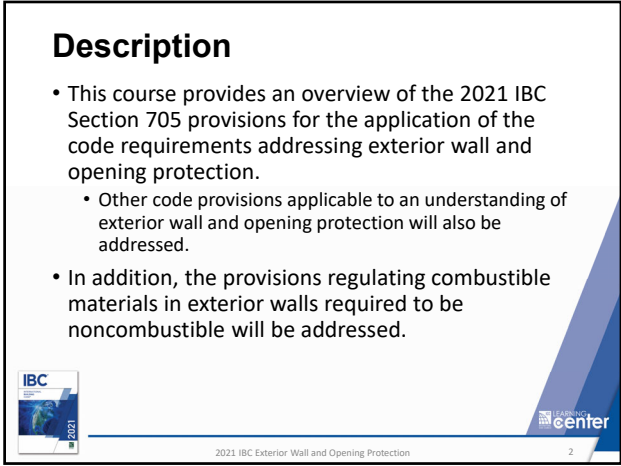
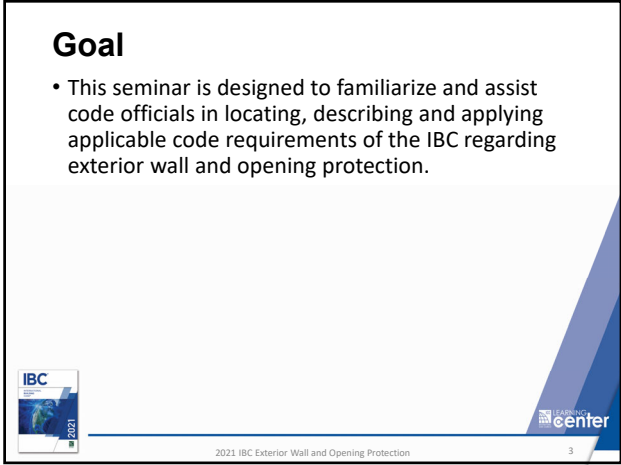


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Objectives

- Upon completion, participants will be better able to:
 - Understand differing concepts regarding fire protection requirements for exterior walls and openings.
 - Identify conditions under which exterior walls and openings in such walls must be protected.
 - Determine appropriate fire-resistance ratings and/or fire-protection ratings based on various conditions.
 - Apply the provisions regulating combustible materials in walls required to be of noncombustible construction.





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Course Overview

Module 1	Roles of Fire-resistance-rated Exterior Wall Protection
Module 2	Fire-resistance-rated vs. Fire-protection-rated Elements
Module 3	Common Conditions under which Exterior Walls are to be Protected
Module 4	Projections and Parapets
Module 5	Miscellaneous Conditions and Elements Related to Exterior Wall and Opening Protection
Module 6	Combustible Materials in Exterior Walls Required to be Noncombustible





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Roles of Fire-resistance-rated Exterior Wall Protection

Module 1





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Exterior Wall Protection

- The required fire-resistance rating of exterior walls can be based on a variety of factors:
 - Structural integrity during a fire event
 - Radiant heat exposure to adjacent buildings and lots
 - Protection of exit paths
 - Miscellaneous protection purposes





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Structural Integrity

- Exterior walls are regulated differently depending on their contribution to the structural integrity of the building.
- Bearing walls must be fire-resistance-rated in buildings of Types I, IIA, III, IV and VA construction.
 - Degree of fire-resistance established in Table 601.
- Nonbearing walls require no fire-resistance when solely addressing structural protection.





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Radiant Heat Exposure

- Fire-resistance of exterior walls is required where a building’s location on the lot creates concerns of radiant heat exposure to:
 - Adjacent lots
 - Other buildings on the same lot.
- Spatial separation can be substituted for fire-resistance as a means of protection based on distances established in Table 705.5.




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Protection of Exit Paths

- Exterior walls sometimes require fire-resistance in order to protect exterior exit paths in:
 - Egress courts
 - Exterior exit stairways
 - Interior exit stairways
 - Exterior areas of assisted rescue.





