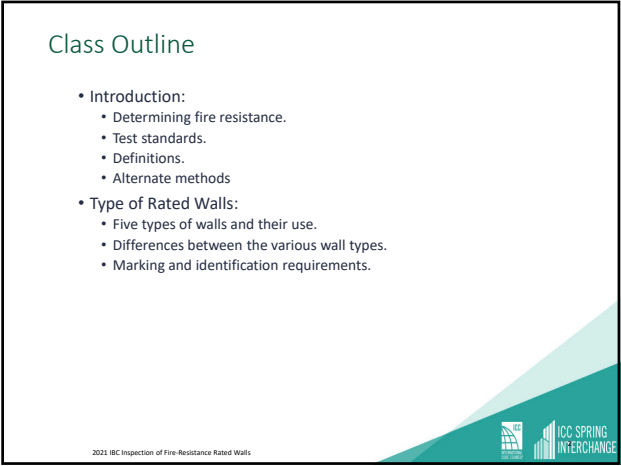
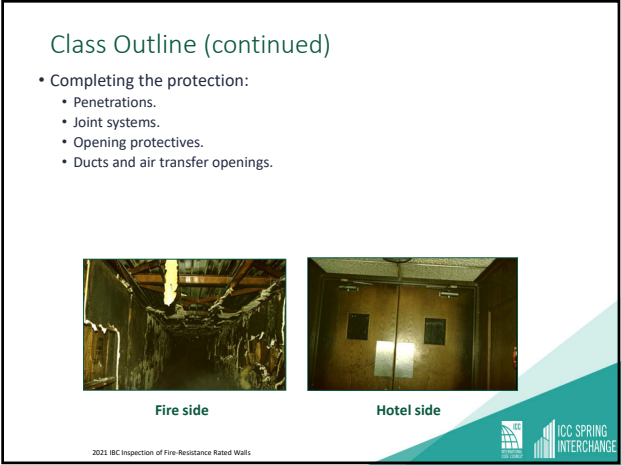




1



2



3

Introduction

- Standard fire test methods for determining fire-resistance ratings and combustibility of materials are covered in Section 703.



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4

Section 703.2 – Fire-resistance

- The fire-resistance ratings of building elements shall be determined in accordance with:
 - Section 703.2 – Tested assemblies
 - ASTM E119, or
 - UL 263
 - Section 703.2.2 – Analytical methods
 - Designs documented in approved sources
 - Prescriptive designs
 - Calculations
 - Engineering analysis
 - Designs certified by an approved agency
 - Section 703.2.3 – Approved alternative methods
 - As established by Section 104.11

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5


Section 703.2.1 – Fire-resistance Ratings

The fire-resistance ratings of building elements, components and assemblies as determined by testing is to be in accordance with the procedures set forth in:

- ASTM E119 (*Test Methods of Fire Tests of Building Construction and Materials*), or
- UL 263 (*Fire Test of Building Construction and Materials*)



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6

Purpose of Rated Assemblies

Fire Resistance: That property of materials or their assemblies that prevents or retards the passage of excessive heat, hot gases or flames under conditions of use.



Fire-Resistance Rating: The period of time 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.



7

Purpose of Rated Assemblies


Fire Protection Rating: The period of time that an opening protective will maintain the ability to confine a fire as determined by tests prescribed in Section 716. Ratings are stated in hours or minutes.

8

Section 703.2.1.4 – Supplemental Features

- Where materials, systems or devices that have not been tested as part of a fire-resistance-rated assembly are incorporated into the assembly, sufficient data must show that the required fire-resistance rating is not reduced.
 - Materials and methods of construction used to protect joints and penetrations shall not reduce the required fire-resistance rating. (testing per 714 and 715 accomplishes this)



9

Guidelines on Fire Ratings of Archaic Materials and Assemblies - IEBC Chapter Resource A

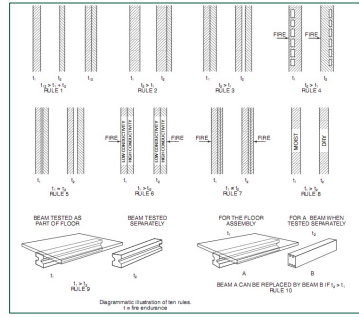
The **Guideline on Fire Ratings of Archaic Materials and Assemblies** focuses upon the fire-related performance of archaic construction. "**Archaic**" encompasses construction typical of an earlier time, generally prior to 1950. "**Fire-related performance**" includes fire resistance, flame spread, smoke production and degree of combustibility.

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10

Harmathy's 10 Rules - See IEBC



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11

Section 104.11 - Alternative Materials, Design and Methods of Construction

104.11 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved.

Alternates are:

- Approved.
- Complies with intent of the code.
- Equivalent to code in:
 - Quality, Strength, Effectiveness, Fire-Resistance, Durability and Safety.


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12

Section 104.11 - Alternative Materials, Design and Methods of Construction

- Dedicated sprinkler for exposed structural column.




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13

Chapter 2 - Definitions

- Annular Space
- Building Element
- Combination Fire/Smoke Damper
- Draftstop
- F Rating
- Fire Barrier
- Fire Damper
- Fire Door Assembly
- Fire Partition
- Fire Protection Rating
- Fire Resistance
- Fire-resistance Rating
- Fire-resistant Joint System



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14

Chapter 2 - Definitions (continued)

- Fire Separation Distance
- Fire Wall
- Fire Window Assembly
- Fireblocking
- Joint
- Membrane Penetration
- Shaft
- Shaft Enclosure
- Smoke Barrier
- Smoke Compartment
- Through Penetration
- Primary Structural Frame
- Secondary Members

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15

Different Types of Fire-Resistance

The provisions of Chapter 7 address four major areas:
1. Structural fire-resistance, regulated primarily by Table 601.

**TABLE 601
FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (HOURS)**

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV		TYPE V	
	A	B	A	B	A	B	A	B	A	B
Primary structural frame (see Section 202)	3 ^h	2 ^h , 1 ^h	1 ^h	0 ^h	1 ^h	0 ^h	3 ^h	2 ^h	2 ^h	1 ^h
Bearing walls										
Exterior ^a	3	2	1	0	2	2	3	2	2	1
Interior	3 ^b	2 ^b	1	0	1	0	3	2	2	1
Nonbearing walls and partitions	See Table 705.5									
Exterior	See Table 705.5									
Nonbearing walls and partitions Interior ^d	0	0	0	0	0	0	0	0	0	0
Floor construction and associated secondary structural members (see Section 202)	2	2	1	0	1	0	2	2	2	1
Roof construction and associated secondary structural members (see Section 202)	1½	1½	1 ^h	0 ^h	1 ^h	0	1½	1	1	0

For SI: 1 foot = 304.8 mm.
 a. Roof supports. Fire-resistance ratings of primary structural frame and bearing walls are permitted to be reduced by 1 hour where supporting a roof only.
 b. Except as Group 1, 1L, 1M and 1N occupancy, the protection of structural members in roof construction shall not be required, including protection of primary structural frame members, roof framing and decking where every part of the roof construction is 20 feet or more above any floor immediately below. Fire-resistance rated steel members shall be allowed to be used for steel-supported members.
 c. In all occupancies, heavy timber complying with Section 2504.11 shall be allowed for roof construction, including primary structural frame members, where a 1-hour or less fire-resistance rating is required.
 d. Not less than the fire-resistance rating required by other sections of this code.
 e. Not less than the fire-resistance rating based on the separation distance (see Table 705.5).
 f. Not less than the fire-resistance rating as referenced in Section 704.10.
 g. Heavy timber bearing walls supporting more than two floors or more than a floor and a roof shall have a fire resistance rating of not less than 1 hour.

16

Different Types of Fire-Resistance (continued)

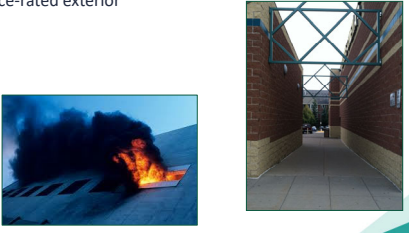
The provisions of Chapter 7 address four major areas:

2. Separation of adjacent building spaces through the use of fire-resistance-rated elements, such as fire walls, fire barriers and fire partitions.
3. Separation of adjacent building spaces through the use of smoke-resistant construction, such as smoke barriers and smoke partitions.

17

Different Types of Fire-Resistance (continued)


4. Protection of adjacent buildings from fire spread through the use of fire-resistance-rated exterior walls.




18

Different Types of Fire-Protection

- Penetrations. (Section 714)
- Joint Systems. (Section 715)
- Opening Protectives. (Section 716)
 - Includes doors and windows.
- Ducts and Air Transfer Openings. (Section 717)
 - Dampers.



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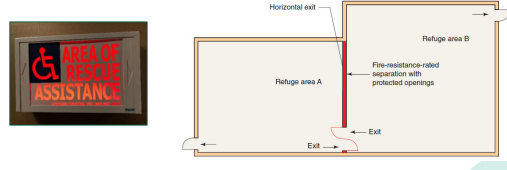


19


Section 702.1 - Multiple Use Fire Assemblies

Fire assemblies that serve multiple purposes in a building shall comply with all of the requirements that are applicable for each of the individual fire assemblies.

