembly separates mixed occupancies, the assembly shall have a fire-resistance rating of not less than that required by Section 508.4 based on the occupancies being separated.

711.2.4.2 Separating fire areas. Where the ~~floor-horizontal~~ 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 707.3.10.

711.2.4.3 Dwelling units and sleeping units. Where the ~~horizontal assemblyies separating~~ dwelling units in the same building and horizontal assemblies separating, or sleeping units in the same building, the assembly shall be a minimum of 1-hour fire-resistance-rated construction.

Exception: Horizontal assemblies separating dwelling units and sleeping units shall be a minimum of ½ hour fire-resistance-rated construction separations in a buildings of Type IIB, IIIB and VB construction, shall have fire-resistance ratings of not less than 1/2 hour in when the buildings is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

711.2.4.4 Separating smoke compartments. Where the horizontal assembly is required to be a smoke barrier, the assembly shall comply with Section 709.

711.2.4.5 Separating incidental uses. Where the horizontal assembly separates incidental uses from the remainder of the building, the assembly shall have a fire-resistance rating of not less than that required by Section 509.

711.2.4.6 Other separations. Where a horizontal assembly is required by other sections of this code, it shall have a fire-resistance rating of not less than that required by that section.

711.2.5 711.3.4 Ceiling panels. Where the weight of lay-in ceiling panels, where used as part of fire-resistance-rated floor/ceiling or roof/ceiling assemblies, is not adequate to resist an upward force of 1 pound per square foot (48 Pa), wire or other approved devices shall be installed above the panels to prevent vertical displacement under such upward force.

(Section 711.3.2 revised and relocated to Section 712.1.13.2)

711.2.6 711.3.3 Unusable space. In 1-hour fire-resistance-rated floor/ceiling assemblies, the ceiling membrane is not required to be installed over unusable crawl spaces. In 1-hour fire-resistance-rated roof assemblies, the floor membrane is not required to be installed where unusable attic space occurs above.

711.3 Nonfire-resistance rated floor and roof assemblies. Nonfire-resistance rated floor, floor/ceiling, roof and roof/ceiling assemblies shall comply with Sections 711.3.1 and 711.3.2.

711.3.1 Materials. Assemblies shall be of materials permitted by the building type of construction.

711.3.2 Continuity. Assemblies shall be continuous without vertical openings, except as permitted by Section 712.

(Section 711.4 revised and relocated to Section 711.2.2)

(Section 711.4.1 revised and relocated to Section 712.1.5.2)

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

(Section 711.6 revised and relocated to Section 712.1.5.1)

711.7 Ducts and air transfer openings. ~~Penetrations in horizontal assemblies by ducts and air transfer openings shall comply with Section 717.~~

(Section 711.8 revised and relocated to Section 712.1.13.1)

711.9 Smoke barrier. ~~Where horizontal assemblies are required to resist the movement of smoke by other sections of this code in accordance with the definition of smoke barrier, penetrations and joints in such horizontal assemblies shall be protected as required for smoke barriers in accordance with Sections 714.5 and 715.6. Regardless of the number of stories connected by elevator shaft enclosures, doors located in elevator shaft enclosures that penetrate the horizontal assembly shall be protected by enclosed elevator lobbies complying with Section 713.14.1. Openings through horizontal assemblies shall be protected by shaft enclosures complying with Section 713. Horizontal assemblies shall not be allowed to have unprotected vertical openings.~~

SECTION 712 VERTICAL OPENINGS

712.1 General. ~~The provisions of this section shall apply to the Each vertical opening applications listed shall comply with one of the protection methods in Sections 712.1.1 through 712.1.168.~~

712.1.1 Shaft enclosures. Vertical openings contained entirely within a shaft enclosure complying with Section 713 shall be permitted.

712.1.2 Individual dwelling unit. Unconcealed vertical openings totally within an individual residential dwelling unit and connecting four stories or less shall be permitted.

712.1.3 Escalator openings. Where a building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1, vertical openings for an escalator's opening shall be permitted when protected according to Section 712.1.3.1 or 712.1.3.2.

712.1.3.1 Opening size. Protection by a draft curtain and closely spaced sprinklers in accordance with NFPA 13 shall be permitted where the area of the vertical opening between stories does not exceed twice the horizontal projected area of the escalator. In other than Groups B and M, this application is limited to openings that do not connect more than four stories.

712.1.3.2 Automatic shutters. Protection of the vertical opening by approved shutters at every penetrated floor shall be permitted in accordance with this section. 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 907.3.1 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.