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Miscellaneous Protection

- Exterior wall protection is required for a variety of other purposes throughout the code
 - Continuity of fire wall separation
 - Vertical separation of openings
 - Special provisions for special building types:
 - Group H occupancies
 - Aircraft hangars
 - Unlimited area buildings
 - Opening parking garages
 - Penthouses





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Openings in Exterior Walls

- Based on the protective role the wall plays, openings in exterior walls are regulated differently.
 - Bearing walls (opening protection not required)
 - Location on lot (opening protection may be required)
 - Protection of exitways (opening protection always required)
 - Miscellaneous locations (opening protection varies based on each specific condition)





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Additional Exterior Wall Protection

- Joints in or between exterior walls are required by Section 705 to be fire-resistance rated to comply with Section 715.
 - Exceptions for walls permitted to have unprotected openings.
- Penetration by an air duct or air transfer opening in fire-resistance-rated exterior wall is to be provided with a fire damper where the wall is required to have protected openings.





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Fire-resistance-rated vs. Fire-protection-rated Elements

Module 2





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Ratings for Exterior Walls and Openings

Fire protection of exterior walls and openings are typically based on the procedures set forth in:

- ASTM E119 or UL 263 for wall assemblies, including glazed wall assemblies
- NFPA 252 or UL 10C for swinging fire door assemblies, including glazing in doors
- NFPA 257 or UL 9 for fire window assemblies



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Fire-resistance Ratings

Section 703.2

The fire-resistance ratings of building elements shall be determined in accordance with:

- The procedures set forth in ASTM E119 (*Test Methods of Fire Tests for Building Construction and Materials*), or UL 263 (*Standard for Fire Test of Building Construction and Materials*), or
- Analytical methods listed in Section 703.2.2
- The alternative methods for determining fire resistance as established by Section 104.11.

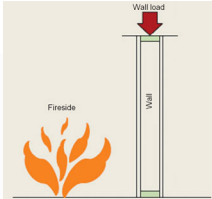


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Wall Assembly Fire Test

ASTM E119 Fire Test for Wall Assemblies



Assembly must:

- Sustain an applied load.
- Have no passage of flame or gas hot enough to ignite cotton waste.
- Have an average temperature rise on unexposed surface not more than 250°F (121°C) above initial temperature or more than 325°F (163°C) at any point.
- Allow no water to pass through during hose stream test.



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Fire-resistance Ratings

Section 705.5

Exterior walls are required to be rated for exposure to fire from:

- Both sides where the separation distance is 10 feet or less.
- Only the inside where the fire separation distance exceeds 10 feet.



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Fire-resistance Ratings Section 705.5

Rated for exposure to fire from both sides

Fire separation distance ≤ 10 ft

Plan

Rated for exposure to fire from inside only

Fire separation distance > 10 ft

Plan

For 5 ft: 1 foot = 304.8 mm.

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Key Points

- Provisions of Section 705.5 are to be applied regardless of the reason that the exterior wall requires a fire-resistance rating.
- An exterior wall rated for exposure to fire from the inside only must be tested as a complete wall assembly.

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Nonsymmetrical Wall Construction Section 703.2.1

Exterior cladding

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

Mineral or glass fiber insulation

3 1/2-inch 20 gage steel studs at 24 inches on center

FIRE SIDE

5/8-inch proprietary Type X gypsum wallboard*

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Calculation of Exterior Wall Ratings
Section 722.6.2.3

- Calculation of fire-resistance ratings for wood-framed exterior walls permitted under the provisions of Section 722.6.2.3.
- Limited to 1-hour assemblies
- Applicable to “Fire Side”-only assemblies as well as full assemblies

TABLE 722.6.2(1)
TIME ASSIGNED TO WALLBOARD MEMBRANE^{a, b, c}

DESCRIPTION OF FINISH	TIME ^d (minutes)
1/2-inch wood structural panel bonded with exterior glue	5
1/2-inch wood structural panel bonded with exterior glue	10
1/2-inch wood structural panel bonded with exterior glue	15
1/2-inch gypsum wallboard	10
5/8-inch gypsum wallboard	15
1/2-inch gypsum wallboard	30
1/2-inch Type X gypsum wallboard	25
1/2-inch Type X gypsum wallboard	40
Double 1/2-inch gypsum wallboard	25
1/2-inch + 1/2-inch gypsum wallboard	35
Double 1/2-inch gypsum wallboard	40