Example: Horizontal exit also serving as a smoke barrier and area of refuge.



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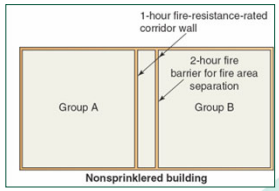


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Section 702.1 - Multiple Use Fire Assemblies

Fire assemblies that serve multiple purposes in a building shall comply with all of the requirements that are applicable for each of the individual fire assemblies.

Example: Rated corridor also serving as a fire area separation. Must meet requirements for both types of separations.

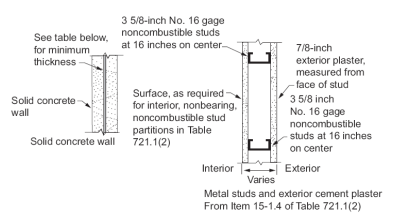


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21

Table 721.1(2) - Prescriptive Fire-Resistance



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22

Section 703.2.1.1 – Nonsymmetrical Wall Construction

Interior Walls:

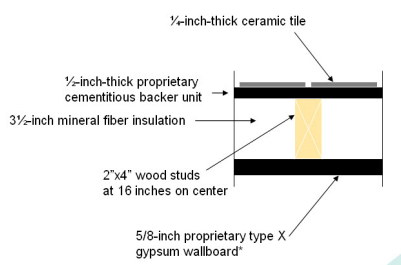
- Nonsymmetrical wall construction to be tested with both faces exposed to the furnace, with the assigned fire-resistance rating based on the shortest duration of the two tests.
- Where the wall is tested with the least fire-resistant side exposed to the furnace, the wall need not be subjected to tests from the opposite side (if approved by building official).

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23

Section 703.2.1.1 – Non-Symmetrical Wall Construction



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24

Section 703.5 - Marking and Identification

Minimum 9 in. high with 1/2" stroke lettering

Sign or stenciling of maximum 30-ft. intervals and within 15 ft. of end of wall

Concealed space

Floor or roof deck

Fire barrier
Protect all openings

Ceiling

Floor

- Signage is only required in accessible concealed spaces.

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25

Types of Rated Walls

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26

Types of Rated Walls

There are five types of fire-resistance rated walls:

- Exterior walls. (Section 705)
- Fire walls. (Section 706)
- Fire barriers. (Section 707)
- Fire partitions. (Section 708)
- Smoke barriers. (Section 709)

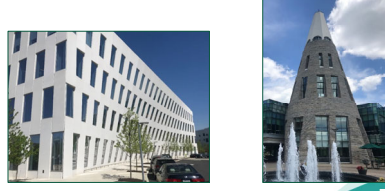
They each have different purposes and requirements

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27

Section 202 - Definitions

Exterior Wall: A wall, bearing or nonbearing, that is used as an enclosing wall for a building, other than a fire wall, and that has a slope of 60 degrees or greater with the horizontal plane.



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28

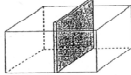
Section 202 - Definitions

Fire Wall (Area Separation):
A fire-resistance-rated wall having protected openings, which restrict the spread of fire and extends continuously from the foundation to or through the roof, with sufficient stability under fire conditions to allow collapse of construction on either side without collapse of the wall.


Fire Barrier (Occupancy Separation):
A fire-resistance-rated wall assembly of materials designed to restrict the spread of fire in which continuity is maintained.

Fire Partition (Corridor Wall):
A vertical assembly of materials designed to restrict the spread of fire in which openings are protected.

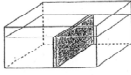
Fire Area (Compartment):
The aggregate floor area enclosed and bounded by fire walls, fire barriers, exterior walls or horizontal assemblies of a building. Areas of the building not provided with surrounding walls shall be included in the fire area if such areas are inclosed within the horizontal projection of the roof or floor next above.



Fire Wall
2, 3 or 4 Hour
Vertical




Fire Barrier
1, 2, 3 or 4 Hour
Vertical and Horizontal



Fire Partition
1 Hour
Vertical

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29

Purpose of Rated Assemblies

Fire Resistance: That property of materials or their assemblies that prevents or retards the passage of excessive heat, hot gases or flames under conditions of use.

Fire-Resistance Rating: The period of time 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.


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30

Purpose of Rated Assemblies

Fire Protection Rating: The period of time that an opening protective will maintain the ability to confine a fire as determined by tests prescribed in Section 716. Ratings are stated in hours or minutes.



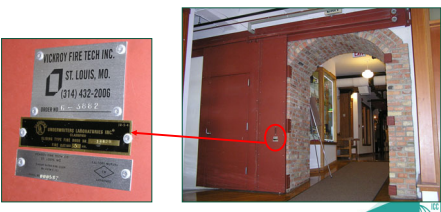
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31

Primary Difference Between Various Walls

- The purpose they serve.
- Continuity/construction requirements.
- Amount and type of opening protection.




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32

Section 705: Exterior Walls



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33


Section 705 - Exterior Walls

Exterior walls are regulated for fire resistance under these conditions:

- Type of construction requirements (Table 601).
 - For exterior bearing walls.
- Location on lot (Table 705.5).
- Other locations, including:
 - Horizontal continuity of fire walls.
 - Exterior areas for assisted rescue.
 - Egress courts.



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34


Table 705.5

**TABLE 705.5
FIRE-RESISTANCE RATING REQUIREMENTS FOR EXTERIOR WALLS BASED ON FIRE SEPARATION DISTANCE^{a, b}**

FIRE SEPARATION DISTANCE - X (feet)	TYPE OF CONSTRUCTION	OCCUPANCY GROUP I ^c	OCCUPANCY GROUP F-1, M, S-1 ^d	OCCUPANCY GROUP A, B, E, F-2, I, R, S-2, U ^e
X < 5 ^f	All	3	2	1
	IA, IVA	3	2	1
5 ≤ X < 10	Others	2	1	1
	IA, IB, IVA, IVB	2	1	1 ^g
10 ≤ X < 30	III, VB	1	0	0
	Others	1	1	1 ^g
X ≥ 30	All	0	0	0

^a For SI: 1 foot = 304.8 mm.
^b Load-bearing exterior walls shall also comply with the fire-resistance rating requirements of Table 601.
^c See Section 706.1.1 for party walls.
^d Pipe-penetrating devices complying with Section 403c shall not be required to have a fire-resistance rating.
^e The fire-resistance rating of an exterior wall is determined based upon the fire separation distance of the exterior wall and the story in which the wall is located.
^f For special requirements for Group II occupancies, see Section 415.6.
^g For special requirements for Group S aircraft hangars, see Section 412.3.1.
^h Where Table 705.5 permits nonbearing exterior walls with unlimited area of unprotected openings, the required fire-resistance rating for the exterior walls is 0 hours.
ⁱ For a building containing only a Group U occupancy private garage or carport, the exterior wall shall not be required to have a fire-resistance rating where the fire separation distance is 5 feet (1523 mm) or greater.
^j For a Group R-3 building of Type III or Type V-3 construction, the exterior wall shall not be required to have a fire-resistance rating where the fire separation distance is 5 feet (1523 mm) or greater.

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35


Section 705.5 - Exterior Wall – Fire-Resistance Ratings

Exterior walls shall be rated for exposure to fire from:

- Both sides where the separation distance is **10'** or less.
- The inside where the fire separation distance exceeds **10'**.



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36

Section 705.5 - Exterior Wall - Fire-Resistance Ratings

Rated for exposure to fire from both sides

Fire separation distance Equal to or less than 10 feet

Rated for exposure to fire from inside only

Fire separation distance More than 10 feet

Line used to determine FSD

For SI: 1 foot = 304.8 mm.

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37

Section 705.5 - Exterior Wall - Fire-Resistance Ratings

Exterior cladding

5/8-inch-thick proprietary glass mat gypsum sheathing

Mineral or glass fiber insulation

3/8-inch 20 gage steel studs at 24 inches on center

FIRE SIDE

5/8-inch proprietary Type-X gypsum wallboard*

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38

Section 705.8 – Openings

Maximum area of unprotected or protected openings located in an exterior wall is limited by Table 705.8.

- Values are the percentage of area of the exterior wall per story.
- Unlimited unprotected openings where an exterior fire-resistance rating in accordance with Table 705.5.

are permitted where an exterior fire-resistance rating in accordance with Table 705.5.

