

CONST-181

Building Code Interpretation:

Non-Structural

Chapter 1 & 35: Learning Objective

To obtain an understanding of the administrative provisions of the International Building Code.

- Understand the scope and purpose of the code,
- Duties of the building official
- Issuance of permits
- Inspection procedures
- Special inspections
- Existing buildings and referenced standards.

Class 3: Chapter 6 Type of Construction

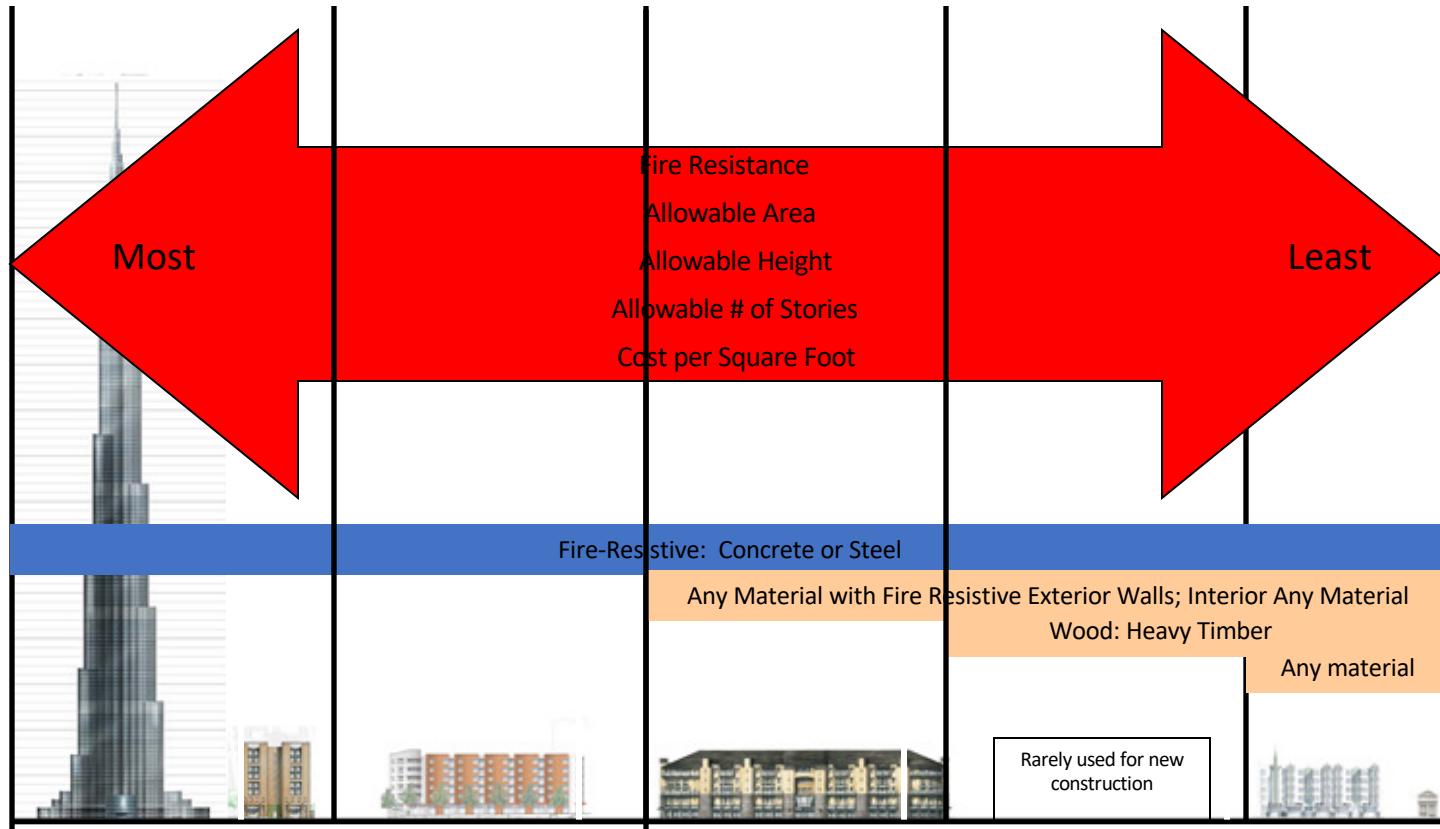
602.1 Construction Classification

Noncombustible	Exterior and interior (bearing or nonbearing) walls, floors, roofs and structural elements are to be of noncombustible materials	I	A	B
		II	A	B
Noncombustible or combustible	Exterior walls are to be of noncombustible materials	III	A	B
		IV	A	B
	V	A	B	C
				HT

It is the intent of the *International Building Code* that each building be classified as a single type of construction. The construction materials and the degree to which such materials are protected determine the classification based on the criteria of Table 601 and Chapter 6.

Source: 2021 IBC

1. The Five Basic Construction Types

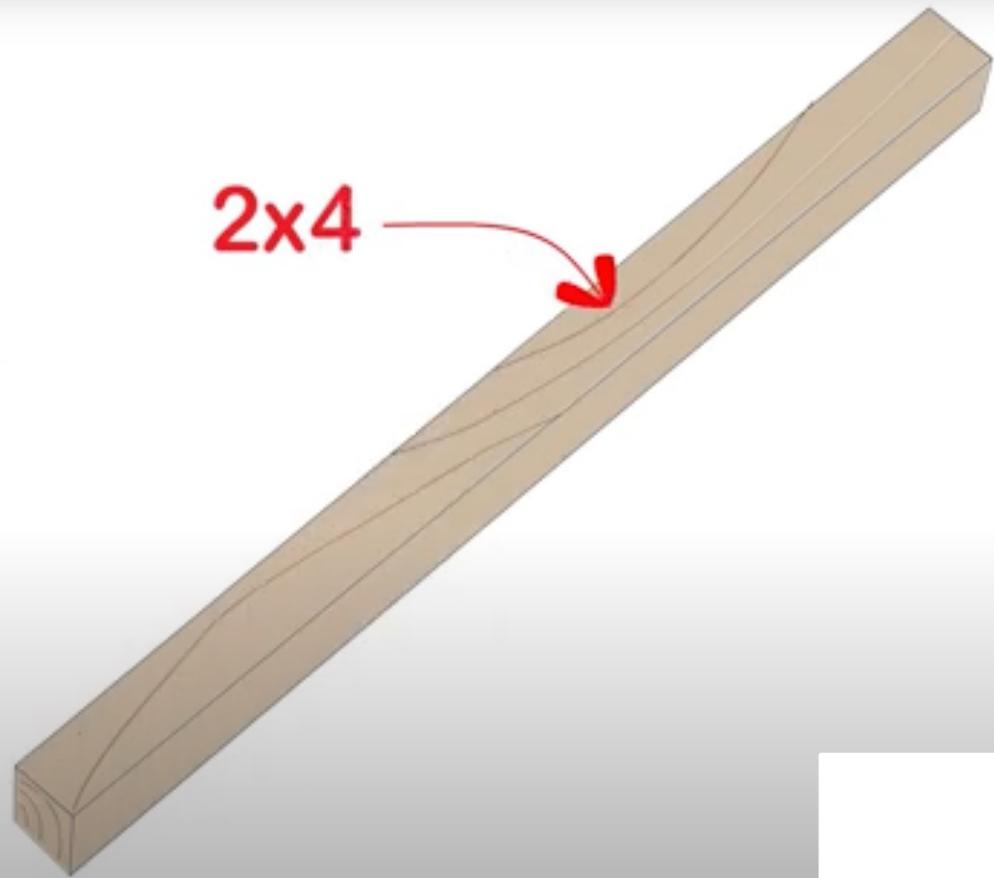


T601, 202 Primary Structural Frames

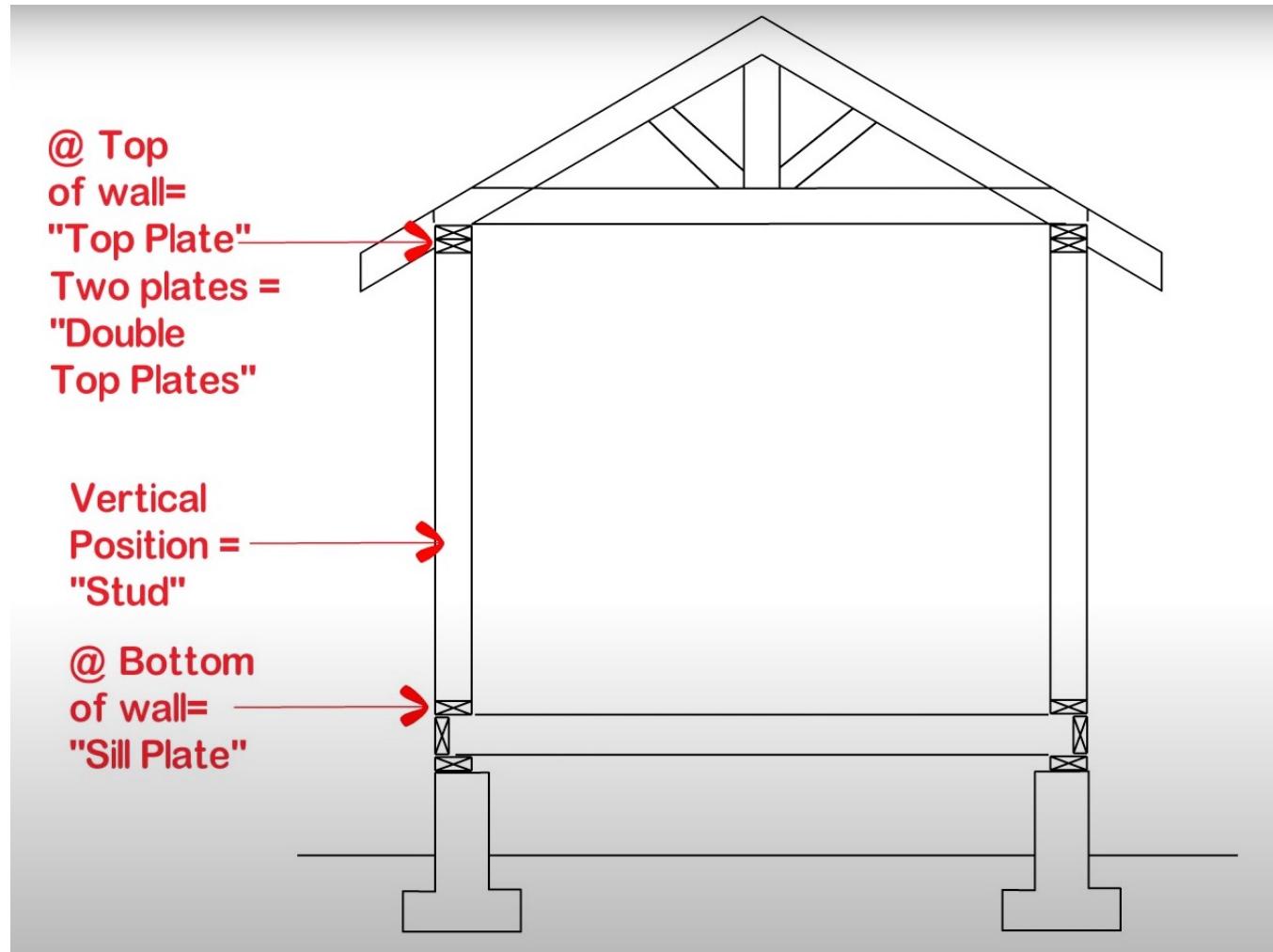
Joist?

Rafter?