For SI: 1 inch = 25.4 mm.
a. These values apply only when membranes are installed on framing members which are equal to 16 inches o.c. or less.
b. Gypsum wallboard installed over framing or tarring shall be installed so that all edges are supported, except 1/2-inch Type X gypsum wallboard shall be permitted to be installed horizontally with the horizontal joints supported 24 inches each side and unsupported but finished.
c. On wood frame floor/ceiling or roof/ceiling assemblies, gypsum board shall be installed with the long dimension perpendicular to framing members and shall have all joints finished.
d. The membrane on the unexposed side shall not be included in determining the fire resistance of the assembly. When dissimilar membranes are used as a wall assembly, the calculation shall be made from the least fire-resistant (weakest) side.
e. The time assigned is not a finished rating.



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TABLE 722.6.2(2)
TIME ASSIGNED FOR CONTRIBUTION OF WOOD FRAME^{a, b, c}

DESCRIPTION	TIME ASSIGNED TO FRAME (minutes)
Wood studs 16 inches o.c.	30
Wood floor and roof joists 16 inches o.c.	10

For SI: 1 inch = 25.4 mm.
a. This table does not apply to studs or joists spaced more than 16 inches o.c.
b. All studs shall be nominal 2 x 4 and all joists shall have a nominal thickness of at least 2 inches.
c. Allowable spans for joists shall be determined in accordance with Sections 2308.8, 2308.10.2 and 2308.10.3.

TABLE 722.6.2(3)
MEMBRANE^a ON EXTERIOR FACE OF WOOD STUD WALLS

SHEATHING	PAPER	EXTERIOR FINISH
1/2-inch T & G lumber		Lumber siding
1/2-inch exterior glue wood structural panel	Sheathing paper	Wood shingles and shakes
1/2-inch gypsum wallboard		1/2-inch wood structural panels exterior type
1/2-inch gypsum wallboard		1/2-inch hardboard
1/2-inch fiberboard		Metal siding
		Stucco on metal lath
		Masonry veneer
		Vinyl siding
None	—	1/2-inch exterior-grade wood structural panels

For SI: 1 pound/cubic foot = 16.0185 kg/m³.
a. Any combination of sheathing, paper and exterior finish is permitted.

TABLE 722.6.2(4)
TIME ASSIGNED FOR ADDITIONAL PROTECTION

DESCRIPTION OF ADDITIONAL PROTECTION	FIRE RESISTANCE (minutes)
Add to the fire-resistance rating of wood stud walls if the spaces between the studs are completely filled with glass fiber mineral wool batts weighing not less than 2 pounds per cubic foot (80.4 pound per square foot of wall surface) or rockwool or slag material wool batts weighing not less than 3.3 pounds per cubic foot (1 pound per square foot of wall surface), or cellulose insulation having a nominal density not less than 2.6 pounds per cubic foot.	15



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Fire-resistance-rated Glazing
Section 703.4

- Fire-resistance-rated glazing permitted for use where:
- Tested in accordance with ASTM E119 or UL 263
- Permanently labeled or identified per Table 716.1(1)
- Installed in accordance with listing

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	CH	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.

For SI: °C = (°F) - 32(°F) ÷ 1.8.
a. See Section 2409.1.





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Fire Door Assemblies

Section 716.2

- Side-hinged or pivoting doors must comply with NFPA 252 or UL 10C.
- Fire-protection rating must comply with Table 716.1(2).
- Glazing in door assembly and/or adjacent to door assembly shall be further regulated.





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Fire Window Assemblies

Section 716.3

- Fire-protection-rated glazing for fire window assemblies shall meet acceptance criteria of NFPA 257 or UL 9.
- Protected openings may be required in nonfire-resistance-rated exterior walls under the provisions of Sections 705.8.5 and 705.8.6.
 - Vertical separation of openings
 - Vertical exposure
- A minimum fire-protection rating of 45 minutes shall be required for such openings.