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39

Table 705.8

TABLE 705.8 MAXIMUM AREA OF EXTERIOR WALL OPENINGS BASED ON FIRE SEPARATION DISTANCE AND DEGREE OF OPENING PROTECTION		
FIRE SEPARATION DISTANCE (feet)	DEGREE OF OPENING PROTECTION	ALLOWABLE AREA ^A
0 to less than 5 ⁽¹⁾	Unprotected, Non sprinklered (U.P. NS)	Not Permitted ^D
	Unprotected, Sprinklered (U.P. SF)	Not Permitted ^D
	Protected (P)	Not Permitted ^D
5 to less than 5 ⁽¹⁾	Unprotected, Non sprinklered (U.P. NS)	Not Permitted
	Unprotected, Sprinklered (U.P. SF)	15%
	Protected (P)	15%
5 to less than 10 ⁽¹⁾	Unprotected, Non sprinklered (U.P. NS)	10% ^B
	Unprotected, Sprinklered (U.P. SF)	25%
	Protected (P)	25%
10 to less than 15 ⁽¹⁾	Unprotected, Non sprinklered (U.P. NS)	15% ^B
	Unprotected, Sprinklered (U.P. SF)	45%
	Protected (P)	45%
15 to less than 20 ⁽¹⁾	Unprotected, Non sprinklered (U.P. NS)	25%
	Unprotected, Sprinklered (U.P. SF)	75%
	Protected (P)	75%
20 to less than 25 ⁽¹⁾	Unprotected, Non sprinklered (U.P. NS)	45%
	Unprotected, Sprinklered (U.P. SF)	No Limit
	Protected (P)	No Limit

(Partial Table)



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40

Horizontal lines for student notes.

Section 705.8.4 – Mixed Openings

Where both protected and unprotected openings are located in an exterior wall of any story, the total area of openings are to comply with following formula:

(A_p/a_p) + (A_u/a_u) ≤ 1 Equation 7-2

- Where:
- A_p** = Actual area of protected openings, or the equivalent area of protected openings, **A_e**.
- a_p** = Allowable area of protected openings.
- A_u** = Actual area of unprotected openings.
- a_u** = Allowable area of unprotected openings.

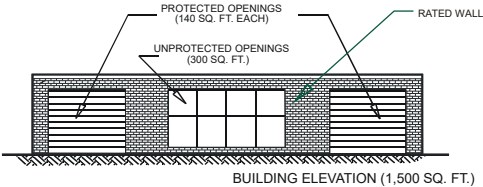


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41

Horizontal lines for student notes.

$$\frac{\text{Actual protected}}{\text{allowable protected}} + \frac{\text{Actual unprotected}}{\text{allowable unprotected}} \leq 1$$



$\frac{300 \text{ ft.}^2}{375} + \frac{280 \text{ ft.}^2}{1125}$
 $.80 + .25 = 1.05$
Total exceeds value of 1 and must be revised.
 See Table 705.8



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42

Horizontal lines for student notes.

Section 705.8.5 - Vertical Separation of Openings

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43

Section 705.8.6 - Vertical Exposure

- Applicable to buildings on the same lot. (Not at lot lines).
- See exceptions:
 - One-hour roof on lower building.
 - Buildings considered as one building.

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44

Sections 705.11 & 705.11.1 - Parapets; Parapet Construction

Parapets shall be provided on exterior walls of buildings:

- Same fire-resistance rating as the supporting wall.
- Side adjacent to roof surface to have noncombustible facing for uppermost **18"**.
- Height above the roof surface to be at least **30"**.


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45

Section 705.11 - Exceptions 1-3

Parapets need not be provided on exterior walls of buildings where any of the following conditions exist:

1. The wall is not required to be fire-resistance rated in accordance with Table 602 because of fire separation distance.
2. The building has an area of not more than **1,000 sq.ft.** on any floor.
3. Walls that terminate at roofs of not less than **2-hr.** fire-resistance-rated construction or where the roof, including the deck and supporting construction, is constructed entirely of noncombustible materials.




46

Section 705.11 - Exception 6


Where the wall is permitted to have at least 25% unprotected openings based on fire separation distance in accordance with Table 705.8:

- For fully sprinklered buildings, this distance would be greater than **5'** or greater.
- For non-sprinklered buildings, this distance would be greater than **15'** or greater.



47


**Section 706:
Fire Walls**



48

202 Fire Walls


- Fire walls are fire-resistance-rated walls having protected openings, which restricts the spread of fire and extends continuously from the foundation to or through the roof.



49

503.1 Fire Walls

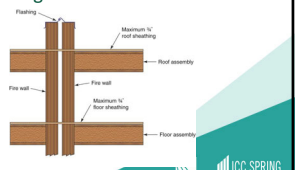
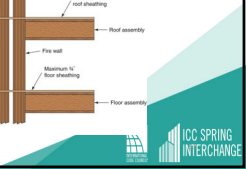
- Fire walls are typically used to create separate buildings for the purposes of determining:
 - Area limitations
 - Height limitations
 - Type of construction
 - Allowable number of control areas



50

706.2 Structural Stability

- Fire walls to be designed and constructed to allow collapse of the structure on either side without collapse of the wall under fire conditions.
 - Fire walls designed and constructed per NFPA 221 are deemed to comply.
 - Exception for SDCs D through F:

51

Section 706.2 - Structural Stability

Fire-Resistance Rating of Each Wall (Hour)	Equivalent to Single Wall (Hour)
3	4
2	3
1	2

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52

Table 706.4

**TABLE 706.4
FIRE WALL FIRE-RESISTANCE RATINGS**

GROUP	FIRE-RESISTANCE RATING (hours)
A, B, E, H-4, I, R-1, R-2, U	3 ^a
F-1, H-3b, H-5, M, S-1	3
H-1, H-2	4 ^b
F-2, S-2, R-3, R-4	2

a. In Type II or V construction, walls shall be permitted to have a 2-hour fire-resistance rating.
 b. For Group H-1, H-2 or H-3 buildings, also see Sections 415.7 and 415.8.

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53

Section 706.5 - Horizontal Continuity

- Fire walls shall extend a minimum of **18'** beyond the exterior surface of exterior walls.
- Several exceptions allow for an alternative means of protection.

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54

Section 706.5 - Exception 1

- Terminate at the interior surface of combustible exterior sheathing or siding.

4 feet 4 feet

Minimum 1-hour exterior wall with minimum ¾-hour opening protection

Fire Wall

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55

Section 706.5 - Exception 2

- Terminate at the interior surface of non-combustible exterior sheathing, siding or finish.

4 feet 4 feet

Sheathing, siding or other exterior finish of noncombustible materials

Fire Wall

- No opening protection requirement in this 4' area as there is with Exception 1.

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56

Section 706.5 - Exception 3

- Terminate at the interior surface of noncombustible exterior sheathing in sprinklered building.

Exterior sheathing of noncombustible materials

Sprinklered Building

Sprinklered Building

Fire Wall

- No specific distance established for the sheathing as with Exceptions 1 & 2.
- Nothing stated about opening protection as stated in Exception 1.

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57

Section 706.5.1, #1 - Exterior Walls

- Protect wall for 4' and protect any openings in that area.

4 feet minimum

4 feet minimum

Less than 180°

Minimum 1-hour exterior wall with minimum 1/2-hour openings.

Fire Wall

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58

Section 706.5.1, #2 - Exterior Walls

- Establish an imaginary property line and deal with the adjacent exterior walls accordingly.
- Base the adjacent wall and opening protection on the Fire Separation Distance from that imaginary line.

Assumed Imaginary Lot Line

Fire Wall

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59

Section 706.5.2 - Horizontal Projecting Elements

- Fire walls shall extend to the outer edge of horizontal projecting elements that are within 4' of the fire wall.

Outer edge of horizontal projecting element

Fire wall to extend to edge of projection

Fire Wall

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60

Section 706.5.2 - Exception 1

- Fire walls need not extend to outer edge of projection where the:
 - Projection contains no concealed space; and
 - Exterior walls behind and below projection for depth of the projecting element 'd' are a minimum of 1 hour with ¾-hour opening protection.

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61

Section 706.5.2 - Exception 2

- Fire walls need not extend to outer edge of a noncombustible projection that contains concealed space, if:
 - A 1-hour wall extends through a concealed space; and
 - Exterior walls both within and below the projection for the depth of the projecting element 'd' are a minimum of 1 hour with ¾-hour opening protection.
 - Wall that extends through projection is not required to extend below the projection (just through the projection). This requirement is not applicable to the "exterior" wall that is to each side of the fire wall, just to the wall that extends out through the projection

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62

Section 706.5.2 - Exception 2


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63

Section 706.5.2 - Exception 3

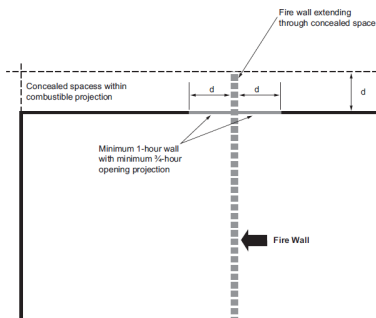

- Fire walls need not extend to outer edge of noncombustible projection that contains concealed space if the:
 - Fire wall extends through the concealing space; and
 - Exterior wall behind and below the projection for the depth of the projecting element, 'd', are a minimum of 1 hour with ¾-hour opening protection.
 - Fire wall extends through concealed projection – not beneath it.