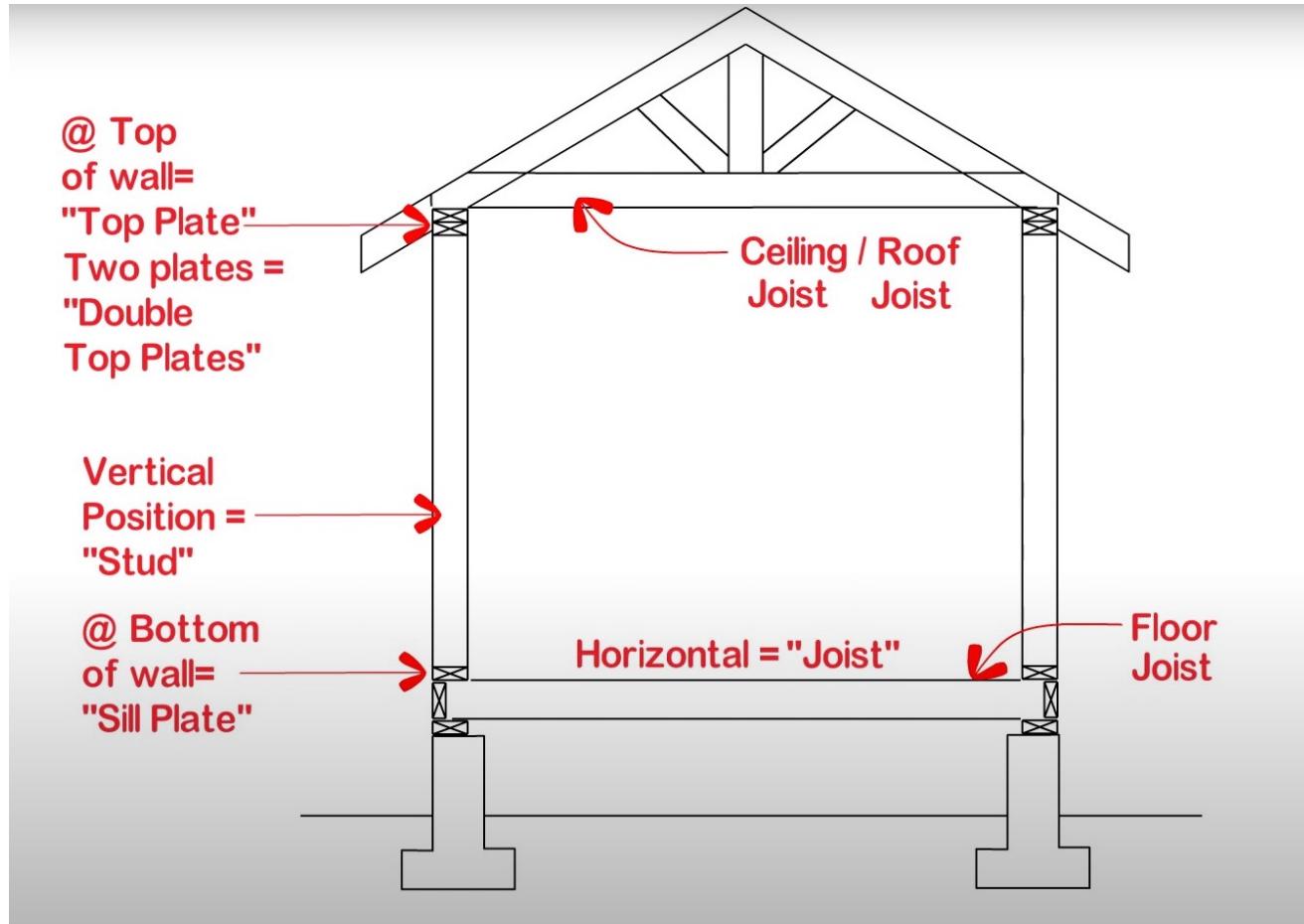
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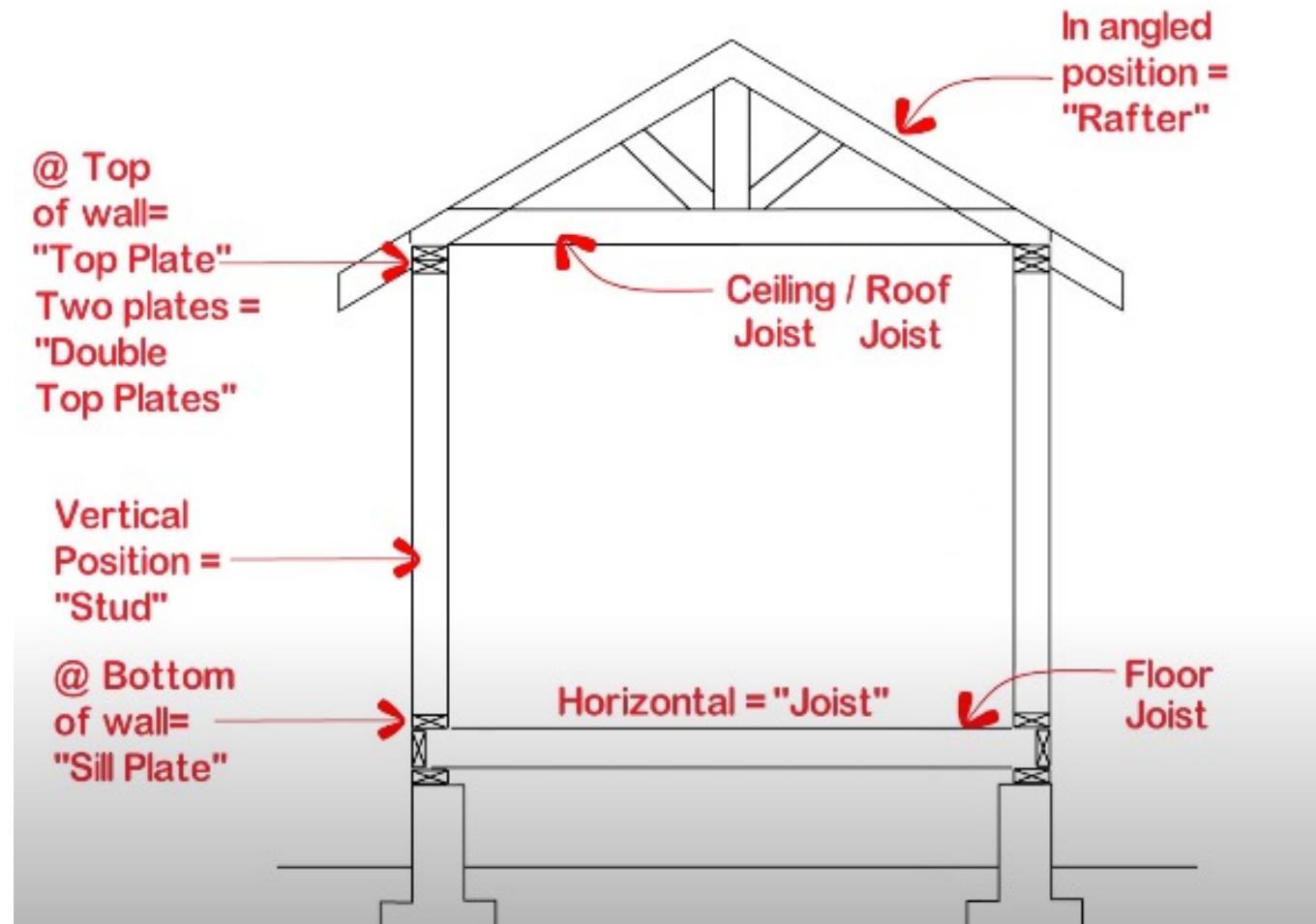
T601, 202 Primary Structural Frames