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Common Conditions under which Exterior Walls are to be Protected

Module 3



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Where Regulated

Exterior walls are to be regulated under the following conditions:

- Type of construction (bearing walls)
- Location on lot (radiant heat transfer)
- Multiple buildings on the same lot
- Protection of exitways



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Type of Construction
Chapter 6

- Bearing walls regulated for fire-resistance because of structural integrity conditions are addressed by Chapter 6 and Table 601.
- Nonbearing walls are not regulated for type of construction purposes
- Fire-resistance shall be required because of its:
 - Contribution to structural stability/integrity
 - Types I, IIA, III, IV and VA
 - Perimeter containment/resistance under fire conditions
 - Types IIIA, IIIB and IV



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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	HT	A	B	
Primary structural frame ^a (see Section 202)	3 ^h	2 ^h , 1 ^h	0 ^c	1 ^h	0 ^c	1 ^h	3 ^h	2 ^h	2 ^h	1 ^h	0 ^c	0
Bearing walls												
Exterior ^f	3	2	1	0	2	2	3	2	2	2	1	0
Interior	3 ^h	2 ^h	1	0	1	0	3	2	2	1/HT ^g	1	0
Nonbearing walls and partitions	See Table 705.5											
Exterior												
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 ^e	1 ^h	1 ^h	0 ^c	1 ^h	0	1 1/2 ^e	1	1	HT	1 ^h	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 I-1, II, 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 705.10.
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.



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FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (HOURS)												
BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV		HT	TYPE V		
	A	B	A	B	A	B	A	B		A	B	
Primary structural frame ^a (see Section 202)	3 ^h	2 ^h , 1 ^h	1 ^h	0 ^f	1 ^h	0	3 ^h	2 ^h	2 ^h	HT	1 ^h	0
Bearing walls												
Exterior ^d	3	2	1	0	2	2	3	2	2	2	1	0
Interior	3 ^h	2 ^h	1	0	1	0	3	2	2	1/1 ^h	1	0
Nonbearing walls and partitions	See Table 703.5											
Exterior												
Nonbearing walls and partitions												
Interior ^e	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 ^h	1 ^h	1 ^h	0 ^f	1 ^h	0	1 1/2 ^h	1	1	HT	1 ^h	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, F-2, M and S-1 occupancies, 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-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 703.5).

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.

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Openings in Bearing Walls Section 602.1

- Openings in exterior walls require no fire-resistance-rated or fire-protection-rated protection where wall rating only required per Table 601.
- Opening protection may be required by other provisions of the code, such as Table 705.5 regulating its location on the lot.
 - Most restrictive provisions apply

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Lot Line Concept



- Use of the lot line as controlling factor based on the concern that control is only possible on own lot
- Lot line concept is used as means of protecting one building from another as far as exposure is concerned
 - Exposure is deemed as a potential for heat to be transmitted from one building to another during fire conditions
- Radiation is considered a primary means of heat transfer
- Lot line concept is also utilized where multiple buildings are located on the same lot

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Exterior Wall Ratings

Section 705.5

- Section 705.5 and Table 705.5 regulate fire resistance of exterior walls because of proximity to adjacent lot lines or other buildings on the same lot.
- Fire separation distance is determined to be “distance measured from building face to closest interior lot line, to centerline of street, alley or public way, or to imaginary line between two buildings on lot. Distance to be measured at right angles from face of wall”

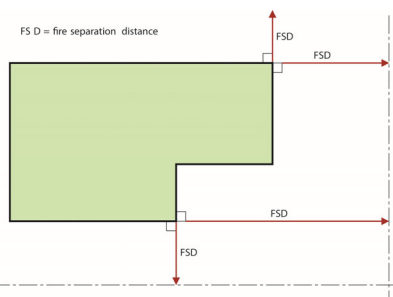


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Fire Separation Distance

Section 202



FS D = fire separation distance



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Fire Ratings of Exterior Walls

Table 705.5

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

^a For SI: 1 foot = 304.8 mm.
^b See Section 706.1.1 for party walls.
^c Open parking garages complying with Section 406 shall not be required to have a fire-resistance rating.
^d 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.
^e For special requirements for Group H occupancies, see Section 415.6.
^f For special requirements for Group S aircraft hangars, see Section 412.3.1.
^g 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.
^h 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.
ⁱ For a Group R-3 building of Type I-II or Type V-II 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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Fire Ratings of Exterior Walls Table 705.5

FSD = fire separation distance

Group B
Type VB

< 10' FSD

≥ 10' FSD

No exterior wall rating required

Minimum 1-hour exterior wall

For SI: 1 foot = 304.8 mm.