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64

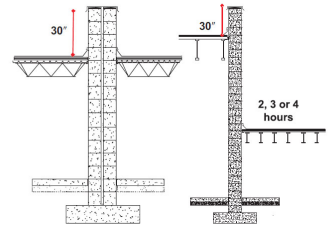


Section 706.5.2 - Exception 3

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65

Section 706.6 - Vertical Continuity

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66

Section 706.6 - Exception 1
Section 706.6.1 – Stepped Buildings

Stepped Buildings

- If higher building is not 15' higher, then just protect for full height.
- If higher building is more than 15' above lower roof, then only the portion of the exterior wall that is within 15' of lower roof is protected.
- Portions above that height are unprotected.

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67

Section 706.6 - Exception 1
Section 706.6.1, Exception

Roof Protection for Stepped Building

- As an alternative, the fire wall may terminate at the underside of the roof sheathing, deck or slab of the lower roof, provided:
 1. The lower roof assembly within 10' of the wall has not less than a 1-hour fire-resistance rating, and the entire length and span of supporting elements for the rated roof assembly has a fire-resistance rating of not less than 1 hour.
 2. Openings in the lower roof shall not be located within 10' of the fire wall.

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68

Section 706.6 - Exception 2

2. Two-hour fire-resistance-rated walls shall be permitted to terminate at the underside of the roof sheathing, deck or slab provided:

- The roof assembly is protected for 1 hour and is within 4' of wall; the entire length and span of supporting elements are also protected for 1 hour.
- No openings within 4'.
- Minimum Class B roof covering.

- Roof of same height
- Two-hour FW
- One-hour, 4 foot entire span span and supporting elements
- No roof openings within 4 ft of FW

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69

Section 706.6 - Exception 3

3. Walls are permitted to terminate at the underside of noncombustible roof sheathing, deck or slab where:

- Both buildings are provided with minimum Class B roof coverings.
- No roof openings are located within 4' of the fire wall.

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70

Section 706.6 - Exception 4

4. Fire walls may terminate at the underside of noncombustible roof sheathing, deck or slab where:

- Buildings are of Type III, IV or V construction.
- No roof openings occur within 4' of the fire wall.
- Minimum Class B roof covering.
- For a minimum of 4' on each side of the fire wall, sheathing or deck constructed of fire-retardant-treated plywood or 5/8" gypsum board shall be installed directly below sheathing or deck.

- Building type of Type III, IV, or V construction.
- No roof openings occur within 4 feet of the fire wall.
- Minimum Class B roof covering.
- For a minimum of 4 feet on each side of the fire wall, sheathing or deck constructed of FRT plywood or 5/8-inch Type gypsum board installed directly below sheathing or deck.

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71

Section 706.8 - Openings

- Each opening through a fire wall shall be protected in accordance with Section 716.5 and shall not exceed **156 sq.ft.**
- The aggregate width of openings at any floor level shall not exceed **25%** of the length of the wall.


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72


Section 706.8 - Openings

- Exceptions:
 1. Openings are not permitted in party walls.
 2. Openings are not limited to **156 sq.ft.** where both buildings are equipped throughout with an NFPA 13 automatic sprinkler system.
- Ducts and air openings may penetrate a fire wall (other than a party wall) provided they are protected in accordance with Sections 717.

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73



**Section 707:
Fire Barriers**

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74


Section 707 - Fire Barriers

A fire-resistance-rated wall assembly of materials designed to restrict the spread of fire in which continuity is maintained.

Used for:

- Shaft enclosures
- Stairway and ramp enclosures
- Exit passageways
- Horizontal exits
- Atrium enclosures
- Incidental uses
- Control areas
- Separated occupancies
- Fire areas

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75

Section 707.5 - Continuity

Fire barriers are to extend from the top of the floor/ceiling assembly below to the underneath side of:

- Floor slabs.
- Roof slabs.
- Floor sheathing of floors/ceiling assemblies.
- Roof sheathing of roofs/ceiling assemblies.

• Cannot stop at the ceiling, even if it is a part of a rated horizontal assembly.

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76

Section 707.6 - Openings

- Openings in a fire barrier to be protected in accordance with Section 716.
- Openings shall be limited to:
 - Maximum aggregate width of **25%** of wall length. (See exceptions)
 - **156 sq.ft.** per single opening. (See exceptions)
 - Additional limitations for exit or exit access stairway and ramp enclosures and exit passageways.

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77

Section 708: Fire Partitions

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78


Section 708 - Fire Partitions

A vertical assembly of materials designed to restrict the spread of fire in which openings are protected.

Selectively used for:

- Walls separating dwelling/sleeping units.
- Walls separating tenant spaces in mall buildings.
- Corridor walls.
- Elevator lobbies.
- Egress balconies.
- Walls separating ambulatory care facilities.
- Vestibules.

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79

Section 708.4 Continuity

- Fire partition provisions address three distinct areas:
 - Continuity in regard to enclosure limits.
 - Supporting construction components.
 - Fireblocking and draftstopping.

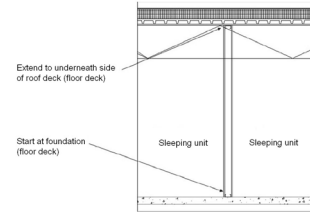
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80

Section 708.4, #1 Continuity

- Option 1: Fire partitions to extend from top of foundation or floor/ceiling assembly below to underside of:
 - Floor or roof sheathing, deck or slab above



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81

Section 708.4 Continuity

- Option 2: Fire partitions to extend from top of foundation or floor/ceiling assembly below to underside of:
 - Floor/ceiling or roof/ceiling assembly rated less than the fire partition.

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82

Section 708.4 Continuity, Exception 2.1

- Fire partitions not required to extend above lower membrane of corridor ceiling, if:
 - Room-side membrane of corridor wall extends to underside of floor or roof sheathing, deck or slab of FRR floor or roof above.

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83

Section 708.4 Continuity, Exception 2.2

- Optional enclosure continuity method for corridor walls that do not extend above lower membrane of corridor ceiling:
 - Applicable to sprinklered buildings where sprinklers installed in concealed space.

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84

Section 708.4 – Exception 3
Tunnel Corridor

- Allows corridor ceiling to be constructed as required for wall.
- Requires “corridor damper” if duct penetrates this horizontal assembly.

The diagram shows a cross-section of a tunnel corridor. The walls and ceiling are labeled as fire-resistant protection. A corridor damper is shown at the top of the wall assembly. Labels include 'Fire-resistant protection', 'Adjacent room', 'Corridor', and 'Tunnel Corridor'. A note above the ceiling says 'Lid of corridor constructed as required for corridor walls'.

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85

708.4.2 Fireblocking and Draftstopping at Fire Partitions

- In combustible construction where fire partitions do not extend to the underside of the floor or roof deck above, the space above and along line of fire partition to be fireblocked and draftstopped per Section 718.
- Five exceptions reduce or eliminate fireblocking and draftstopping requirements.

The diagram shows a cross-section of a fire partition wall meeting a floor/roof deck. It illustrates fireblocking and draftstopping measures. Labels include 'Fire partition', 'Fireblocking', 'Draftstopping', and 'Fire-resistance rated wall'.

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86

**Section 709:
Smoke Barriers**

The graphic features a blue background with a white smoke barrier and a globe. It includes the IBC logo and the LEARNING CENTER logo.

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87

Section 709 - Smoke Barriers

A continuous membrane, either vertical or horizontal, such as a wall, floor or ceiling assembly, that is designed and constructed to restrict the movement of smoke.

Selectively required in:

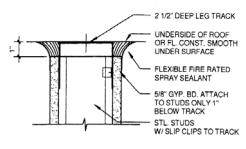
- Underground buildings.
- Group I-2 and I-3.
- Ambulatory care facilities.
- Areas of refuge.
- Smoke control systems.




88

Section 709.3 - Fire-Resistance Rating

- **Fire-resistance rating.** A minimum **1-hr.** fire-resistance rating is required for smoke barriers.
- Exception: Smoke barriers constructed of minimum 0.10-inch-thick steel in Group I-3 buildings.




RATED WALL HEAD DETAIL (SLIP CONDITION) SEE PLAN FOR FIRE RATING
3\" data-bbox="190 565 345 590"/>



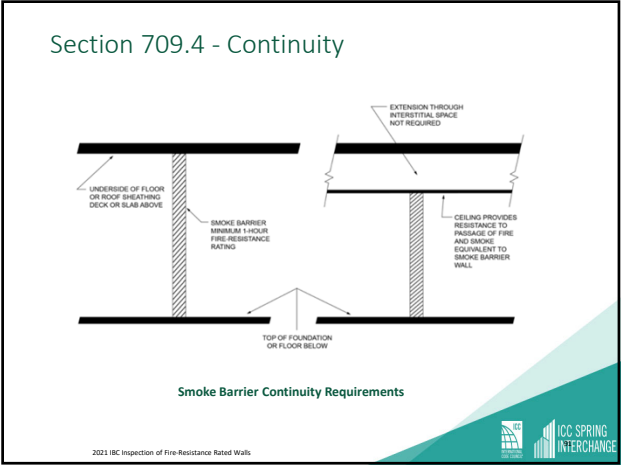
89

Section 709.4 - Continuity

- Smoke barriers shall form an effective membrane continuous from the top of the foundation or floor/ceiling assembly below to the underside of the floor or roof sheathing, deck or slab above, including continuity through concealed spaces, such as those found above suspended ceilings, and interstitial structural and mechanical spaces.
- Smoke barriers not required in interstitial spaces where such spaces designed with ceilings or exterior walls that provide resistance to passage of fire and smoke in a manner equivalent to smoke barrier walls.