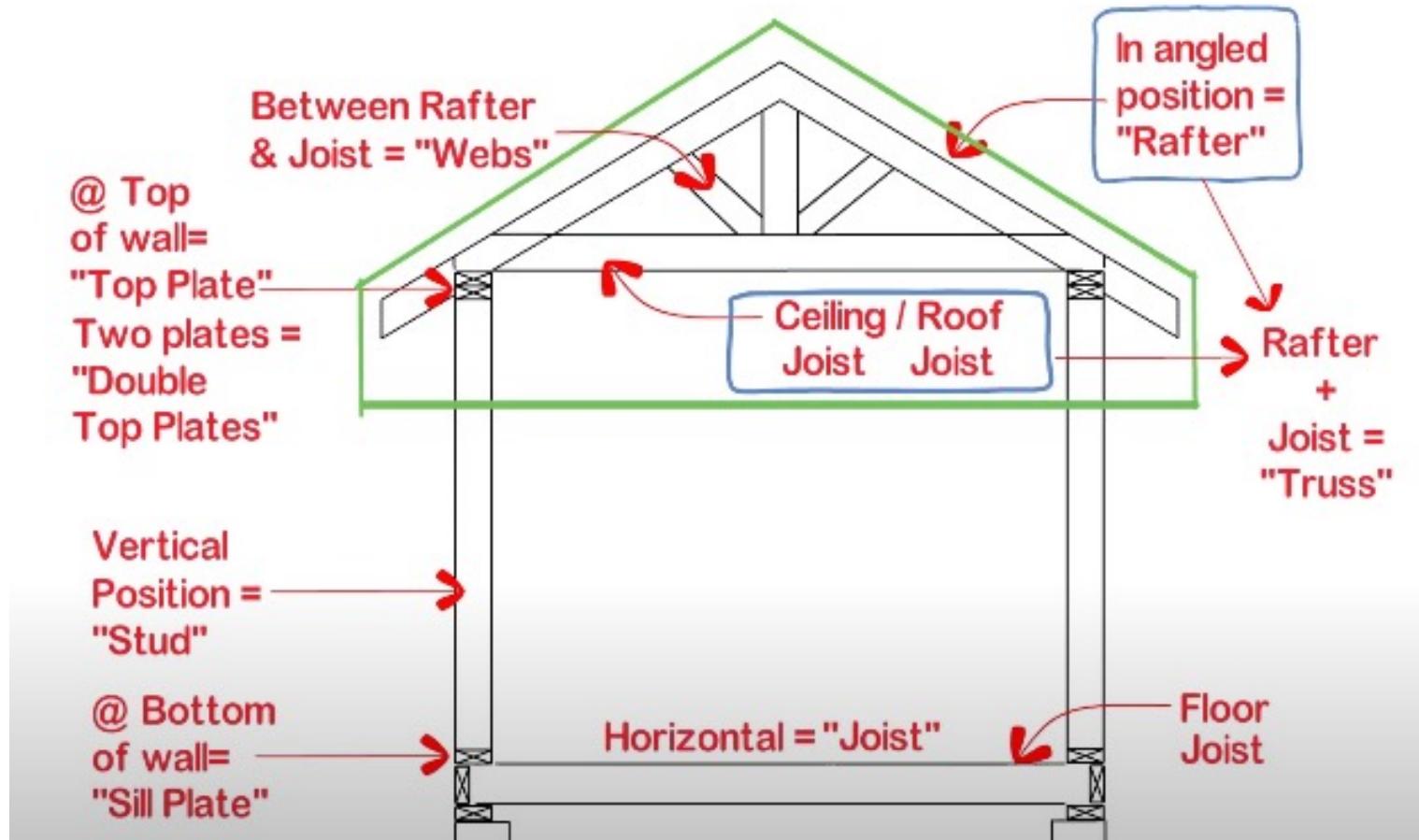
T601, 202 Primary Structural Frames



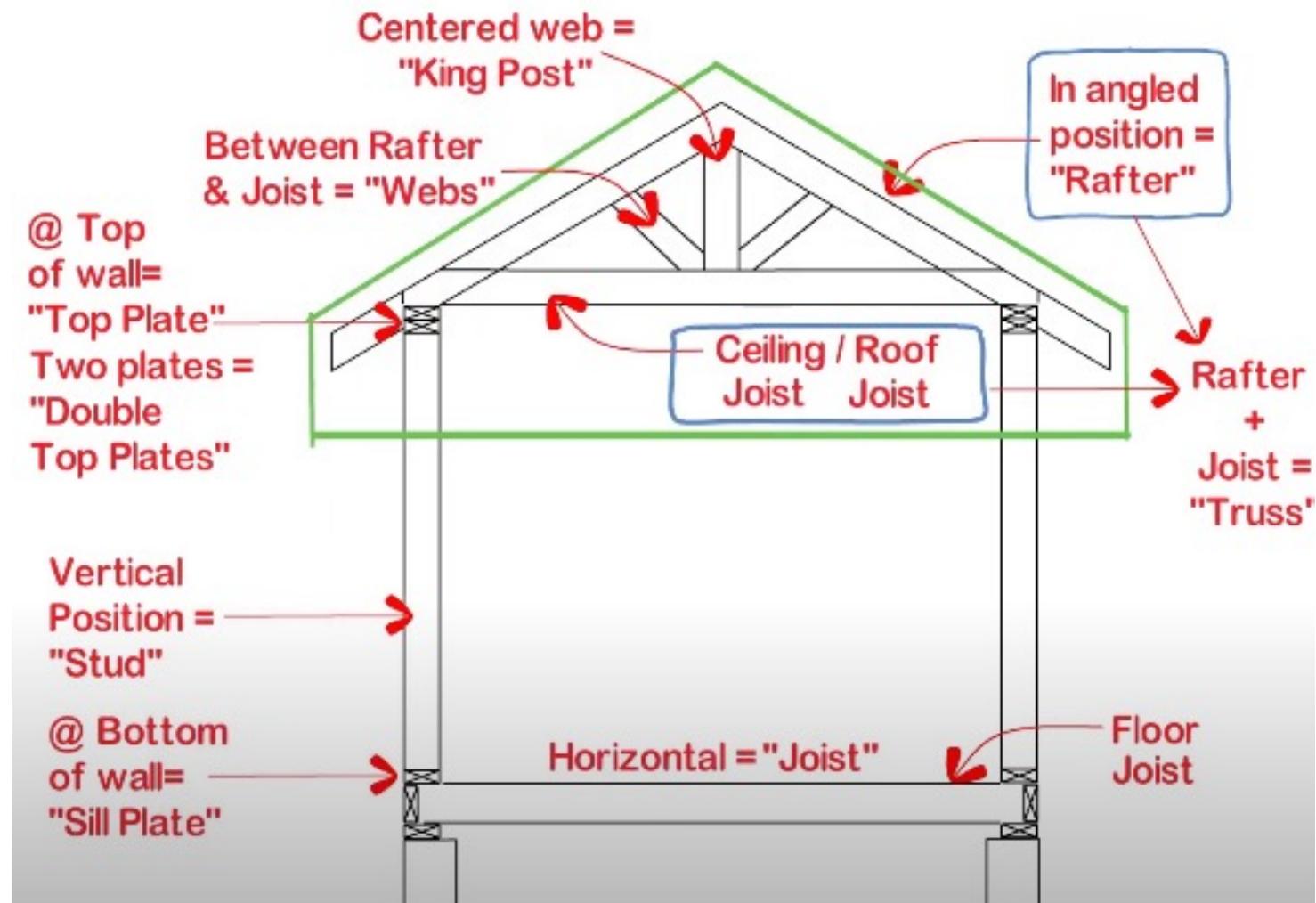
T601, 202 Primary Structural Frames



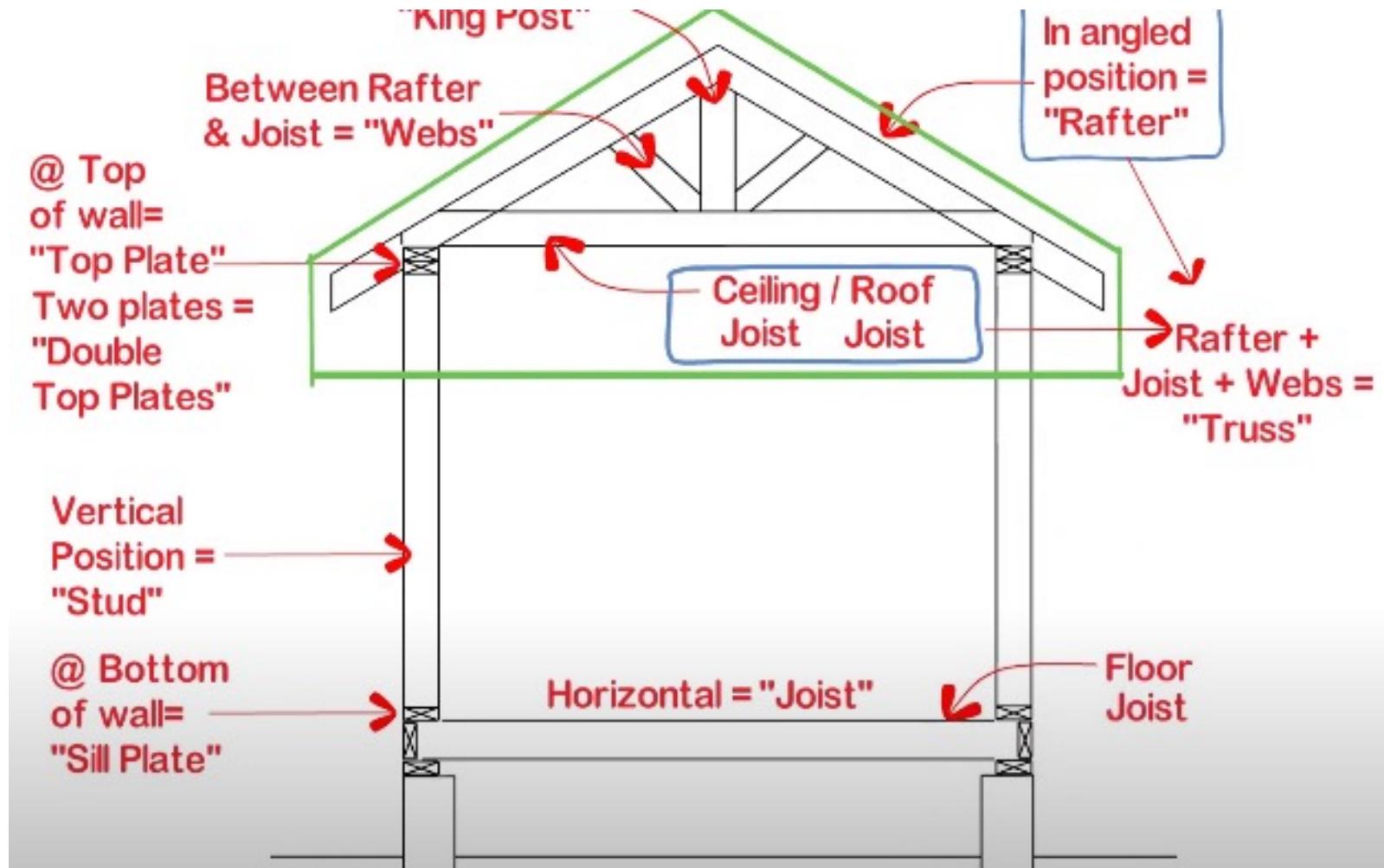
T601, 202 Primary Structural Frames



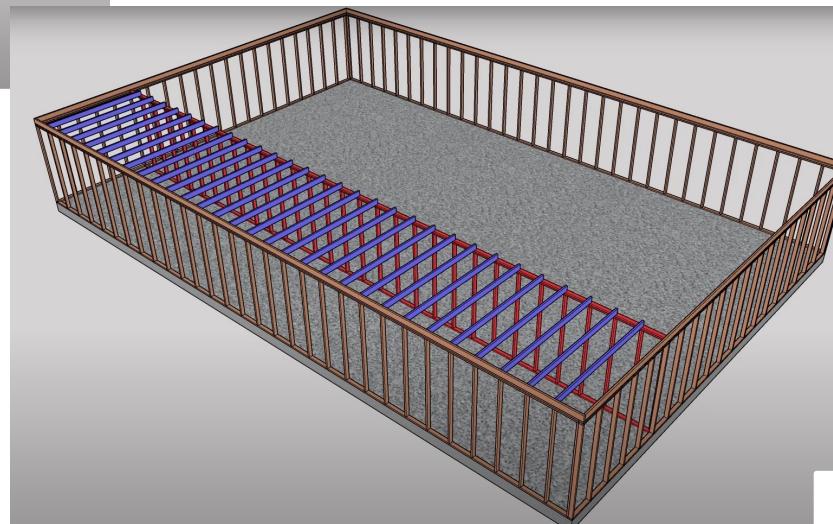
T601, 202 Primary Structural Frames



T601, 202 Primary Structural Frames



T601, 202 Primary Structural Frames (joist - wall)



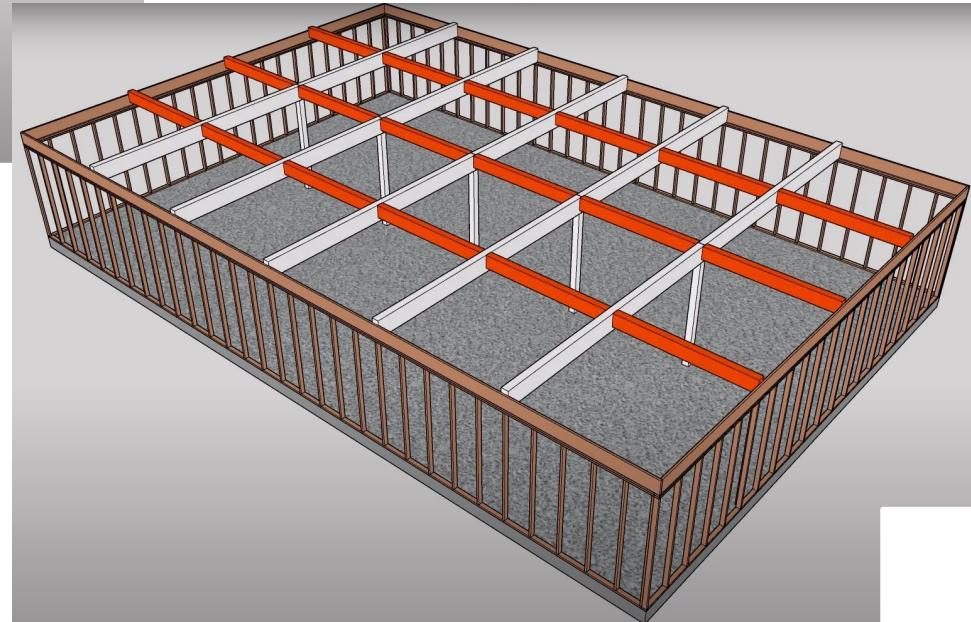
Source: 2021 IBC

T601, 202 Primary Structural Frames (Walls = Beams –Column)



Source: 2021 IBC

T601, 202 Primary Structural Frames (Beams –Girders – Column)



Class 4: Chapter 5, General Building Heights and Areas

602.1 General Building Heights and Areas

- To gain an understanding of how a building is classified and regulated based on its floor area, height and number of stories.

Class 5: Chapter 7, 701-705 Fire and Smoke Protection Features I

510.7 Objective

- To gain an understanding of
 - the fundamentals of fire-resistance-rated construction,
 - the methods for the determination of fire resistance, and
 - the regulation of exterior walls for fire-resistance rating and opening protection.

510.7 Objective

Question 1

0.15 / 0.15 pts

Where a fire-resistance rating of building elements, components or assemblies is determined by test procedures, the procedures set forth in ASTM E119 or _____ shall be applicable.

- ANSI Z 97.1
- ASCE 5
- UL 263
- UL 555

Question 2

0.15 / 0.15 pts

Where a fire barrier is required to be identified by signage in an accessible concealed attic space, the identification shall occur at maximum intervals of _____ feet measured horizontally along the wall.

- 15
- 20
- 30
- 40

510.7 Objective

Question 3	0.15 / 0.15 pts
<p>A projection extending beyond an exterior wall located 6 feet from an interior lot line shall be located such that a minimum of _____ inches is provided between the lot line and the edge of the projection. (Hint Use Table 705.2)</p> <p><input type="radio"/> 12</p> <p><input type="radio"/> 24</p> <p><input checked="" type="radio"/> 40</p> <p><input type="radio"/> 48</p>	

Question 4	0.15 / 0.15 pts
<p>The fire-resistance rating for an exterior wall shall be based on both interior and exterior fire exposure where the wall is located a maximum of _____ feet from an interior lot line.</p> <p><input type="radio"/> 3</p> <p><input type="radio"/> 5</p> <p><input checked="" type="radio"/> 10</p> <p><input type="radio"/> 20</p>	

510.7 Objective

**TABLE 705.2
MINIMUM DISTANCE OF PROJECTION**

FIRE SEPARATION DISTANCE-FSD (feet)	MINIMUM DISTANCE FROM LINE USED TO DETERMINE FSD
0 to less than 2	Projections not permitted
2 to less than 3	24 inches
3 to less than 5	Two-thirds of FSD
5 or greater	40 inches

For SI: 1 foot = 304.8 mm; 1 inch = 25.4 mm.