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Fire Ratings of Exterior Walls Table 705.5

FSD = fire separation distance

Only this portion of exterior wall required to be of 1-hour construction

Group B
Type VB

6' FSD

10' FSD

16' FSD

For SI: 1 foot = 304.8 mm.

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Fire Ratings of Exterior Walls Table 705.5, Note d

Exterior wall regulated by fire separation distance (FSD) "B"

FSD "B"

FSD "A"

Exterior wall regulated by fire separation distance "A"

For SI: 1 foot = 304.8 mm.

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Fire Ratings of Exterior Walls Example

Group B
Type IIB Construction

8'

18'

55"

25"

Lot Line

Centerline of Public Way

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center

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Fire Ratings of Exterior Walls Example

Minimum 1-hour

No rating required

No rating required

No rating required

8'

18'

55"

25"

Lot Line

Centerline of Public Way

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center

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Structural Frame Members Section 704.10

- Structural frame members in exterior walls shall be provided with highest fire-resistance rating in accordance with:
 - Table 601 Structural Frame
 - Table 601 Exterior Bearing Wall
 - Table 602 for Fire Separation Distance

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Structural Frame Members Example

Group A-2 occupancy
Type IB construction

Lot Line

8 ft FSD

Nbearing exterior wall

Structural column

Minimum Fire-resistance Rating for Load-bearing Structural Members within Nonbearing Exterior Wall

	Structural Members	Nonbearing Wall
Table 601 Structural Frame	2 hours	Not applicable
Table 601 Exterior Bearing Wall	2 hours	Not applicable
Table 602 Fire Separation Distance	1 hour	1 hour

Therefore, columns and other primary structural frame members shall be minimum 2-hour fire-resistance-rated. Nonbearing exterior wall to be minimum 1-hour fire-resistance-rated because of FSD.

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Openings in Exterior Walls Section 705.8.1

- Area of protected and unprotected openings permitted in exterior wall in any story are limited by Table 705.8
- Openings prohibited where limited or no fire separation distance is provided
- As fire separation distance increases, openings are permitted in increasing amounts

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Maximum Area of Exterior Openings 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 3 ^{b,c,d}	Unprotected, Nonsprinklered (U.P., NS)	Not Permitted ^b
	Unprotected, Sprinklered (U.P., S)	Not Permitted ^b
	Protected (P)	Not Permitted ^b
3 to less than 5 ^{d,e}	Unprotected, Nonsprinklered (U.P., NS)	Not Permitted
	Unprotected, Sprinklered (U.P., S)	15%
	Protected (P)	15%
5 to less than 10 ^{f,g}	Unprotected, Nonsprinklered (U.P., NS)	10% ^h
	Unprotected, Sprinklered (U.P., S)	25%
	Protected (P)	25%
10 to less than 15 ^{h,i,j}	Unprotected, Nonsprinklered (U.P., NS)	15% ^h
	Unprotected, Sprinklered (U.P., S)	45%
	Protected (P)	45%
15 to less than 20 ^{k,l}	Unprotected, Nonsprinklered (U.P., NS)	25%
	Unprotected, Sprinklered (U.P., S)	75%
	Protected (P)	75%

(continued)

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(continuation of Table 705.8)

20 to less than 25' ± ^a	Unprotected, Non sprinklered (U.P. NS)	45%
	Unprotected, Sprinklered (U.P. S)	No Limit
	Protected (P)	No Limit
25 to less than 30' ± ^a	Unprotected, Non sprinklered (U.P. NS)	30%
	Unprotected, Sprinklered (U.P. S)	No Limit
	Protected (P)	No Limit
30 or greater	Unprotected, Non sprinklered (U.P. NS)	No Limit
	Unprotected, Sprinklered (U.P. S)	No Limit
	Protected (P)	No Limit