90



91

Section 709.4.1 & 709.4.2 - Continuity

- Walls creating smoke compartments must extend from outside wall to outside wall.
- Walls creating areas of refuge or elevator lobbies shall terminate at a fire barrier, another smoke barrier or an outside wall.

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92

Section 709.5 - Openings

- Openings in smoke barriers to comply with Section 716:
 - Minimum **20-minute** fire-protection rating.
 - Meet requirements for a smoke and draft control door assembly tested in accordance with UL 1784.

SWINGING TYPE FIRE DOOR NO. 20 MINUTE DOOR TESTED WITHOUT HOSE STREAM. ISSUE NO. A-1018

CLASSIFIED UL US

CONFORMS TO UL10B, UL10C, & NFPA 252
MIN. LATCH THROW 1/2" SINGLE 5/8" PAIR
FOR (S) RATING. CLASSIFIED GASKETING REQUIRED

STEELCRAFT CINCINNATI, OH
P/N 3145G

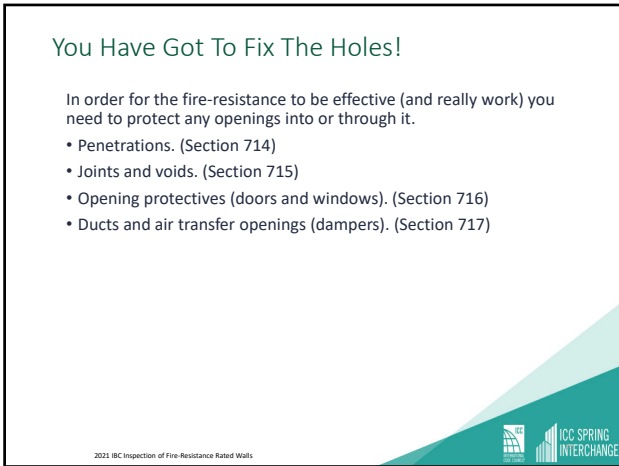
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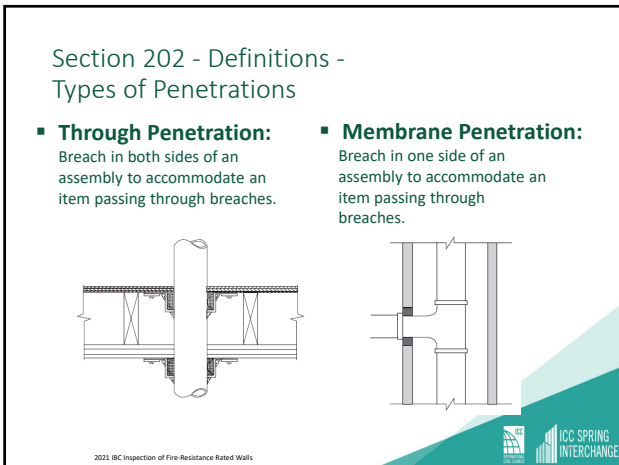
93



94



95




96


Section 714 - Penetrations

Penetrations of fire walls, fire barriers, smoke barrier walls and fire partitions to be protected by one of three basic methods:

- Tested as a part of the original fire-resistive assembly test.
- Tested as a Penetration Firestop System – complying with ASTM E814 or UL 1479.
- Comply with one of the exceptions listed in Sections 714.4.1 or 714.4.2 (Through or Membrane penetration provisions).




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97

Penetration Firestop Systems

- Review and understand definitions!
- Tested and listed as a system. Must be installed and used for walls and penetrants as tested.
- Required to have an “F” rating of not less than the fire-resistance rating of the wall. (Section 714.4.1.2)
- Required to have an “L” rating for penetrations in smoke barriers. (Sections, 714.4, 714.5.4)




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98

Penetration Firestop Systems

- **“F” rating:** Time period that limits spread of fire through penetration firestop system.
- **“T” rating:** Time period that limits maximum 325F temperature rise through penetration firestop system.
- **“S” rating:** Time period that resists passage of smoke through penetration firestop system.
- **“L” rating:** Air leakage rate through penetration firestop system.




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99

Special Inspection – Section 1705.18 – Fire-Resistant Penetrations & Joints

Special inspection of penetration firestops, joint systems and perimeter fire containment systems is required in:

- High-rise buildings.
- Buildings in Risk Category III or IV in accordance with Section 1604.5.
- Fire areas containing Group R occupancies with an occupant load exceeding 250


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100

Risk Category III – Table 1604.5

Buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not limited to:

- Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300.
- Buildings and other structures containing one or more public assembly spaces, each having an occupant load greater than 300 and a cumulative occupant load of the public assembly spaces of greater than 2,500.
- Buildings and other structures containing Group E or Group I-4 occupancies or combination thereof, with an occupant load greater than 250.
- Buildings and other structures containing educational occupancies for students above the 12th grade with an occupant load greater than 500.
- Group I-2, Condition 1 occupancies with 50 or more care recipients.
- Group I-2, Condition 2 occupancies not having emergency surgery or emergency treatment facilities.
- Group I-3 occupancies.
- Any other occupancy with an occupant load greater than 5,000.
- Power-generating stations, water treatment facilities for potable water, wastewater treatment facilities and other public utility facilities not included in Risk Category IV.
- Buildings and other structures not included in Risk Category IV containing quantities of toxic or explosive materials that:
 - Exceed maximum allowable quantities per control area as given in Table 307.1(1) or 307.1(2) or per outdoor control area in accordance with the International Fire Code; and
 - Are sufficient to pose a threat to the public if released.


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101

Risk Category IV – Table 1604.5

Buildings and other structures designated as essential facilities, including but not limited to:

- Group I-2, Condition 2 occupancies having emergency surgery or emergency treatment facilities.
- Ambulatory care facilities having emergency surgery or emergency treatment facilities.
- Fire, rescue, ambulance and police stations and emergency vehicle garages
- Designated earthquake, hurricane or other emergency shelters.
- Designated emergency preparedness, communications and operations centers and other facilities required for emergency response.
- Power-generating stations and other public utility facilities required as emergency backup facilities for Risk Category IV structures.
- Buildings and other structures containing quantities of highly toxic materials that:
 - Exceed maximum allowable quantities per control area as given in Table 307.1(2) or per outdoor control area in accordance with the International Fire Code; and
 - Are sufficient to pose a threat to the public if released.
- Aviation control towers, air traffic control centers and emergency aircraft hangars.
- Buildings and other structures having critical national defense functions.
- Water storage facilities and pump structures required to maintain water pressure for fire suppression


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102

Special Inspection – Section 1705.19 – Testing for Smoke Control

Special inspection of smoke control systems is required:

- During erection of ductwork.
- Prior to concealing for leakage testing.
- Prior to occupancy.




103

Section 714.4.1 - Exception 1

Where penetrating items are **steel, ferrous or copper pipes, tubes or conduit**, annular space protection using concrete, grout or mortar is permitted in lieu of a listed firestop system where:


- Penetrating items are steel, ferrous or copper pipes, tubes or conduits.
- Walls are of concrete or masonry.
- Penetrating item a maximum of 6" in diameter.
- Area of wall opening limited to **144 sq.in (@13.5" dia)**.
- Annular space protection is installed to full thickness of the wall or thickness required to maintain fire-resistance rating.



104

Section 714.4.1 – Exception 2

- Where penetrating items are **steel, ferrous or copper pipes, tubes or conduit**, annular space protection is permitted in lieu of a listed firestop system where material used to fill the annular space is shown to prevent the passage of flame and hot gases in accordance with ASTM E119 or UL 263.

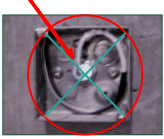


105

Section 714.4.2 - Exception 1


Membrane penetrations of steel electrical boxes may be made subject to the following conditions:

- Walls to be maximum **2 hrs.**
- Boxes to be a maximum of **16 sq.in.**
- Aggregate area of boxes not to exceed **100 sq.in. per 100 sq.ft. of wall area.**
- Annular space between the box and wall membrane is not to exceed **1/8"**.
- Boxes on the opposite sides of a wall or partition to be adequately separated or protected (five methods available).



Boxes are back-back.
No separation.

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106


Section 714.4.2 - Exception 2

Membrane penetrations of listed electrical boxes of any material may be made subject to the following conditions:

- Boxes have been tested for use in a fire-resistance-rated assembly.
- Boxes are installed in accordance with their listing.
- Annular space between the box and wall membrane is not to exceed **1/8"**.
- Boxes on the opposite sides of a wall or partition to be adequately separated or protected (four methods available).