510.7 Objective

Question 5	0.15 / 0.15 pts
<p>In a nonsprinklered Type VB building, what is the maximum permissible area of unprotected exterior wall openings for a fire separation distance of 8 feet? (Use table 705.8)</p> <p><input checked="" type="radio"/> 10</p> <p><input type="radio"/> 25</p> <p><input type="radio"/> unlimited</p> <p><input type="radio"/> unprotected openings are prohibited</p>	

Question 6	0.15 / 0.15 pts
<p>In a nonsprinklered Type IIIA building, what is the maximum allowable area of protected exterior wall openings for a fire separation distance of 20 feet?</p> <p><input type="radio"/> 25%</p> <p><input type="radio"/> 45%</p> <p><input type="radio"/> 75%</p> <p><input checked="" type="radio"/> unlimited</p>	

510.7 Objective

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	C	HT	A	B
Primary structural frame ^f (see Section 202)	3 ^{a, b}	2 ^{a, b, c}	1 ^{b, c}	0 ^c	1 ^{b, c}	0	3 ^a	2 ^a	2 ^a	HT	1 ^{b, c}	0
Bearing walls												
Exterior ^{e, f}	3	2	1	0	2	2	3	2	2	2	1	0
Interior	3 ^a	2 ^a	1	0	1	0	3	2	2	1/HT ^g	1	0
Nonbearing walls and partitions												
Exterior										See Table 705.5		
Nonbearing walls and partitions												
Interior ^d	0	0	0	0	0	0	0	0	0	See Section 2304.11.2	0	0
Floor construction and associated secondary structural members (see Section 202)	2	2	1	0	1	0	2	2	2	HT	1	0
Roof construction and associated secondary structural members (see Section 202)	1 ^{1/2} ^b	1 ^{b,c}	1 ^{b,c}	0 ^c	1 ^{b,c}	0	1 ^{1/2}	1	1	HT	1 ^{b,c}	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 in Group F-1, H, M and S-1 occupancies, fire 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-retardant-treated wood members shall be allowed to be used for such unprotected members.
- c. In all occupancies, heavy timber complying with Section 2304.11 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 fire 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.

510.7 Objective

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 3 ^{b,c}	Unprotected, Nonsprinklered (UP, NS)	Not Permitted
	Unprotected, Sprinklered (UP, S) ^d	Not Permitted
	Protected (P)	Not Permitted
3 to less than 5 ^{b,c}	Unprotected, Nonsprinklered (UP, NS)	Not Permitted
	Unprotected, Sprinklered (UP, S) ^d	15%
	Protected (P)	15%
5 to less than 10 ^{e,f}	Unprotected, Nonsprinklered (UP, NS)	10% ^h
	Unprotected, Sprinklered (UP, S) ^d	25%
	Protected (P)	25%
10 to less than 15 ^{e,f,g}	Unprotected, Nonsprinklered (UP, NS)	15% ^h
	Unprotected, Sprinklered (UP, S) ^d	45%
	Protected (P)	45%
15 to less than 20 ^{f,g}	Unprotected, Nonsprinklered (UP, NS)	25%
	Unprotected, Sprinklered (UP, S) ^d	75%
	Protected (P)	75%

If a building's exterior wall is not required to be fire-resistance rated by Table 705.5, then an unlimited percentage of unprotected openings is permitted regardless of fire separation distance.

510.7 Objective

Question 7

0.15 / 0.15 pts

Where flame barriers are required for the vertical separation of exterior openings in adjacent stories, horizontal barriers must extend at least _____ inches beyond the exterior wall.

- 12
- 24
- 30
- 36

Question 8

0.15 / 0.15 pts

Where required at exterior walls, parapets must extend a minimum of _____ inches above the point where the roof surface and wall intersect.

- 30
- 32
- 36
- 42

510.7 Objective

Question 9

0.15 / 0.15 pts

In a fully sprinklered Type IIA building, the maximum allowable area of protected exterior wall openings is _____ where the fire separation distance is 12 feet.

- 15%
- 25%
- 45%
- 60%

Question 10

0.15 / 0.15 pts

Where an exterior bearing wall of a Group M occupancy of Type IIB construction is located 3 feet from an interior lot line, the wall must have a minimum fire-resistance rating of _____ hour(s).

- 0
- 1
- 2
- 3

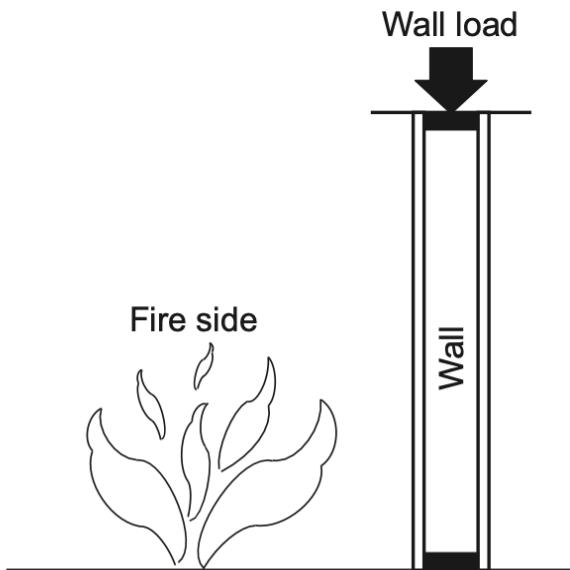
701.1 Scope

- The provisions of Chapter 7 shall govern the materials, systems and assemblies used for structural fire resistance and fire-resistance-rated construction separation of adjacent spaces to safeguard against the spread of fire and smoke within a building and the spread of fire to or from buildings.
- There are basically two reasons for the protection of various building elements with construction resistant to fire. One, structural elements such as columns, girders, bearing walls and other load-bearing members are often required by the code to maintain their structural integrity under fire conditions for a prescribed time period. Two, horizontal and vertical assemblies are used to create compartments, including control areas, or to isolate portions of the building, such as exitways, through fire-resistant construction.

703.2.1 202 Materials and Systems

- Fire-resistance rating is 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. A fire-resistance rating of building elements, components or assemblies shall be determined by the test procedures set forth in ASTM E119 or UL 263 or by analytic methods set forth in Section 703.2.2.
- ASTM E119 is the referenced standard, Standard Test Methods for Fire Tests of Building Construction and Materials. These test methods are used for the great majority of building components or assemblies that are mandated by the code to have a fire resistance rating. Assemblies tested under the criteria of UL 263 are also considered to have the fire-resistance rating as assigned.

703.2.1 202 Materials and Systems



Assembly must:

- sustain applied load,
- have no passage of flame or gases hot enough to ignite cotton waste,
- have average temperature rise on unexposed surface not more than 250°F above initial temperature or more than 325°F at any point, and
- have no water pass through during hose-stream test.

Conditions of acceptance - wall fire test

For nonsymmetrical wall construction, where interior walls and partitions are provided with differing membranes on opposing sides, the IBC mandates that tests be performed from both sides. The side with the shortest test duration is the basis for the fire-resistance rating.

Class 6: Chapter 7, Sections 706 through 712—Fire and Smoke Protection Features II

706-712 Objective

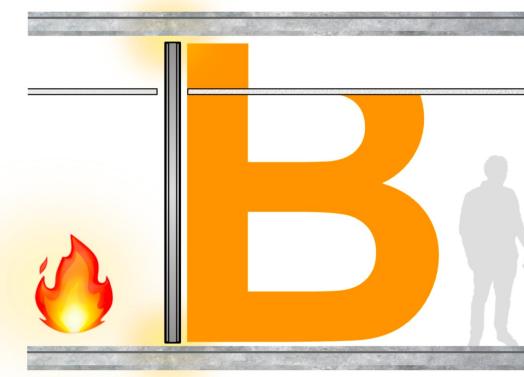
- To gain an understanding of the fire-resistance-rated building components such as fire walls, fire barriers, fire partitions, smoke barriers, smoke partitions, and horizontal assemblies and vertical openings.

Firewall vs Fire Barrier vs Fire Partition



FIRE WALL: This is a type of wall that resists fire from the exterior of the building. It contains the flames in the area of origin to ensure that it does not spread.

- Most Stringent type of Fire Separation
- Separates x2 separate Construction Types
- Allows for an increase in area
- Continuous from foundation to/through roof and exterior wall to/through exterior wall



FIRE BARRIER: These are walls inside a building that subdivide specific rooms and floors. The vertical assembly partitions extend from the floor up to the ceiling.

- Must go from Floor Structure to Ceiling's Structure
- Made from Non-Combustible Materials
- Separates occupancies & Storage Rooms



FIRE PARTITION: These are walls inside a building that subdivide specific rooms and floors. The vertical assembly partitions extend from the floor up to the ceiling.

- Can be made of wood
- Doesn't need to go to structure
- Can essentially create 'tunnels'
- May terminate at a fire rated floor/ceiling/roof assembly
- Used in Dwelling Unit Separations; Corridors

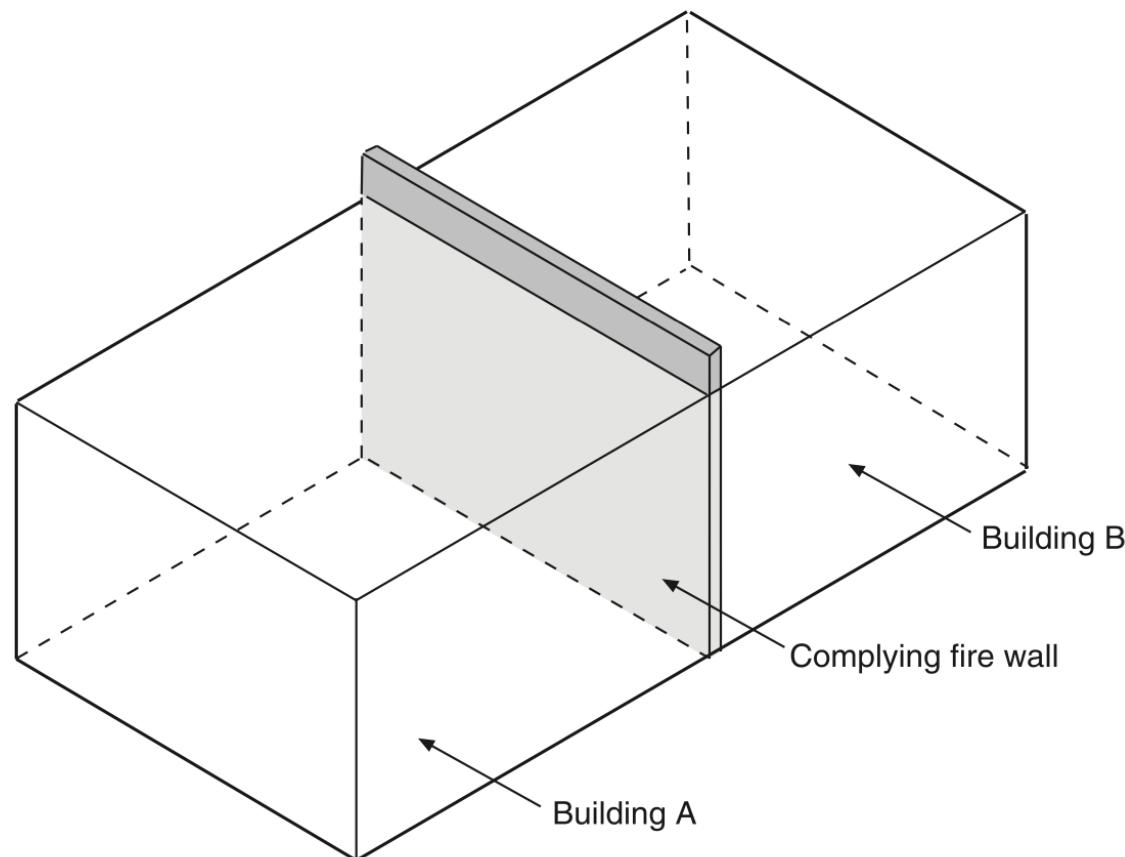
Source: 2021 IBC

706.1, 202 Scope: Fire Walls

- A fire wall is a fire-resistance-rated wall having protected openings, which restricts the spread of fire and extends continuously from the foundation to or through the roof, with sufficient structural stability under fire conditions to allow collapse of construction on either side without collapse of the wall.
- By placing one or more fire walls in a large-area building, multiple smaller-area buildings are created. Each of these smaller spaces can then be considered a unique building for the purposes of allowable height, allowable area, construction type and number of control areas. Under various conditions, fire walls are also recognized for use in the creation of horizontal exits, as well as other applications.

706.1, 202 Scope: Fire Walls

Fire wall to have sufficient structural stability under fire conditions to allow collapse of construction on either side without collapse of wall



In a situation where a fire wall separates distinct occupancy groups that are required to be separated by a fire barrier wall, the most restrictive requirements of each separation apply. This includes both the wall's continuity and the required fire-resistance rating.