712.1.4 Penetrations. Penetrations, concealed and unconcealed, shall be permitted where protected in accordance with Section 714.

712.1.5 Joints. Joints shall be permitted where complying with Section 712.1.5.1 or 712.1.5.2, as applicable.

712.1.5.1 ~~714.6~~ Joints in or between horizontal assemblies. Joints made in or between horizontal assemblies shall comply with Section 715. The void created at the intersection of a floor/ceiling assembly and an exterior curtain wall assembly shall be permitted when protected in accordance with Section 715.4.

712.1.5.2 ~~714.4.1~~ Joints in or between nonfire-resistance-rated floor assemblies. Joints in or between floors without a required *fire-resistance rating* shall be permitted when they comply with one of the following:

1. The joint shall be concealed within the cavity of a wall.

2. The Joint shall be located above a ceiling.
3. The joint shall be sealed, treated or covered with an approved material or system to resist the free passage of flame and the products of combustion.

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

712.1.6 712.1.5 Ducts and air transfer openings. Penetrations by ducts and air transfer openings shall be protected in accordance with Section 717.6. Grease ducts shall be protected in accordance with the *International Mechanical Code*. **[also current 711.7]**

712.1.7 712.1.6 Atriums. In other than Group H occupancies, atriums complying with Section 404 shall be permitted.

712.1.8 712.1.7 Masonry chimney. Approved vertical openings for masonry chimneys shall be permitted where the annular space is fireblocked at each floor level in accordance with Section 718.2.5.

712.1.9 712.1.8 Two-story openings. In other than Groups I-2 and I-3, a ~~floor~~ vertical opening that is not used as one of the applications listed in this section shall be permitted if it complies with all of the items below.

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

712.1.10 712.1.9 Parking garages. Vertical openings in parking garages for automobile ramps, elevators and duct systems shall comply with Section 712.1.10.1, 712.1.10.2 or 712.1.10.3 as applicable. *NOTE: Editorial*

712.1.10.1 Automobile ramps. Vertical openings for automobile ramps in open and enclosed parking garages shall be permitted where constructed in accordance with Sections 406.5 and 406.6, respectively.

712.1.10.2 712.1.15 Elevators in parking garages. Vertical openings for elevator hoistways in open or enclosed parking garages that serve only

the parking garage, and complying with Sections 406.5 and 406.6 respectively, shall be permitted.

712.1.10.3 ~~712.1.16~~ Duct systems in parking garages. Vertical openings for mechanical exhaust or supply duct systems in open or enclosed parking garages complying with Sections 406.5 and 406.6 respectively, shall be permitted to be unenclosed where such duct system is contained within and serves only the parking garage.

712.1.11 ~~712.1.10~~ Mezzanine. Vertical openings between a mezzanine complying with Section 505 and the floor below shall be permitted.

~~**712.1.11 Joints.** Joints shall be permitted where complying with Section 715.~~

712.1.12 Unenclosed stairs and ramps. Vertical floor openings created by unenclosed stairs or ramps in accordance with Sections 1009.2 and 1009.3 shall be permitted.

712.1.13 ~~Openings. Floor fire doors.~~ Vertical openings for floor fire doors and access doors shall be permitted where protected by Section 712.1.13.1 or Section 712.1.13.2 as applicable. ~~floor fire doors in accordance with Section 711.8.~~

712.1.13.1 ~~711.8~~ 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.

712.1.13.2 ~~711.3.2~~ Access doors. Access doors shall be permitted in ceilings of fire-resistance-rated floor/ceiling and roof/ceiling assemblies provided such doors are tested in accordance with ASTM E 119 or UL 263 as horizontal assemblies and labeled by an approved agency for such purpose.

712.1.14. Group I-3. In Group I-3 occupancies, vertical openings shall be permitted in accordance with Section 408.5.

(Section 712.1.15 revised and relocated to Section 712.1.10.2)

(Section 712.1.16 revised and relocated to Section 712.1.10.3)

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

712.1.15 Skylights. 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 assembly is maintained. Unprotected skylights shall not be permitted in roof assemblies required to be fire-resistance rated in accordance with Section 705.8.5. The supporting construction shall be protected to afford the required fire-resistance rating of the horizontal assembly supported.

712.1.16 712.1.18 Openings otherwise permitted. Vertical openings shall be permitted where allowed by other sections of this code.