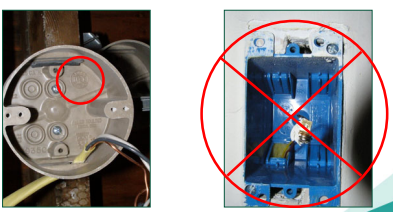
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107

Section 714.4.2 - Exceptions 3 & 4

Electrical boxes of any size or type are permitted as complying membrane penetrations provided they have been listed as part of a wall opening protective material system.



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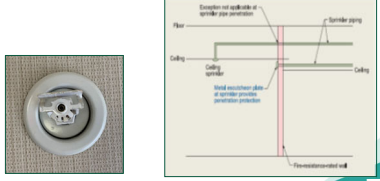


108

Section 714.4.2 - Exception 5


Membrane penetrations created by the penetration of an automatic sprinkler need not be protected by an approved firestop system provided the annular space is covered by a metal escutcheon plate.

- Exception is for a sprinkler, not for a line of sprinkler piping.



The diagram shows a cross-section of a fire-rated wall with a ceiling and floor. A sprinkler pipe penetrates the wall. Labels include: 'Exception not applicable to sprinkler pipe penetration', 'Sprinkler piping', 'Ceiling', 'Metal escutcheon plate at membrane penetration', and 'Fire-resistance-rated wall'. A photo shows a circular metal escutcheon plate installed on a wall.

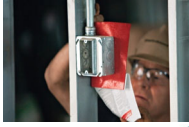
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109


Section 714.4.2 - Exception 6

- Similar in many ways to **Exception 1** but accepts boxes that exceed **16 sq.in.** size
- Relies on "protected by listed putty pads or other listed material"
- Must be installed in accordance with the listing
- Listing would address issues of back-to-back penetrations



The photo shows a person wearing safety glasses applying a red firestop putty pad to a penetration in a fire-rated wall.

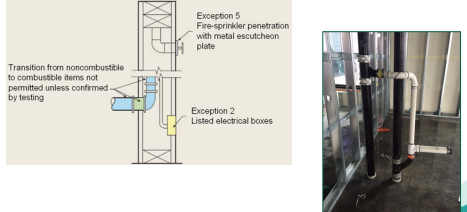
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110


Section 714.4.3 - Dissimilar Materials

- Noncombustible penetrating items shall not connect to combustible items beyond the point of firestopping.



The diagram shows a vertical pipe penetrating a wall. Labels include: 'Transition from noncombustible to combustible items not permitted unless confirmed by testing', 'Exception 5 Fire-sprinkler penetration with metal escutcheon plate', and 'Exception 2 Listed electrical boxes'. A photo shows a vertical pipe with a firestop at the transition between a noncombustible upper section and a combustible lower section.

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111

Section 715 – Joints and Voids

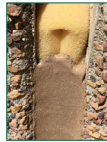
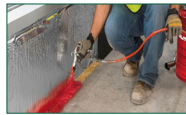
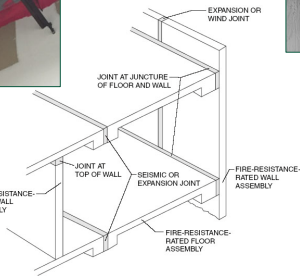
- This section regulates joints or linear openings created between building assemblies, which are sometimes referred to as head-of-wall, expansion or seismic joints.
- These joints are most often created where the structural design of a building necessitates a separation between building components in order to accommodate anticipated structural displacements caused by thermal expansion and contraction, seismic activity, wind or other loads.
- It also addresses voids at the intersection of floors and exterior curtain walls.

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112

Section 715.1 - Examples of Locations



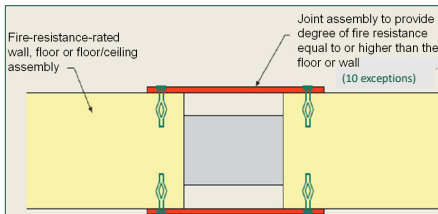
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113

Section 715.1 - General

- Joints to be protected with approved fire-resistant joint systems.



Material or assembly securely installed so as not to dislodge, loosen or otherwise impair its ability to accommodate expected building movements and to resist the spread of fire and hot gases.

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114

Section 715.1 - Exceptions

Fire-resistant joint systems are not required in the following locations:

Locations:


- Within a single dwelling unit.
- Where the joint is protected by a shaft enclosure.
- Within atriums.
- Within malls.
- Within open parking garages.
- Mezzanines.
- Walls permitted to have unprotected openings.
- Roofs where openings are permitted.
- Maximum **5/8"** wide control joints (tested in accordance with ASTM E119 or UL 263).
- Intersection of exterior curtain wall and floor



115

Section 715.4 – Exterior Curtain Wall/Rated Floor Intersections


- Voids created at intersection of exterior curtain wall assemblies and **fire-resistance-rated** floor or floor/ceiling assemblies to be protected with an approved **perimeter fire containment system**.
- Such systems to have an F rating no less than that required for the floor or floor/ceiling assembly.



116

Section 715.5 – Exterior Curtain Wall/Nonrated Floor Intersections



- Voids created at intersection of exterior curtain wall assemblies and **nonfire-resistance-rated** floor or floor/ceiling assemblies to be filled with an approved material or system to retard the interior spread of fire and hot gases between stories.



117

Section 715.6 – Exterior Curtain Wall/Nonrated Floor Intersections

- Voids created at intersection of **nonfire-resistance-rated** exterior curtain wall assemblies and **fire barriers** to be filled with an approved material or system to retard the interior spread of fire and hot gases between stories.








118

Section 716 - Opening Protectives

This section regulates two types of opening protectives:

- Fire door and shutter assemblies (716.2).
- Fire window assemblies (716.3).

119

Section 716 – Opening Protectives - “Approved” Hold-Open Device






120

Section 716 – Opening Protectives -
“Un-Approved” Hold-Open Devices



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121

Section 716.1 - General


Fire door and fire shutter assemblies shall be:

- Side hinged or pivoted.
- “Other doors” (fire shutters or swinging elevator doors, chute intake and discharge doors, etc.).
- Corridor and smoke barrier doors.
- Tin clad doors.
- Floor fire doors.




Fire-protection-rated glazing permitted in:

- “Fire windows.”
- Vision panels in door assemblies



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122


Section 716.1.1 – Alternative Methods for
Determining Fire Protection Rating

Required fire resistance of opening protective:

- Designs documented in approved sources.
- Calculations performed in approved manner.
- Engineering analysis based on NFPA or UL.
- Alternative protection methods allowed by Section 104.11.



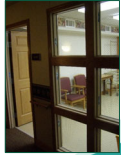
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123

Section 716.1.2.2.1 - Fire-Resistance-Rated Glazing

- Labeled fire-resistance-rated glazing tested as part of a fire-resistance-rated wall or floor/ceiling assembly, in accordance with ASTM E119 or UL 263, is not required to comply with Section 716.
- Fire-resistance-rated glazing is permitted in fire doors and fire windows when installed in accordance with listing and requirements of Section 716.




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124

Sections 716.1.2.2.1 - Fire-Rating Glazing Identification




Glazing to be labeled with 4-part identifier:

- "D": applicable for fire-door assemblies and meets applicable fire-resistance requirements
- "H": meets hose stream requirements
- "T": meets temperature requirements
- "XXX": fire-protection rating in minutes

Fire Door Glazing Identification Requirements

2021 IBC Inspection of Fire-Resistance Rated Walls




125


Table 716.1(1) - Marking Fire-Rated Glazing Assemblies

TABLE 716.1(1) MARKING FIRE-RATED GLAZING ASSEMBLIES		
FIRE TEST STANDARD	MARKING	DEFINITION OF MARKING
ASTM E119 or UL 263	W	Meets wall assembly criteria.
ASTM E119 or UL 263	FC	Meets floor/ceiling criteria ^a
NFPA 257 or UL 9	OH	Meets fire window assembly criteria including the hose stream test.
NFPA 252 or UL 10B or UL 10C	D	Meets fire door assembly criteria.
	H	Meets fire door assembly hose stream test.
	T	Meets 450°F temperature rise criteria for 30 minutes.
—	XXX	The time in minutes of the fire resistance or fire protection rating of the glazing assembly.

^a See Section 2409.1



2021 IBC Inspection of Fire-Resistance Rated Walls



126

Table 716.1(2) - Opening Fire Protection

TABLE 716.1(2)
OPENING FIRE PROTECTION ASSEMBLIES, RATINGS AND MARKINGS

TYPE OF ASSEMBLY	REQUIRED WALL ASSEMBLY RATING (hours)	MINIMUM FIRE DOOR AND FIRE SHUTTER ASSEMBLY RATING (hours)	DOOR VISION PANEL SEE	FIRE-RATED GLAZING MARKING DOOR VISION PANEL*	MINIMUM SIDELIGHT/TRANSOM ASSEMBLY RATING (hours)		FIRE-RATED GLAZING MARKING SIDE-LIGHT/TRANSOM PANEL	
					Fire protection	Fire resistance	Fire protection	Fire resistance
Fire walls and fire barriers having a required fire-resistance rating greater than 1 hour	4	3	See Note a	D-I-W-240	Not Permitted	4	Not Permitted	W-240
	3	3 ^{1/2}	See Note a	D-I-W-180	Not Permitted	3	Not Permitted	W-180
	2	1 1/2	100 sq. in.	≤100 sq. in. = D-I-90 >100 sq. in. = D-I-W-90	Not Permitted	2	Not Permitted	W-120
	1 1/2	1 1/2	100 sq. in.	≤100 sq. in. = D-I-90 >100 sq. in. = D-I-W-90	Not Permitted	1 1/2	Not Permitted	W-90

(partial Table)

• This table lists the minimum fire protection ratings for fire doors relative to the nature and fire-resistance rating of the wall.