For SI: 1 foot = 304.8 mm.
U.P. NS = Unprotected openings in buildings not equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.
U.P. S = Unprotected openings in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.
P = Openings protected with an opening protective assembly in accordance with Section 705.8.2.
a. Values indicated are the percentage of the area of the exterior wall, per story.
b. For the requirements for fire walls of buildings with differing heights, see Section 706.6.1.
c. For openings in a fire wall for buildings on the same lot, see Section 706.6.
d. The maximum percentage of unprotected and protected openings shall be 25 percent for Group R-3 occupancies.
e. Unprotected openings shall not be permitted for openings with a fire separation distance of less than 15 feet for Group H-2 and H-3 occupancies.
f. The area of unprotected and protected openings shall not be limited for Group R-3 occupancies, with a fire separation distance of 5 feet or greater.
g. The area of openings in an open parking structure with a fire separation distance of 10 feet or greater shall not be limited.
h. Includes buildings accessory to Group R-3.
i. Not applicable to Group H-1, H-2 and H-3 occupancies.
j. The area of openings in a building containing only a Group U occupancy private garage or carport with a fire separation distance of 5 feet (1523 mm) or greater shall not be limited.
k. For openings between S-2 parking garage and Group R-2 building, see Section 705.3, Exception 2.





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Openings in Exterior Walls Section 705.8.1, Exception 2

- Buildings whose exterior wall, exterior nonbearing wall and exterior structural frame are not required to be fire-resistance rated (by Tables 601 and 602) are permitted to have unlimited unprotected openings.

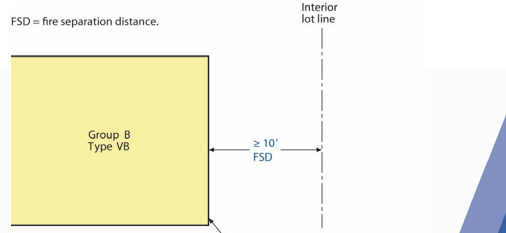


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Openings in Exterior Walls Section 705.8.1, Exception 2

FSD = fire separation distance.





Group B
Type VB

Interior lot line

≥ 10' FSD

Unlimited unprotected openings per Section 705.8.1, Exception 2

For SI: 1 foot = 304.8 mm.



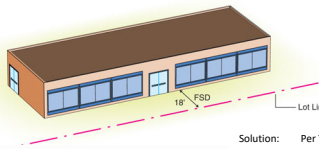
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Openings in Exterior Walls Example

Given: A Type IIB Group M building with its west wall having a fire separation distance of 18 feet.

Determine: The type and amount of permitted openings.





Solution:

Per Table 601, for Type IIB, no rating is required for the exterior wall.

Per Table 705.5 with a fire separation distance of 18 feet, no rating is required for the exterior wall.

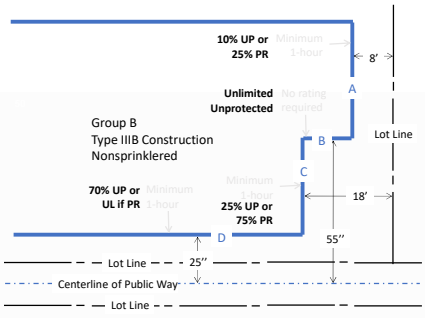
Therefore, there is no limit to the amount of openings permitted in the west wall and the openings are not required to have a fire-protection rating.



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Openings in Exterior Walls Example #1



10% UP or 25% PR Minimum 1-hour

Unlimited Unprotected No rating required



Group B Type IIIB Construction Nonsprinklered

70% UP or UL if PR Minimum 1-hour

Minimum 1-hour 25% UP or 75% PR

Lot Line 8' Lot Line 18' Lot Line 55"

Centerline of Public Way



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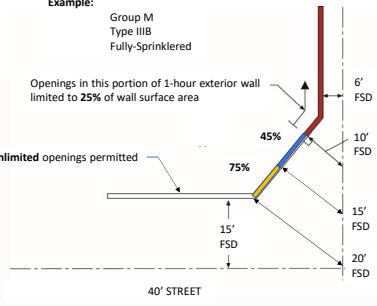
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Exterior Opening Protection Table 705.8

Example: Group M Type IIIB Fully-Sprinklered

Openings in this portion of 1-hour exterior wall limited to 25% of wall surface area



Unlimited openings permitted



40' STREET

6' FSD 10' FSD 15' FSD 20' FSD

45% 75%





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Openings in Exterior Walls Section 705.8.1, Exception 1