Source: 2021 IBC

706.3, 706.4 Construction: Fire Walls

- Fire walls shall be of any approved noncombustible materials. See the exception for Type V construction. Fire walls shall have a fire-resistance rating of not less than that required by Table 706.4.
- A fire wall is designed to act in a manner similar to an exterior wall, as a barrier to prevent a fire in one building from spreading to the other building. Accordingly, construction of the fire wall must be commensurate with the exterior wall requirements for the construction type. In addition, the fire-resistance rating of the wall must be considerable in order to provide the necessary level of protection based on the anticipated fire loading that is due to the uses of the separate buildings. The required ratings vary based on occupancy and, to some degree, type of construction.

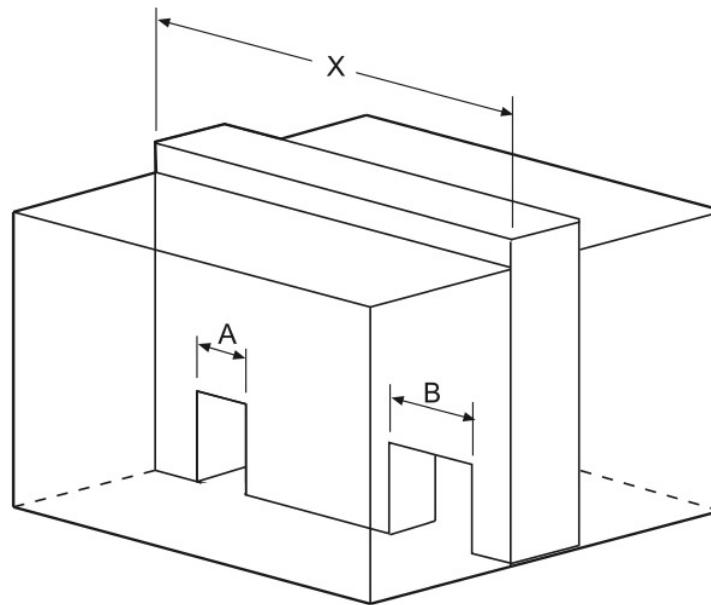
706.3, 706.4 Construction: Fire Walls

**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-3 ^b , 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 415.4 and 415.5.

706.3, 706.4 Construction: Fire Walls



$$A + B \leq 25\% \text{ of } X$$

Each opening limited to 156 square feet unless both buildings are sprinklered

Fire-protection rating based on Tables 706.4 and 715.4

For SI: 1 square foot = 0.093m²

Per Section 706.8, the total width of all openings in a fire wall is limited to 25 percent of the length of the wall in each story. There is no limit on the amount of total wall area containing openings; however, each opening is limited to 156 square feet in nonsprinklered buildings.

706.3, 706.4 Construction: Fire Walls

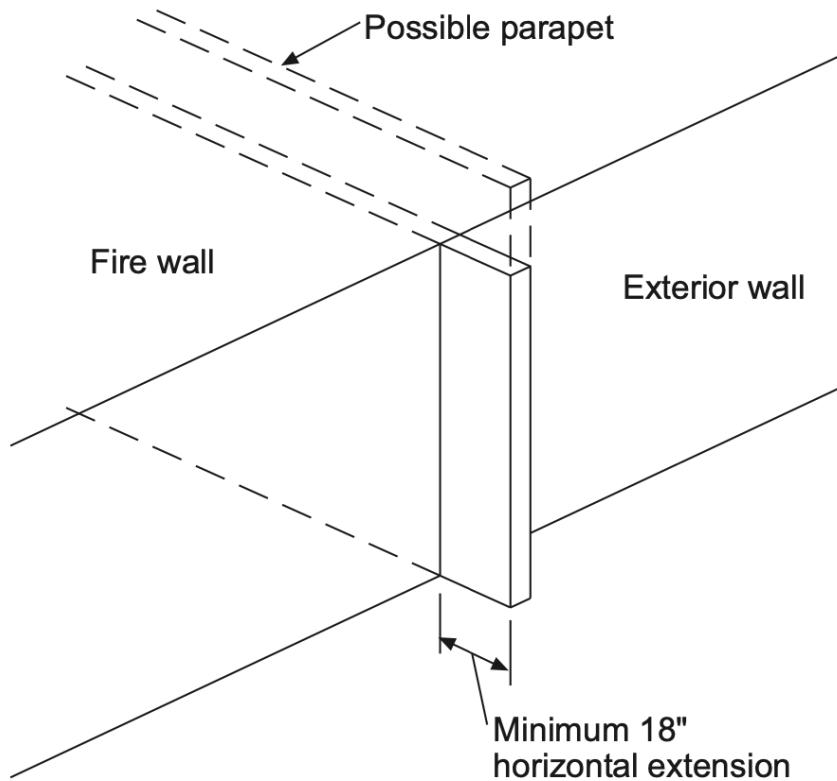
Fire walls must be constructed of noncombustible materials unless separating buildings of Type _____ construction.

- a. I
- b. III
- c. IV
- d. V

706.5 Horizontal Continuity: Fire Walls

- Fire walls shall be continuous from exterior wall to exterior wall and shall extend not less than 18 inches (457 mm) beyond the exterior surface of exterior walls. See the three exceptions for various methods of terminating the fire wall at the interior surface of the exterior sheathing or finish materials.
- Historically, the code has addressed the hazards of fire exposure at the fire wall from a vertical perspective, at the roof. There is also concern of a similar hazard from the horizontal perspective, at the intersection of the fire wall and the exterior wall. The 18-inch extension is intended to abate the potential for fire to travel from one building to the other around the fire wall. The 18-inch extension must extend the full height of the fire wall.

706.5 Horizontal Continuity: Fire Walls



Horizontal continuity

For SI: 1 inch = 25.4 mm.

The three exceptions acknowledge the effect certain types of exterior wall construction will have on fire breaching the exterior of the building and exposing the adjacent building. These methods of protection are similar to those used at the roof construction where a parapet is not provided.

Source: 2021 IBC

706.5 Horizontal Continuity: Fire Walls

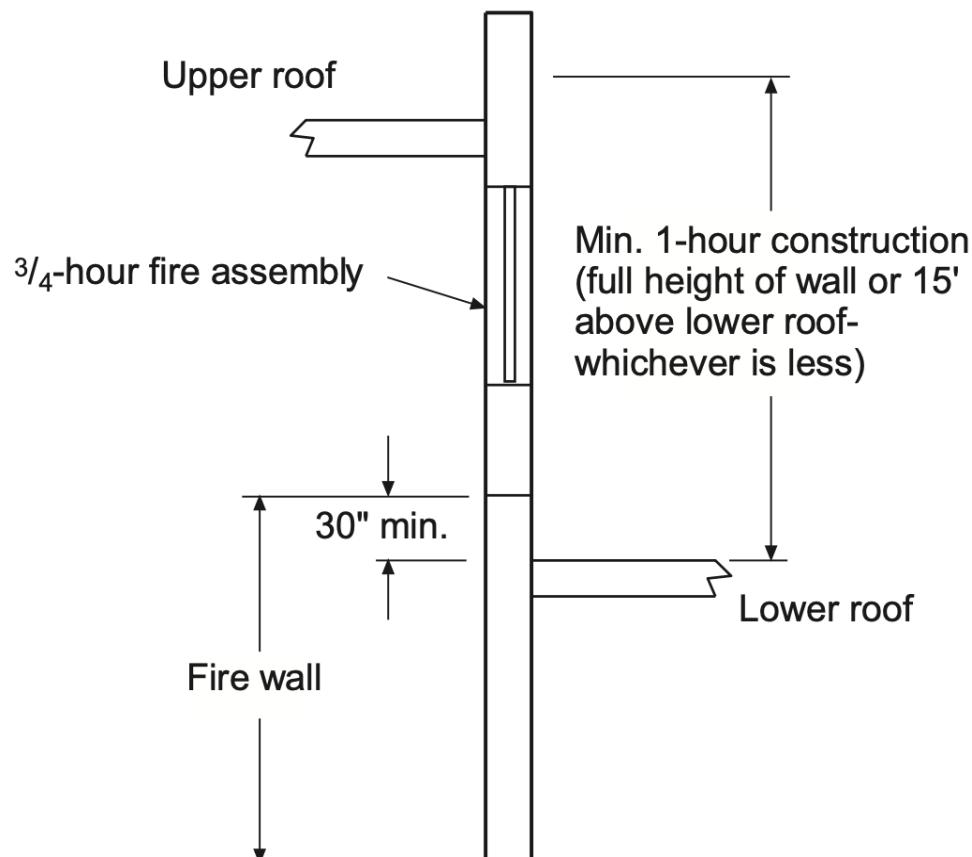
As a general provision, what minimum distance must a fire wall extend horizontally beyond the exterior surface of exterior walls?

- a. 18 inches
- b. 20 inches
- c. 30 inches
- d. 4 feet

706.6 Vertical Continuity: Fire Walls

- Fire walls shall extend from the foundation to a termination point not less than 30 inches (762 mm) above both adjacent roofs. See the exceptions for buildings with different roof levels, those with noncombustible roof construction, and those constructed under special provisions.
- To ensure the separate building concept, a fire wall must be continuous vertically with no horizontal offsets from the foundation, through the roof to a point at least 30 inches above. Various exceptions to the parapet requirement allow the fire wall to terminate at the bottom of the roof deck or sheathing. According to many of the exceptions, the roof covering must be minimum Class B, and no openings in the roof are permitted within 4 feet of the fire wall.

706.6 Vertical Continuity: Fire Walls



Stepped buildings

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

A stepped building, where the fire wall separates buildings having different roof levels, may require additional fire resistance to a point 15 feet above the lower roof. An alternative method provides for minimum 1-hour horizontal protection of the lower roof assembly.

Source: 2021 IBC

706.6 Vertical Continuity: Fire Walls

In general, what minimum distance above the roof must a fire wall extend?

- a. 18 inches
- b. 30 inches
- c. 3 feet
- d. 4 feet

706.6 Vertical Continuity: Fire Walls

**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.

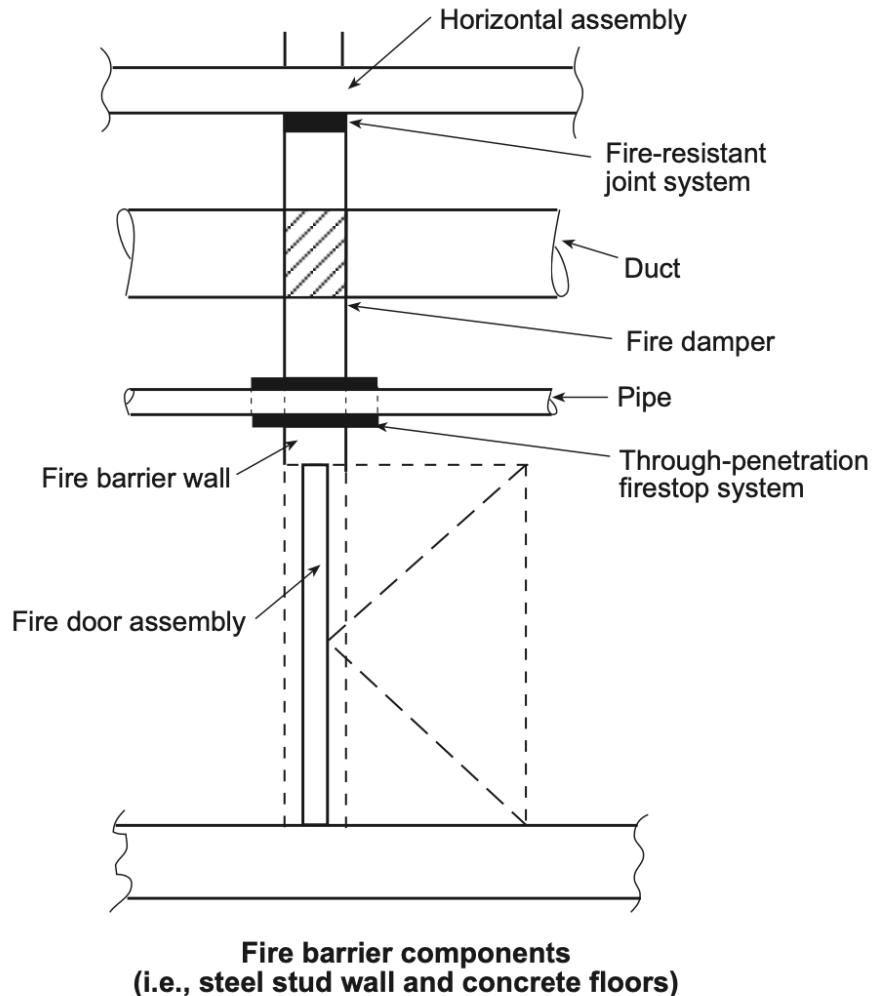
A fire wall separating Type VA buildings housing Group M occupancies must have a minimum fire-resistance rating of _____ hour(s).