2021 IBC Inspection of Fire-Resistance Rated Walls



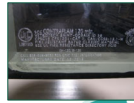
127

Section 716.2.5 - Glazing Material in Fire Door Assemblies

Review Table 716.5 and Section 716.2.5 for limitations on glazing in fire doors.

Provisions vary depending on:

- Fire-protection rated glazing or fire-resistance-rated glazing.
- Type and location of wall assembly.
- Verify glazing is properly labeled. (716.2.9.5 & 716.3)
- Comply with safety glazing provisions. (716.1.2.1)



2021 IBC Inspection of Fire-Resistance Rated Walls



128

Section 716.2.6.1 - Door Closing

- Fire doors shall be self-closing or automatic closing and shall latch to secure the door.
- Automatic-closing devices are required for certain locations. Example is cross-corridor doors installed in a:
 - Smoke-barrier wall in a Group I-2 occupancy.
 - Horizontal exit wall.




2021 IBC Inspection of Fire-Resistance Rated Walls




129

Section 716.2.6.6 - Smoke-Activated Doors

Where automatic-closing doors are installed, activation by smoke detectors are required at 8 specific locations.

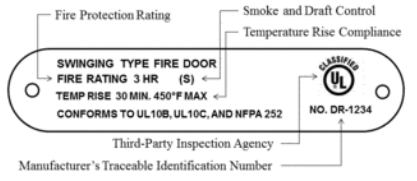


2021 IBC Inspection of Fire-Resistance Rated Walls



130

Section 716.2.9.1 - Fire Door Labeling Requirements



Fire Protection Rating

Smoke and Draft Control

Temperature Rise Compliance

SWINGING TYPE FIRE DOOR

FIRE RATING 3 HR (S)

TEMP RISE 30 MIN. 450°F MAX

CONFORMS TO UL10B, UL10C, AND NFPA 252


UL CLASSIFIED

NO. DR-1234

Third-Party Inspection Agency

Manufacturer's Traceable Identification Number

2021 IBC Inspection of Fire-Resistance Rated Walls



131

Section 716.2.9.1 - Fire Door Labeling Requirements



Fire door labeling requirements

Manufacturer

Rating

Test standard

"S" label (if applicable)

Testing agency

Other information

2021 IBC Inspection of Fire-Resistance Rated Walls



132

Section 716.3.4 - Fire-Protection- Rated Glazing

- Glazing in fire window assemblies shall comply with Table 716.1(3).
- Remember fire-resistance-rated glazing is permitted in fire doors and fire window assemblies where tested and installed in accordance with the listing and must comply with Section 716 when used in these locations.



133

Table 716.1(3)

**TABLE 716.1(3)
FIRE WINDOW ASSEMBLY FIRE PROTECTION RATINGS**

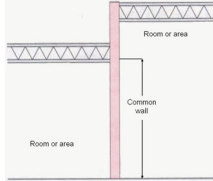
TYPE OF WALL ASSEMBLY	REQUIRED WALL ASSEMBLY RATING (hours)	MINIMUM FIRE WINDOW ASSEMBLY RATING (hours)	FIRE-RATED GLAZING MARKING
Interior walls			
Fire walls	All	NP*	W-XXX*
Fire barriers	>1	NP*	W-XXX*
Fire barriers	1	NP*	W-XXX*
Atrium separations (Section 707.3.6), Incidental use areas (Section 707.3.7), Mixed occupancy separations (Section 707.3.9)	1	1/4	OH-45 or W-60
Fire partitions	1	1/4	OH-45 or W-60
Fire partitions	0.5	1/4	OH-20 or W-30
Smoke barriers	1	1/4	OH-45 or W-60
Smoke barriers	>1	1/2	OH-90 or W-XXX*
Exterior walls	1	3/4	OH-45 or W-60
Exterior walls	0.5	1/3	OH-20 or W-30
Party wall	All	NP	Not Applicable

NP = Not Permitted.
(exceptions not shown)

134

Section 716.3.2.1 - Interior Fire Window Assemblies

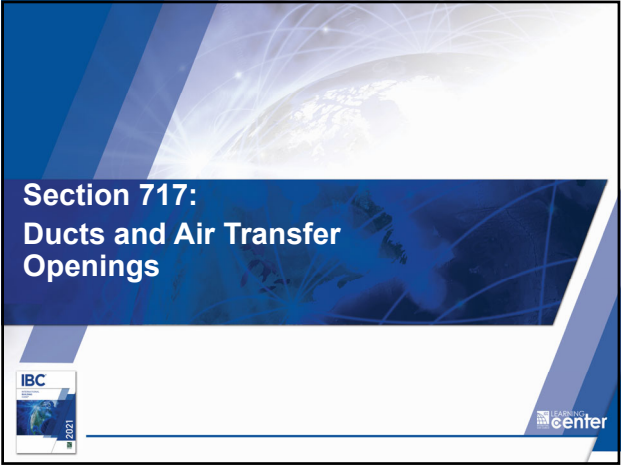
- **3/4 hr.** fire-protection-rated glazing used in fire window assemblies shall be limited to use in fire partitions and fire barriers where the fire-resistance rating of the wall assembly does not exceed **1 hr.**
- **20 minute** rating allowed in smoke barriers and fire partitions requiring **20 minute** opening protection.
- The total aggregate window area shall not exceed **25%** of the area of the **common wall** between any rooms.



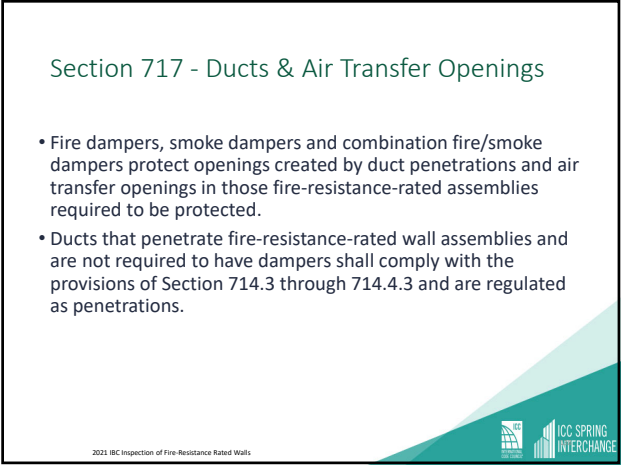
135



136



137





138

Section 717.3 - Damper Testing, Ratings and Actuation

Dampers shall be listed, labeled and in compliance with the following standards:

- Fire dampers: UL 555.
- Smoke dampers: UL 555S.
- Combination fire/smoke dampers to comply with both UL 555 and 555S.
 - A "corridor damper" is a specific type of combination damper used in the ceiling of a tunnel type corridor.



2021 IBC Inspection of Fire-Resistance Rated Walls 


139

Section 717.3.2 - Damper Ratings

TYPE OF PENETRATION	MINIMUM DAMPER RATING (hours)
Less than 3-hour fire-resistance-rated assemblies	1.5
3-hour or greater fire-resistance-rated assemblies	3

Smoke dampers shall be rated as follows:


- Leakage ratings shall be Class I or Class II.
- Elevated temperature ratings shall not be less than 250° F.


2021 IBC Inspection of Fire-Resistance Rated Walls 

140

717.4 Access and Identification

- Dampers equipped with fusible links and/or internal operators to be provided with a:
 - Minimum 12 inch by 12 inch access door, or
 - Removable duct section.
- Where space constraints or physical barriers restrict damper access for periodic inspection and testing, the damper to be a single- or multi-blade type and comply with remote inspection requirements of NFPA 80 or NFPA 105.
 - Requirements for maintenance and periodic inspection found in IFC Section 706.1
- Access points to be identified by minimum ½"-high letters reading "FIRE /SMOKE DAMPER," SMOKE DAMPER" or "FIRE DAMPER."



2021 IBC Inspection of Fire-Resistance Rated Walls 

141

Section 717.5 - Where Required

The type and location of dampers is specified in Section 717.5 based on the type of assembly it penetrates.



- Fire Walls. (Section 717.5.1)
- Fire Barriers. (Section 717.5.2)
- Shaft Enclosures. (Section 717.5.3)
- Fire Partitions. (Section 717.5.4)
- Smoke Barriers. (Section 717.5.5)
- Exterior Walls. (Section 717.5.6)
- Smoke Partitions. (Section 717.5.7)



142

Section 717.5.1 - Fire Walls



- Ducts and air transfer openings permitted in fire walls in accordance with Section 706.11 shall be protected with listed **fire dampers** installed in accordance with their listing.
- Where the fire wall serves as a **horizontal exit**, listed **smoke dampers** are also required at those points where any ducts or air transfer openings penetrate the fire wall.