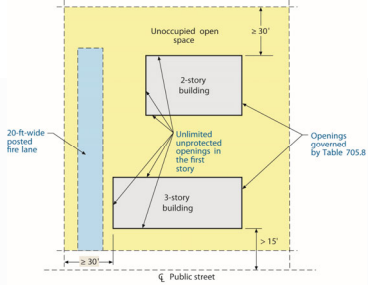
- In other than Group H, unlimited unprotected openings are permitted in the first story of exterior walls facing:
 - A street with fire separation distance > 15 feet
 - An unoccupied space ≥ 30 feet in width and accessible from a street by a posted fire lane
 - Unoccupied space to be located on same lot or dedicated for public use





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Openings in Exterior Walls Section 705.8.1, Exception 1



For SI: 1 foot = 304.8 mm.





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Mixed Openings in Exterior Walls Section 705.8.4

- Where both protected and unprotected openings are located in an exterior wall in any story, total area of openings shall comply with the following formula (only applicable to nonsprinklered buildings):
$$(A_p/a_p) + (A_u/a_u) \leq 1.0$$
 - where:
 - A_p = actual area of protected openings
 - 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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Mixed Openings in Exterior Walls Example

Given: A nonsprinklered Group S-1 building of Type IIIB construction. The exterior wall shown is located 12 feet from an interior lot line.

Determine: The maximum area permitted for unprotected openings.

Solution:

$$(A_o/a_o) + (A_p/a_p) \leq 1.0$$
$$83/(45\%)(18 \times 40) + (15\%)(18 \times 40) = 1.0$$
$$83/324 + A_p/108 = 1.0$$
$$0.25 + 81/108 = 1.0$$

Up to 81 sf of unprotected openings are permitted.

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Protected Openings Section 705.8.2

- Where openings are required to be protected, fire doors, fire shutters and fire windows to comply with Section 716.
 - Opening protectives not required where:
 - Building is provided with sprinkler system throughout, and
 - Exterior openings are protected by water curtain.
 - Allowance applicable where provisions require protected openings, such as:
 - Exterior exit stairway protection
 - Egress courts
 - Exterior areas of assisted rescue
 - Use of exception not applicable to Table 705.8
 - Based on sprinklered condition, protected openings not required to gain maximum percentage of openings.

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Unprotected Openings Section 705.8.3

- Where unprotected openings are permitted, windows and doors shall be constructed of any approved materials.
 - Glazing shall conform with Chapters 24 and 26

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Fire Door Assemblies
Section 716.2

- Table 716.1(2) identifies minimum fire door and fire shutter assembly ratings based on
 - Type of wall assembly where the door/shutter is located
 - Required wall assembly rating
- Table also identifies:
 - Door vision panel size
 - Fire-rated glazing marking of door vision panels
 - Minimum sidelight/transom assembly rating
 - Fire-rated glazing marking of sidelight/transom panel



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Fire Door Assemblies
Table 716.1(2)

TABLE 716.1(2)—continued 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 SIZE ^a	FIRE-RATED GLAZING MARKING OF DOOR VISION PANEL ^b	MINIMUM SIDELIGHT/TRANSOM ASSEMBLY RATING (hours)		FIRE-RATED GLAZING MARKING OF SIDELIGHT/TRANSOM PANEL
					Fire protection	Fire resistance	
Exterior walls	3	1½	100 sq. in. ^c	≤ 100 sq. in. = D-H-90	Not Permitted	3	Not Permitted
	2	1½	Maximum size tested	> 100 sq. in. = D-H-W-90	1½	2	D-H-OH-90
	1	¾	Maximum size tested	D-H-45	¾		D-H-45
Smoke barriers					Fire protection		
	1	¾	Maximum size tested	D-20	¾		D-H-OH-45



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Fire Window Assemblies
Table 716.1(3)

- Table 716.1(3) identifies minimum fire window assembly ratings based on
 - Type of wall assembly where door/shutter located
 - Required wall assembly rating
- Table also identifies:
 - Fire-rated glazing marking of fire windows



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Fire Window Assemblies


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 ^a	W-XXX ^b
Fire barriers	>1	NP ^a	W-XXX ^b
	1	NP ^a	W-XXX ^b
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
	0.5	1/4	OH-20 or W-30
Smoke barriers	1	1/4	OH-45 or W-60
Exterior walls	>1	1 1/2	OH-90 or W-XXX ^b
	1	1/4	OH-45 or W-60
	0.5	1/4	OH-20 or W-30
Party wall	All	NP	Not Applicable

NP = Not Permitted.
a. Not permitted except fire-resistance-rated glazing assemblies tested to ASTM E119 or UL 263, as specified in Section 716.1.2.3.
b. XXX = The fire rating duration period in minutes, which shall be equal to the fire-resistance rating required for the wall assembly.