- a. 1
- b. 2
- c. 3
- d. 4

707.1, 202 Fire Barriers: Definition and Scope

- A fire barrier is a fire-resistance-rated wall assembly of materials designed to restrict the spread of fire in which continuity is maintained. Fire barriers installed as required elsewhere in the International Building Code or the International Fire Code shall comply with Section 707.
- The term fire barrier is specific in the IBC and is used to describe a unique type of vertical fire separation element. Many of the building elements required to be constructed as fire barriers are listed in Section 707.3, including shaft enclosures, enclosures for interior exit stairways and exit access stairways, exit passageways, horizontal exits, atriums, incidental uses, control areas, separation of mixed occupancies and separation of fire areas.

707.1, 202 Fire Barriers: Definition and Scope



Fire barriers may also be mandated for specific conditions not specifically mentioned in Section 707. Throughout the IBC, as well as the other *International Codes*, fire barriers are identified as the element used to provide the necessary fire separation for compartmentation of building spaces.

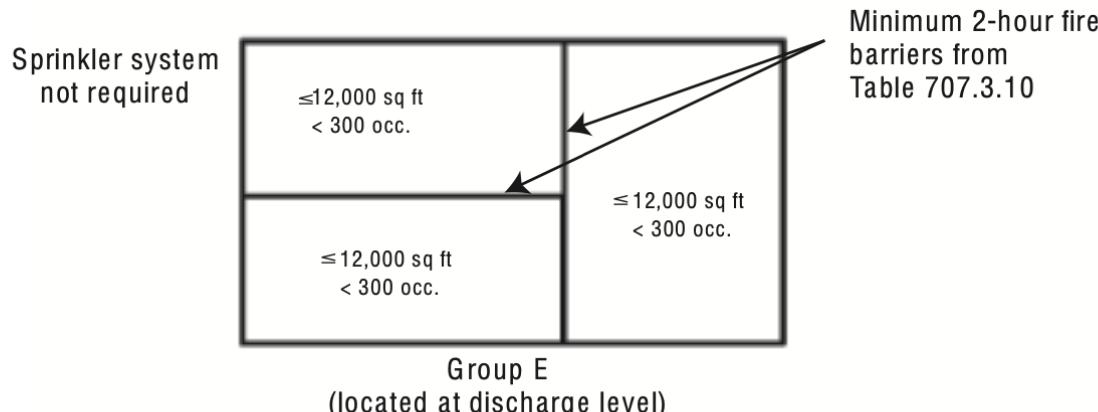
Source: 2021 IBC

707.3.10, Table 707.3.10 Fire Areas

- The fire barriers, fire walls or horizontal assemblies, or combination thereof, separating a single occupancy into different fire areas shall have a fire-resistance rating of not less than that indicated in Table 707.3.10. The fire barriers, fire walls or horizontal assemblies, or combination thereof, separating fire areas of mixed occupancies shall have a fire-resistance rating of not less than the highest value indicated in Table 707.3.10 for the occupancies under consideration.
- The code recognizes that in many buildings there are two methods to limit the spread of fire, either: (1) the use of an automatic sprinkler system, or (2) the creation of fire-resistive compartments that contain a fire's movement (fire areas). Section 903.2 identifies those occupancies where compartmentation is an acceptable alternative to a sprinkler system. Table 707.3.10 then mandates the minimum level of fire resistance of the fire barriers utilized to separate the building into two or more compartments (fire areas). As a result, the use of Table 707.3.10 is only applicable in buildings not protected by an automatic sprinkler system.

707.3.10, Table 707.3.10 Fire Areas

Example of the use of fire area concept



For SI: 1 square foot = 0.093 m²

TABLE 707.3.10
FIRE-RESISTANCE RATING REQUIREMENTS FOR
FIRE BARRIERS, FIRE WALLS OR HORIZONTAL
ASSEMBLIES BETWEEN FIRE AREAS

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

A fire area is considered the aggregate floor area enclosed and bounded by fire walls, fire barriers, exterior walls or horizontal assemblies of a building. The floor area under a canopy or similar horizontal projection is also included in the fire area determination.

ce: 2021 IBC

707.3.10, Table 707.3.10 Fire Areas

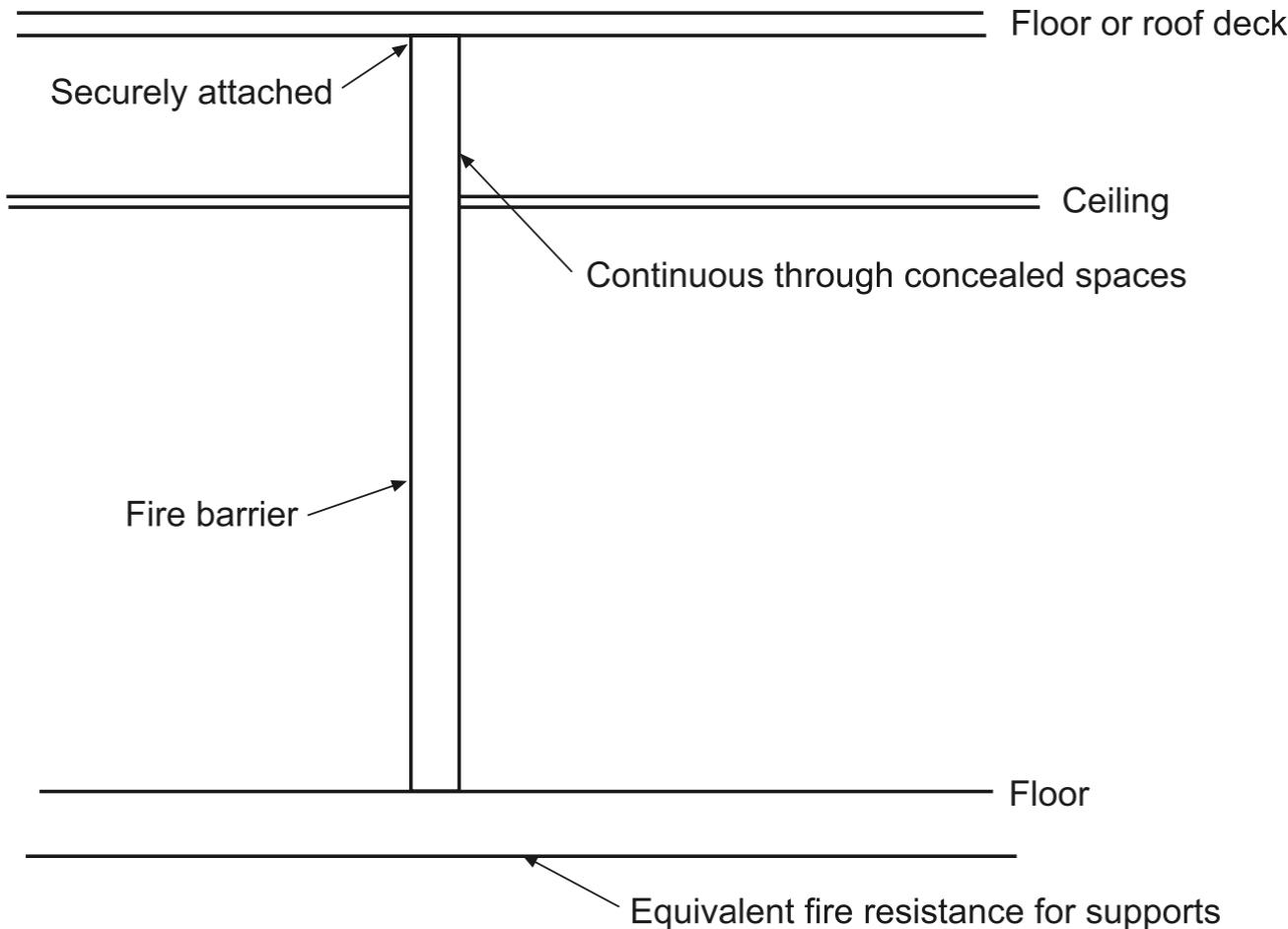
Fire barriers are required for the separation of all of the following building elements, except _____.

- a. shaft enclosures
- b. exit passageways
- c. incidental uses
- d. fire-resistance-rated corridors

707.5, 707.5.1 Continuity: Fire Barriers

- Fire barrier walls shall extend from the top of the floor/ceiling assembly below to the underside of the floor or roof sheathing, slab or deck above and shall be securely attached thereto. Such fire barriers shall be continuous through concealed spaces, such as the space above a suspended ceiling. See the exceptions for shaft, stairway and ramp, and exit passageway enclosures. The supporting construction for fire barrier walls shall be protected to afford the required fire-resistance rating of the fire barrier supported. See the exceptions for fire barriers: (1) separating tank storage in accordance with Section 415.9.1.2, and (2) enclosing incidental uses.
- Where a wall is required to serve as a fire barrier, it must be tight from floor deck to floor or roof deck in order to provide a full separation. A fire barrier is often used in conjunction with a horizontal assembly in a multistory building to provide a complete separation.

707.5, 707.5.1 Continuity: Fire Barriers



Under most conditions, the structural members or assemblies supporting fire barriers must be provided with equivalent or better fire resistance. It is important that the integrity of fire barriers supported by other building elements be maintained for the mandated time period.

Source: 2021 IBC

707.5, 707.5.1 Continuity: Fire Barriers

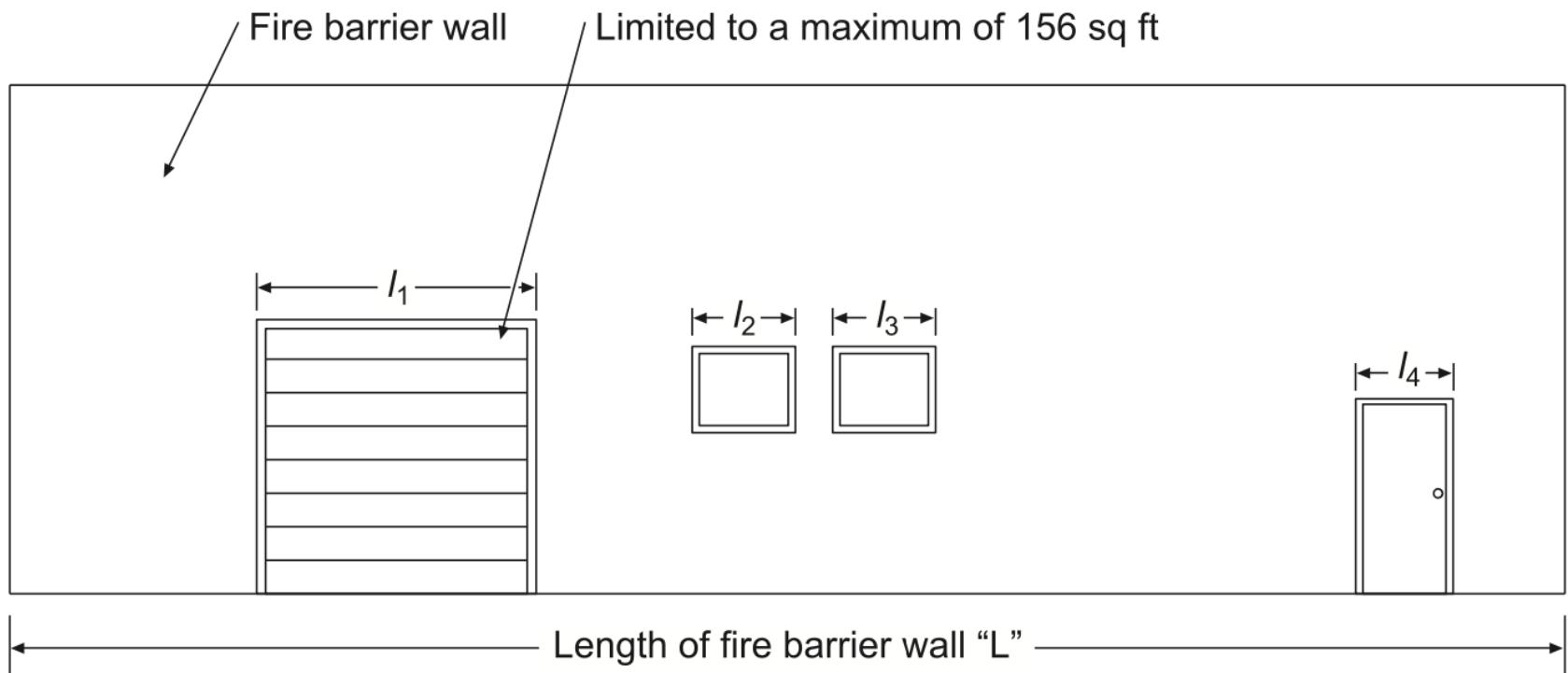
In Type VB buildings, construction supporting fire barriers need not be protected by equivalent fire resistance where the fire barriers are used for _____.