143

Section 717.5.2 - Fire Barriers


- Ducts and air transfer openings that penetrate fire barriers shall be protected with approved **fire dampers** installed in accordance with their listing.
- Ducts and air transfer openings shall not penetrate enclosures for interior exit stairways and ramps and exit passageways except as permitted by Sections 1023.5 and 1024.6, respectively.
- Where the fire barrier serves as a **horizontal exit**, listed **smoke dampers** are also required at those points where any ducts or air transfer openings penetrate the fire barrier.

144

Section 717.5.2 - Exceptions 1, 2 & 3


- Fire dampers are not required at penetrations of fire barriers where:
 1. Penetrations are tested in accordance with ASTM E119 or UL 263 as part of the fire-resistance-rated assembly.
 2. Ducts are used as part of an approved smoke control system in accordance with Section 909 and would interfere with system operation.
 3. Maximum 1-hour wall penetrated by a:
 - Ducted HVAC system (continuous w/26 ga. Steel)
 - In areas other than Group H.
 - The building is sprinklered.


2021 IBC Inspection of Fire-Resistance Rated Walls 

145

Section 717.5.3 - Shaft Enclosures

- Shaft enclosures that are permitted to be penetrated by ducts and air transfer openings shall be protected with approved **fire and smoke dampers** installed in accordance with their listing.

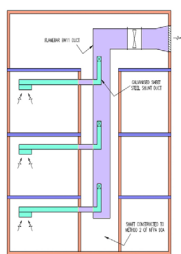



2021 IBC Inspection of Fire-Resistance Rated Walls 

146

Section 717.5.3 - Exception 1 – Shaft Enclosures

- 1. **Fire dampers** are not required at penetrations of shafts where:
 - 1.1 Steel exhaust subducts extend at least **22"** vertically in exhaust shafts provided there is continuous airflow upward to the outside.
 - 1.2 Penetrations are tested in accordance with ASTM E119 or UL 263 as part of the rated assembly.




2021 IBC Inspection of Fire-Resistance Rated Walls 

147

Section 717.5.3 - Exception 1

1.3 Ducts are used as part of an approved smoke control system designed and installed in accordance with Section 909, and where the fire damper will interfere with the operation of the smoke control system; or

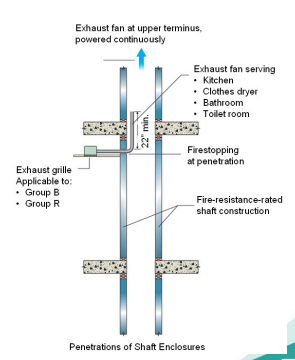

1.4 The penetrations are in parking garage exhaust or supply shafts that are separated from other building shafts by not less than 2-hr. fire-resistance-rated construction.



148

Section 717.5.3 - Exception 2

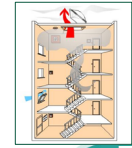

Exception 2 eliminates smoke damper requirement.

149

Section 717.5.3 - Exceptions 3 & 4


- **Smoke dampers** are not required at penetration of exhaust or supply shafts in parking garages that are separated from other building shafts by not less than 2-hr. fire-resistance-rated construction.
- **Smoke dampers** are not required at penetrations of 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.


150

Section 717.5.3 - Exception 5

- Fire dampers and combination fire/smoke dampers are not required in kitchen and clothes dryer exhaust systems installed in accordance with the IMC.




2021 IBC Inspection of Fire-Resistance Rated Walls




151

Section 717.5.4 - Fire Partitions

- Ducts and air transfer openings that penetrate fire partitions shall be protected with listed **fire dampers** installed in accordance with their listing.



2021 IBC Inspection of Fire-Resistance Rated Walls




152

Section 717.5.4 – Exceptions 1 & 2

In occupancies other than Group H, **fire dampers** are not required where any of the following apply:

1. 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 714. (Notice this only exempts fire damper. Smoke damper is still required.)
2. Tenant partitions in covered mall buildings where the walls are not required by provisions elsewhere in the code to extend to the underside of the floor or roof deck above.

2021 IBC Inspection of Fire-Resistance Rated Walls




153

Section 717.5.4 – Exceptions 3 & 4

3. Duct systems of approved materials and the duct penetrating the wall meets all of the minimum requirements.
4. Wall is penetrated by:
 - Ducted HVAC system;
 - In areas other than Group H;
 - The building is sprinklered; and
 - Wall rating of 1-hour or less.

2021 IBC Inspection of Fire-Resistance Rated Walls




154

Section 717.5.4.1 – Corridors

Ducts and air transfer openings that penetrate corridors shall be protected with dampers as follows:

- **Corridor damper** – Where ceiling constructed using 708.4 Exception 3 (tunnel construction).
- **Ceiling radiation damper** – Where ceiling membrane is part of a rated assembly.
- **Smoke damper** – Where penetrating corridor enclosure that requires smoke-and-draft control doors.

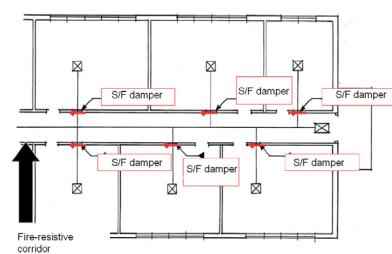
2021 IBC Inspection of Fire-Resistance Rated Walls




155

Section 717.5.4.1 – Corridors

Fire-resistant Corridor in a Non-sprinklered Building.




2021 IBC Inspection of Fire-Resistance Rated Walls



156

Section 717.5.4.1 – Exception 2

- **Smoke dampers** are not required at the point a duct or air transfer opening penetrates a corridor where the:
 - Building is equipped with a smoke control system.
 - Duct is constructed of steel not less than **0.019” (26 gage steel; 28 gage galvanized)** in thickness and there are no openings serving the corridor.




2021 IBC Inspection of Fire-Resistance Rated Walls

157

Section 717.5.5 – Smoke Barriers

- Listed smoke damper to be provided at each point a duct or air transfer opening penetrates a smoke barrier.

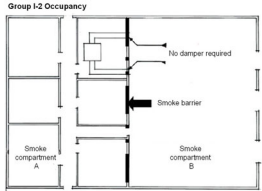


2021 IBC Inspection of Fire-Resistance Rated Walls

158

Section 717.5.5 - Smoke Barriers

- Listed smoke damper to be provided at each point a duct or air transfer opening penetrates a smoke barrier.



Group I-2 Occupancy

No damper required


Smoke barrier

Smoke compartment A

Smoke compartment B

Exceptions:

1. Where openings in duct are limited to a single smoke compartment and duct is constructed of steel
2. I-2, Condition 2 with ducted HVAC system and quick response sprinklers




2021 IBC Inspection of Fire-Resistance Rated Walls


159

Section 717.5.6 - Exterior Walls

- Ducts and air transfer openings in fire-resistance-rated exterior walls required to have protected openings in accordance with Section 705.10 shall be protected with listed fire dampers installed in accordance with their listing.



2021 IBC Inspection of Fire-Resistance Rated Walls




160

Damper Inspection Issues

- Dampers must be installed in accordance with their listing. Get and review manufacturer’s installation instructions.
- Verify access is provided per Section 717.4.
- Verify proper type of damper being used and is installed in the correct direction.
- Breakaway connections provided on ductwork.
- Proper gap and support brackets provided around damper. (See manufacturer’s instructions)


2021 IBC Inspection of Fire-Resistance Rated Walls




161

Closing Comments - “Recipe”

- It is only through the proper construction and protection of openings or penetrations that a fire-resistance rated assembly can do what it is intended to do.
- If one aspect is done incorrectly it can compromise the integrity of the assembly and lead to it not doing its intended job.
- So verify construction, continuity and protection of openings of all fire-resistance-rated walls.



2021 IBC Inspection of Fire-Resistance Rated Walls



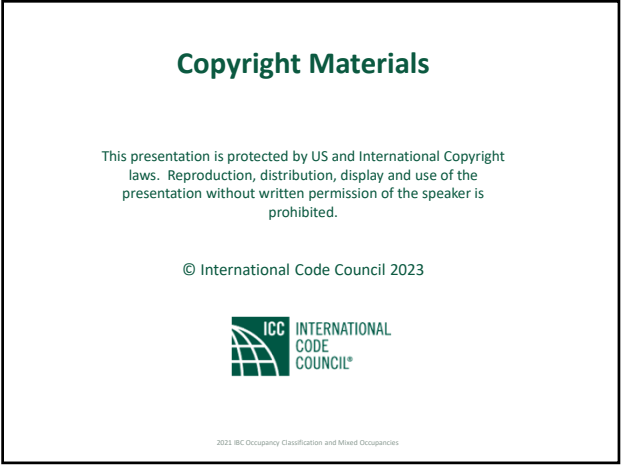
162



163



164



165



166