713.14.1 Elevator lobby. An enclosed elevator lobby shall be provided at each floor where an elevator shaft enclosure has an opening ~~connects more than three stories~~ . The lobby enclosure shall separate the elevator shaft enclosure doors from each floor by fire partitions. In addition to the requirements in Section 708 for fire partitions , doors protecting openings in the elevator lobby enclosure walls shall also comply with Section 716.5.3 as required for corridor walls and penetrations of the elevator lobby enclosure by ducts and air transfer openings shall be protected as required for corridors in accordance with Section 717.5.4.1. Elevator lobbies shall have at least one means of egress complying with Chapter 10 and other provisions within this code.

Exceptions:

1. In other than Group I-2 or I-3 occupancies, an enclosed elevator lobby shall not be required where an elevator shaft enclosure connects not more than three stories.

(renumber exceptions – no change to text of exceptions)

714.4 Horizontal assemblies. Penetrations of a fire-resistance rated-floor, floor/ceiling assembly or the ceiling membrane of a roof/ceiling assembly not required to be

enclosed in a shaft by Section 712.1 shall be protected in accordance with Sections 714.4.1 through 714.4.4 ~~714.4.2.2~~.

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

~~**714.4.1 714.4.1.1 Through penetrations.** Through penetrations of fire-resistance-rated horizontal assemblies shall comply with Section 714.4.1.1 or 714.4.1.2 ~~714.4.1.1.1~~ or ~~714.4.1.1.2~~.~~

(exceptions to remain unchanged)

~~**714.4.1.1 714.4.1.1.1 Installation.** Through penetrations shall be installed as tested in the approved fire-resistance-rated assembly.~~

~~**714.4.1.2 714.4.1.1.2 Through-penetration firestop system.** Through penetrations shall be protected by an approved through-penetration firestop system installed and tested in accordance with ASTM E 814 or UL 1479, with a minimum positive pressure differential of 0.01 inch of water (2.49 Pa). The system shall have an F rating/T rating of not less than 1 hour but not less than the required rating of the floor penetrated.~~

(exceptions to remain unchanged)

~~**714.4.2 714.4.1.2 Membrane penetrations.** Penetrations of membranes that are part of a horizontal assembly shall comply with Section 714.4.1.1 or 714.4.1.2 ~~714.4.1.1.1~~ or ~~714.4.1.1.2~~. Where floor/ceiling assemblies are required to have a fire-resistance rating, recessed fixtures shall be installed such that the required fire resistance will not be reduced.~~

(exceptions to remain unchanged)

714.4.3 ~~714.4.1.3~~ Dissimilar materials. Noncombustible penetrating items shall not connect to combustible materials beyond the point of firestopping unless it can be demonstrated that the fire-resistance integrity of the horizontal assembly is maintained.

714.4.4 ~~714.5~~ Penetrations in smoke barriers. Penetrations in *smoke barriers* shall be protected by an approved *through-penetration firestop system* installed and tested in accordance with the requirements of UL 1479 for air leakage. The *L rating* of the system measured at 0.30 inch (7.47 Pa) of water in both the ambient temperature and elevated temperature tests, shall not exceed:

1. 5.0 cfm per square foot (0.025m³ / s · m²) of penetration opening for each *through-penetration firestop system*; or
2. A total cumulative leakage of 50 cfm (0.024m³/s) for any 100 square feet (9.3 m²) of wall area, or floor area.

714.5 ~~714.4.2~~ Nonfire-resistance-rated assemblies. Penetrations of nonfire-resistance-rated floor or floor/ceiling assemblies or the ceiling membrane of a nonfire-resistance-rated roof/ceiling assembly shall meet the requirements of Section 713, or shall comply with Section 714.5.1 or 714.5.2 ~~714.4.2.1 or 714.4.2.2~~.

714.5.1 ~~714.4.2.1~~ Noncombustible penetrating items. Noncombustible penetrating items that connect not more than five stories are permitted, provided that the annular space is filled to resist the free passage of flame and the products of combustion with an approved noncombustible material or with a fill, void or cavity material that is tested and classified for use in through-penetration firestop systems.

714.5.2 ~~714.4.2.2~~ Penetrating items. Penetrating items that connect not more than two stories are permitted, provided that the annular space is filled with an approved material to resist the free passage of flame and the products of combustion.

(Section 714.5 revised and relocated to Section 714.4.4)

Reason: This proposal reorganizes some sections of Chapter 7 in order to clarify the provisions for protection of vertical openings. In the last code cycle, FS56-09/10 removed some inconsistencies, conflicts and obsolete language in Chapter 7, and eliminated some “do loops” that sent the code user in circles. This code change continues to take the code in the direction established by FS56.