- a. 1-hour occupancy separations
- b. 1-hour interior exit stairways
- c. 1-hour incidental use separations
- d. 2-hour horizontal exits

707.6 Openings: Fire Barriers

- Openings in a fire barrier shall be protected in accordance with Section 716. Openings shall be limited to a maximum aggregate width of 25 percent of the length of the wall, and the maximum area of any single opening shall not exceed 156 square feet (15 m²). Openings in enclosures for exit access stairways and ramps, interior exit stairways and ramps and exit passageways shall also comply with Sections 1019, 1023.4 and 1024.5, respectively. See the exceptions for (1) sprinklered adjoining floor areas, (2) fire doors serving an interior exit stairway or exit access stairway, (3) openings tested per ASTM E119 or UL 263, (4) fire windows in atrium separation walls and (5) fire doors separating an interior exit stairway/ramp or exit access stairway/ramp from an exit passageway.
- As openings in a fire barrier create a potential breach in the integrity of the fire-resistive separation, a limit is placed on the amount of permitted openings. The limitation allows for design flexibility without compromising the necessary level of fire separation. The aggregate area of such openings is not limited; however, each opening is limited to 156 square feet.

707.6 Openings: Fire Barriers



For SI: 1 square foot = 0.093 m².

Opening in Fire-barrier Walls

As is the case with fire walls and fire partitions, penetrations, joints, ducts and air transfer openings are typically protected or prohibited when they occur in fire barriers.

707.6 Openings: Fire Barriers

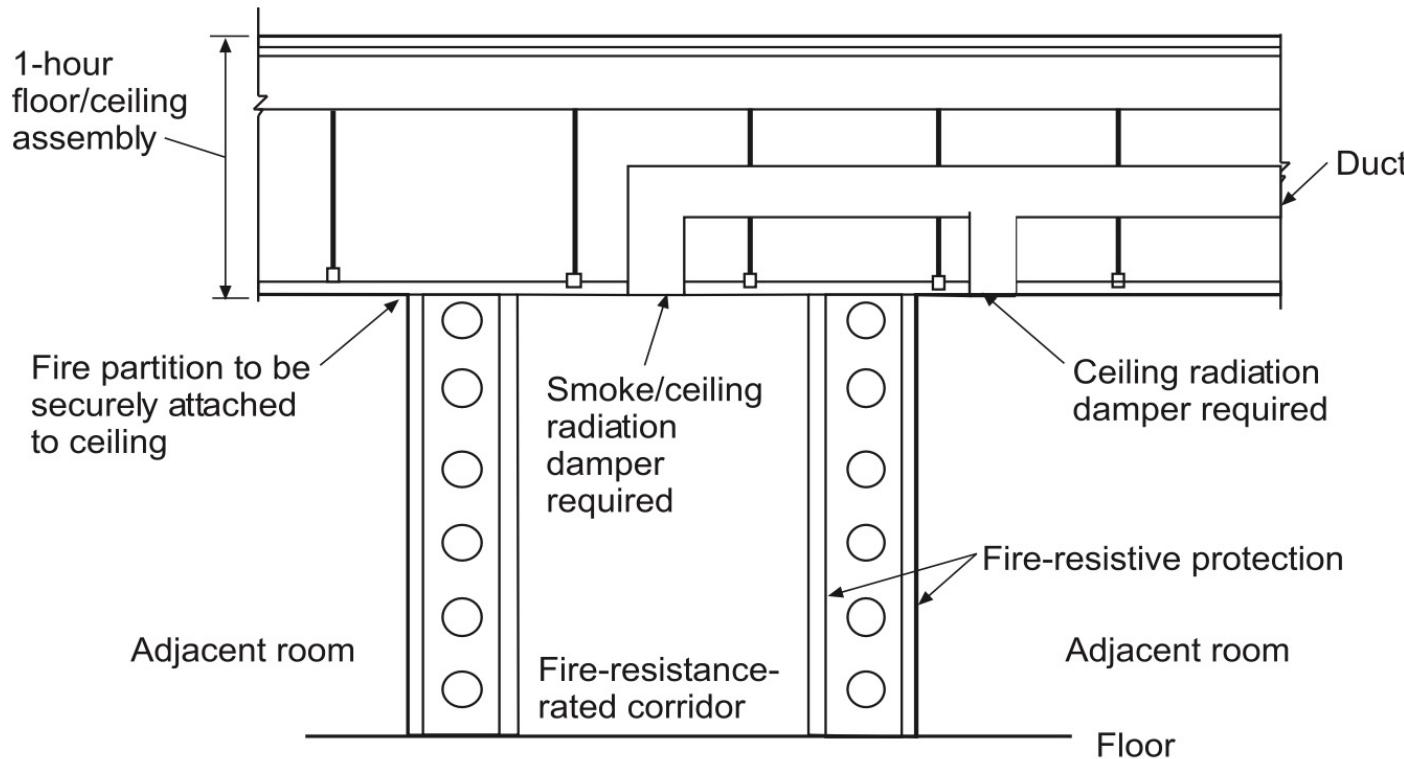
In a nonsprinklered building, any single opening in a fire barrier used for separating control areas is limited to a maximum area of _____ square feet.

- a. 20
- b. 100
- c. 120
- d. 156

708.1, 202 Fire Partitions: Definition and Scope

- A fire partition is a vertical assembly of materials designed to restrict the spread of fire in which openings are protected. The following wall assemblies shall comply with Section 708: (1) separation walls as required by Section 420.2 for Group I-1 and Group R occupancies; (2) walls separating tenant spaces in covered and open mall buildings as required by Section 402.4.2.1, (3) corridor walls as required by Section 1020.3, (4) enclosed elevator lobby separation as required by Section 3006.3, (5) egress balconies as required by Section 1021.2, (6) walls separating ambulatory care facilities from adjacent spaces, and (7) vestibules per Section 1028.2. Fire partitions shall have a fire-resistance rating of not less than 1 hour. See the exceptions for ratings reductions for corridor walls and dwelling unit/sleeping unit separations.
- Typically required to have a fire-resistance-rating of one-hour, fire partitions provide a moderate level of separation that is necessary under certain conditions. Although fire partitions have limited applications, they are important elements in the specific uses and areas in which they are mandated.

708.1, 202 Fire Partitions: Definition and Scope



The suspended ceiling is used to provide fire protection for the structural members above. Dampers are required wherever ducts pierce the rated ceiling.

Corridor fire partitions

In sprinklered buildings of Types IIB, IIIB and VB construction, the 1-hour fire-resistance rating for dwelling unit and guestroom separations may be reduced to $\frac{1}{2}$ hour. For a typical wood-stud wall system, this separation could be satisfied with $\frac{1}{2}$ -inch gypsum board installed on each side.

Source: 2021 IBC

708.1, 202 Fire Partitions: Definition and Scope

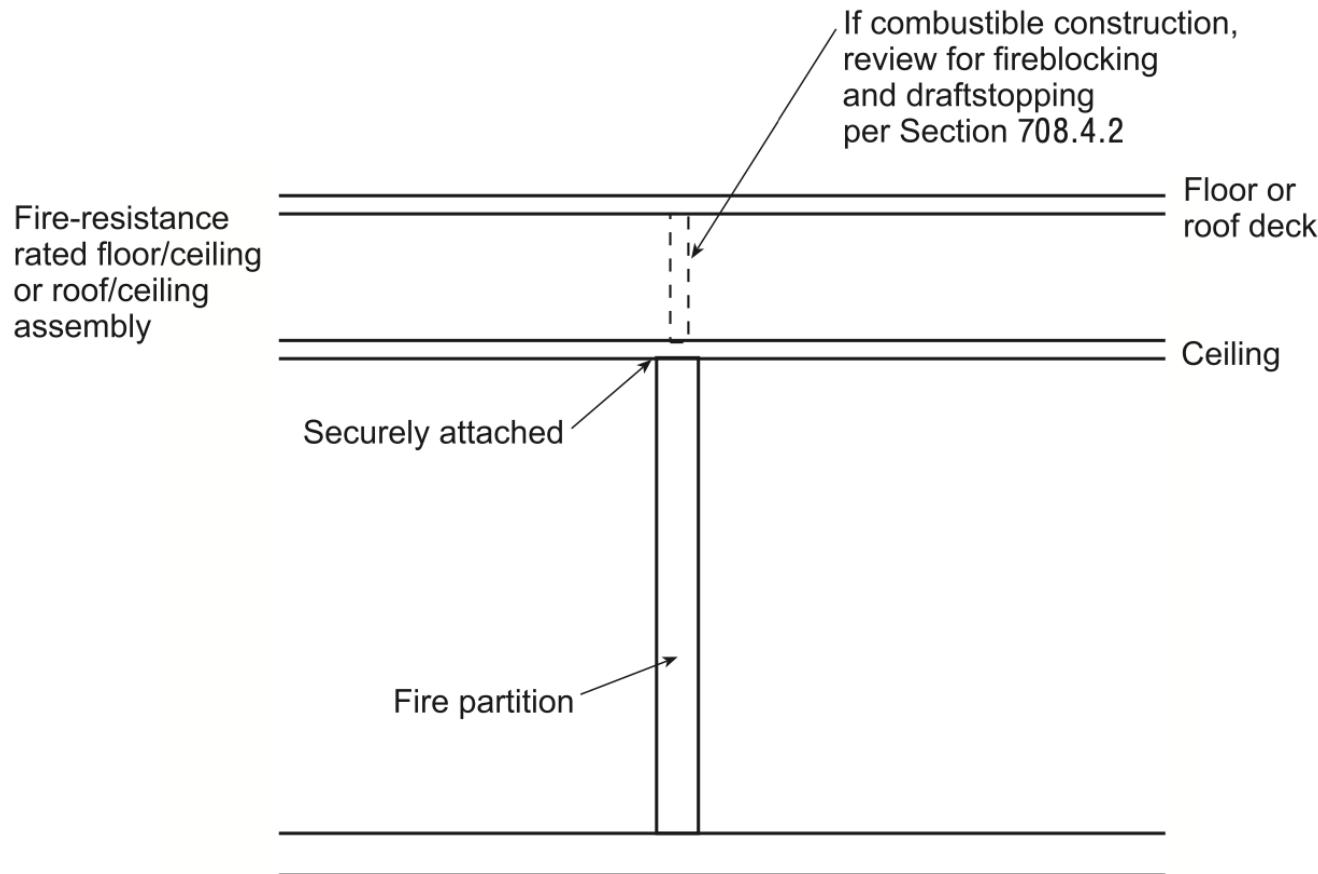
A fire partition is not the appropriate wall assembly for walls separating

-
- a. sleeping units in a Group R-1 hotel
 - b. tenant spaces in a covered mall building
 - c. control areas in a manufacturing occupancy
 - d. dwelling units in an apartment building

708.4 Fire Partitions: Continuity

- Fire partitions shall extend from the top of the foundation or floor/ceiling assembly below and be securely attached to one of the following: (1) the underside of the floor or roof sheathing, deck or slab above; or (2) the underside of a fire-resistance-rated floor/ceiling or roof/ceiling assembly having a fire-resistance rating that is not less than the fire-resistance rating of the fire partition. See four exceptions to these continuity options. The supporting construction for a fire partition shall have a fire-resistance rating that is equal to or greater than the required fire-resistance rating of the supported fire partition. See exception for conditions where rating is not required.
- The method of continuity is a primary difference between fire barriers and fire partitions. Fire partitions need not extend through a concealed space, such as the one above a suspended ceiling, provided that the ceiling is a portion of a fire-resistance-rated floor/ceiling or roof/ceiling assembly.