As with FS56-09/10, these proposed changes are editorial in nature and will not change how the code is applied. The primary change is to distinguish the different functions of Sections 711 and 712. Section 711 will contain only provisions for construction of horizontal assemblies and floor assemblies; Section 712 will contain all the initial provisions for vertical openings. In the 2012 IBC, Section 711 has a mixture of provisions related to assembly construction and to protection of vertical openings. In this proposal, all those provisions related to vertical openings are relocated to Section 712.

This proposal corrects an inconsistency in Section 711 with regard to non-rated floor and roof assemblies. The charging language in Section 711.1 of the 2012 code says that only rated horizontal assemblies are required to comply with Section 711; non-rated floor and roof assemblies are required to comply only with Section 714.4.2. However, Section 711.4.1 is titled “nonfire-resistance-rated assemblies” and contains provisions that are meant to apply to non-rated assemblies. This proposal corrects that anomaly by dividing Section 711 into separate subsections for rated and nonrated assemblies, and revising Section 711.1 to state that non-rated assemblies are required to comply with 711.3.

The specific changes include the following.

Sec. 711.1: The charging language is revised to clarify that rated assemblies are required to comply with Section 711.2 (“Horizontal assembly” is defined in Chapter 2 as “a fire-resistance-rated floor or roof assembly ...”). Nonrated assemblies are required to comply with Section 711.3.

Sec. 711.2: A new subsection is created that applies only to rated horizontal assemblies. The provisions of Section 711.3 through 711.3.2 are separated into subsections with no change to the requirements. New subsections 711.2.4.4, 711.2.4.5 and 711.2.4.6 are added so that all the requirements for fire-resistance rating of horizontal assemblies are included in 711.

711.2.2 & 711.2.3: The language currently found in Section 711.4, Continuity, is moved closer to the beginning of the section and divided into two subsections to draw attention to the fact that the two provisions deal with separate subjects.

711.3.2 (2012 IBC): This section is being moved to Section 712 (712.1.13) because it applies to a vertical opening rather than a horizontal or floor assembly.

711.3: A new subsection is created that includes basic provisions for non-rated assemblies.

Sec. 711.4 (2012 IBC): The first sentence is relocated to new Section 711.2.1. The sentence that addresses skylights is moved to Section 712 (712.1.15) because it applies to a vertical opening rather than a horizontal or floor assembly. The last sentence and the exception are relocated to new Section 711.2.3.

Secs 711.5-711.8: All these sections pertain to protection of vertical openings and are relocated to Section 712.

Sec. 711.9: The provisions related to elevator lobbies are moved to Section 713.14 except the last sentence which is deleted because it is covered by Section 712.

Sec. 712.1: The charging language is revised to state more clearly that all vertical openings are required to be protected with one of the methods described in Section 712.

Sec. 712.1.5: 2012 Section 711.4.1 is relocated to 712 because it pertains to protection of vertical openings.

Sec. 712.1.10: The provisions related to vertical openings in parking garages are collected in this section. 712.1.10.1 is taken from current Sec. 712.1.9; 712.1.10.2 is taken from current Sec. 714.1.15; and 712.1.10.3 is taken from current Sec. 712.1.16.

Sec. 712.1.11: The current section moved to Section 712.1.5.

Sec. 712.1.13: Provisions related to opening protectives are collected together in new subsections. Sec. 712.1.13.1 relocated the provisions for floor fire door assemblies from current Sec. 711.8; Sec. 712.1.13.2 is relocated from current Sec. 711.3.2.

Sec. 712.1.15: A portion of current Sec. 711.4 is relocated here.

Sec. 713.14.1: This section is revised to accommodate provisions currently found in Section 711.9. Lobbies will still be required in most buildings only if there are more than 3 stories. However, the 3-story limitation is moved to an exception in order to incorporate the provision from 711.9 that requires lobbies whenever an elevator penetrates a smoke barrier. The exception mentions Group I-2 and I-3 occupancies because that is where smoke barriers are used.

Sec. 714.4: Sec. 714.4 is separated into separate sections for horizontal assemblies and non-rated assemblies.

Code change proposal #2: New definition of VERTICAL OPENING.

Add to Section 202:

VERTICAL OPENING: Any breach, gap, hole, or other feature within a floor or roof that interrupts the continuity of the floor or roof construction.

Reason statement: Forthcoming.