708.4 Fire Partitions: Continuity



A variety of additional methods are described for creating a fire-resistance-rated corridor. A common construction technique is the “tunnel” corridor, where the corridor ceiling is constructed in a manner consistent with that of the corridor walls.

708.4 Fire Partitions: Continuity

Where a fire-resistance-rated corridor ceiling is constructed as required for the corridor walls, the walls shall not terminate before reaching _____.

- a. the lower membrane of the ceiling assembly
- b. the upper membrane of the ceiling assembly
- c. the underside of the floor or roof deck above
- d. an approved fire-resistant joint system

709.4, 202 Smoke Barriers: Definition and Continuity

- A smoke barrier is 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. 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 including interstitial structural and mechanical spaces. See the exceptions where ceilings or exterior walls provide resistance to fire and smoke equivalent to the resistance provided by smoke barrier walls.
- Where the primary concern of the code is the containment of smoke, the use of a smoke barrier is mandated. The locations for smoke barriers are found in various provisions in the IBC, including Section 407.5 for Group I-2 occupancies and Section 1009.6.4 for areas of refuge.

709.4, 202 Smoke Barriers: Definition and Continuity

Required Use of Smoke Barriers

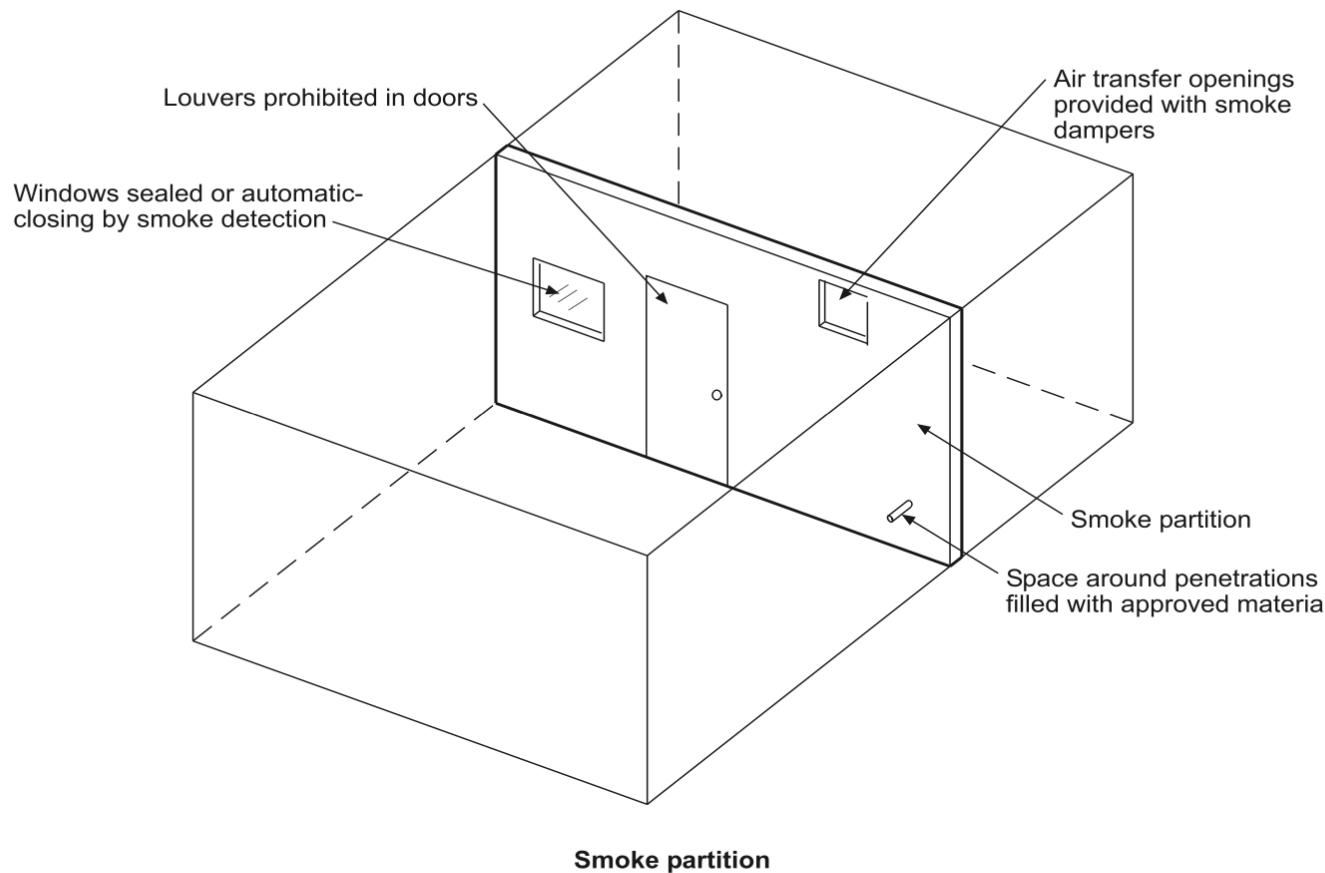
- Compartmentation of underground buildings (Sec. 405.4.2)
- Compartmentation of Group I-2 (Sec. 407.5)
- Compartmentation of Group I-3 (Sec. 408.6)
- Compartmentation of ambulatory care facilities (Sec. 422.3)
- Compartmentation of Group I-1, Condition 2 (Sec. 420.6)
- Smoke control systems (Sec. 402.7.2, 404.5 and 909.5)
- Areas of refuge (Sec. 1009.6.4)

A smoke barrier must have a minimum 1-hour fire-resistance rating. Openings, penetrations, joints, ducts and transfer openings must also be protected to minimize the passage of smoke through the barrier. Opening protectives must have a minimum 20-minute fire-protection rating.

710 Smoke Partition: General Provisions

- Smoke partitions installed as required elsewhere in the IBC shall comply with Section 710. The walls shall be of materials permitted by the building type of construction. Unless required elsewhere in the IBC, smoke partitions are not required to have a fire- resistance rating. Smoke partitions shall extend from the top of the foundation or floor below to the underside of the floor or roof sheathing, deck or slab above or to the underside of the ceiling above where the ceiling membrane is constructed to limit the transfer of smoke.
- A smoke partition is designed for a singular purpose, to limit the movement of smoke from one area to another. Therefore, windows in smoke partitions must be sealed, penetrations and joints must be adequately filled, and smoke dampers used to protect air transfer openings. The most common application of smoke partitions is corridor walls of Group I-2 occupancies.

710 Smoke Partition: General Provisions

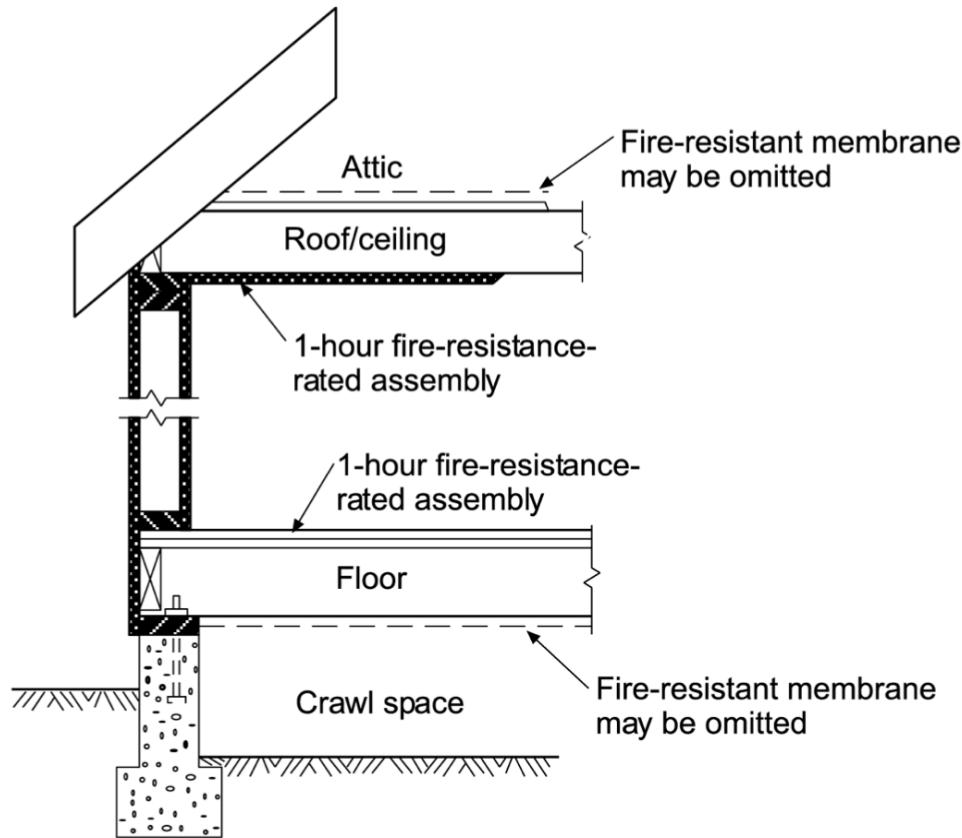


A smoke partition is a specific element with specific requirements, much like smoke barriers, fire barriers, fire partitions and fire walls. Only where the code specifically mandates smoke partitions are the requirements of Section 710 applicable.

711.2 Fire-Resistance Rating

- Assemblies shall be continuous without vertical openings, except as permitted by Sections 711 and 712. The supporting construction shall be protected to afford the required fire-resistance rating of the horizontal assembly supported. See the exception for incidental uses, dwelling and sleeping unit separations and smoke barriers. The fire-resistance rating of horizontal assemblies shall comply with Sections 711.2.4.1 through 711.2.4.6 but shall be not less than that required by the building type of construction.
- Table 601 regulates the minimum fire-resistance ratings for floor construction based on the building's type of construction. This minimum level of fire-resistance must always be maintained. Other provisions of the code must also be considered where a horizontal separation is needed within a multistory building, such as for control areas or occupancy separations.

711.2 Fire-Resistance Rating



Omission of ceiling and flooring in horizontal assemblies per Section 711.2.6

Other than permitted openings, penetrations or joints, horizontal assemblies must be continuous in order to isolate totally one floor from another. An allowance is permitted for fire-resistance-rated roof construction, where skylights and other penetrations may be unprotected.

711.2 Fire-Resistance Rating

Under which of the following conditions may the ceiling membrane of a fire-resistance-rated horizontal assembly be omitted?

- a. where usable attic space occurs above
- b. where the assembly has a minimum fire-resistance rating of 2 hours
- c. where the floor construction is limited to combustible construction
- d. where an unusable crawl space occurs below

712.1 Applications: Vertical Openings

- Each vertical opening shall comply in accordance with one of the protection methods in Sections 712.1.1 through 712.1.16.
- In multistory buildings, the upward transmission of fire, smoke and toxic gases through openings in the floor/ceiling assemblies continues to be a hazard of the highest degree. For many years, a shaft enclosure was considered the appropriate method to protect openings within a floor/ceiling assembly. Over time, other methods of protection have been identified as acceptable alternatives to the shaft enclosure approach. The IBC now places the emphasis on the presence of vertical openings while identifying the use of shaft enclosures as one of many protective measures that can be utilized to address the concern related to the vertical spread of fire, smoke and toxic gases.

712.1 Applications: Vertical Openings

Shaft Enclosures	712.1.1
Individual Dwelling Units	712.1.2
Escalator Openings	712.1.3
Penetrations	712.1.4
Joints	712.1.5
Ducts	712.1.6
Atriums	712.1.7
Masonry Chimneys	712.1.8
Two-Story Openings	712.1.9
Parking Garages	712.1.10
Mezzanines	712.1.11
Exit Access Stairs and Ramps	712.1.12
Floor Fire Doors and Access Doors	712.1.13
Group I-3 Occupancies	712.1.14
Skylights	712.1.15
Openings Otherwise Permitted	712.1.16

In addition to a general reference to any other code provisions that might address the protection of vertical openings between stories, seventeen specific conditions—including shaft enclosures—are listed that identify various methods of compliance.

Source: 2021 IBC