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Section 705.3

Buildings on the Same Lot

- For purposes of required wall/opening protection and projections, buildings on the same lot shall be assumed to have an imaginary line between them.





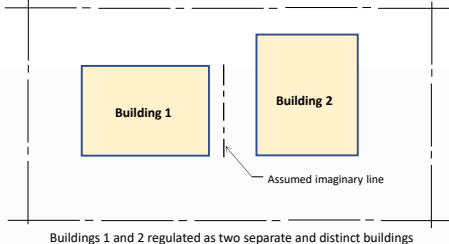
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Buildings on Same Lot

Option #1







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Buildings on the Same Lot Section 705.3

Note: Imaginary line may be located to take best advantage of provisions.
For SI: 1 foot = 304.8 mm.

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Buildings on the Same Lot Section 705.3

- Where a new building is erected on the same lot as an existing building, the location of the assumed imaginary line with relation to the existing building to be such that the exterior wall and opening protection of the existing building comply.

Imaginary line must be located such that wall and openings in exterior wall of existing building are in compliance

FSD = fire separation distance.

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Buildings on the Same Lot Section 705.3, Exception 1

- As an alternative, multiple buildings on the same lot are permitted to be considered as portions of a single building if the aggregate area of such buildings are within limits specified in Chapter 5 for single building.
- Where buildings contain different occupancy groups or are of different types of construction, areas shall be that allowed for the most restrictive occupancy or construction.
- Provisions of the IBC applicable to aggregate building shall be applicable to each building (Section 503.1.2).

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Buildings on the Same Lot Option #2

Building 1a

Building 1b

No assumed imaginary line

Buildings 1 and 2 regulated as portions of a single building

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Buildings on the Same Lot Section 705.3

Building 1
Group B
Type IIB
12,000 sq ft

Building 2
Group B
Type IIB
8,000 sq ft

Imaginary line not required where aggregate areas of Buildings 1 and 2 are within limits of Chapter 5 for a single building.

Note: Section 503.1.2 indicates that all provisions of IBC applicable to the aggregate building are applicable to each individual building.

For SI: 1 square foot = 0.093 m².

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Buildings on the Same Lot Section 705.3, Exception 2

- Special provisions for exterior wall openings are available for a Type I or IIA Group S-2 parking garage on the same lot as a Group R-2 building.
- Adjoining exterior walls between buildings are permitted to have occupant use openings in accordance with Section 706.8.

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Buildings on the Same Lot Section 705.3, Exception 2

Exception allows: Exterior wall of adjacent building with no the separation distance between them*

S-2 Parking garage

R-2

Opening protection required in exterior wall of garage 1½-hour rating

No opening protection required in exterior wall of R-2

*Generally, would require a fire wall or exterior walls with no openings.

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Interior Exit Stairways Exterior Walls Section 1023.7

- Exterior walls of interior exit stairways and ramps shall comply with Section 705
- Where nonrated walls or unprotected openings enclose the exterior of the stairway, protection shall be provided at adjacent walls and openings where exposed at less than 180 degrees.

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Interior Exit Stairways Exterior Walls Section 1023.7

Interior

Interior

Min. 1 hour construction for 10 ft.

<180°

If enclosure wall is nonrated or openings are unprotected, protection of exposing portion required

No additional protection if wall ≥ 180° from enclosure wall

3/4 hour opening protection



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Exterior Stairway Protection Section 1027.6

- Exterior stairways and ramps shall be separated from the interior of the building per Section 1023.2.
- Openings limited to those necessary for egress from normally occupied spaces.
- Exceptions include where:
 - Stairway serves two stories maximum (not R-1 or R-2)
 - Access to 2nd exit is provided
 - Complying open-ended corridors are provided
 - Group R-3 not more than 4 stories in height





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Exterior Stairway Protection Section 1027.6

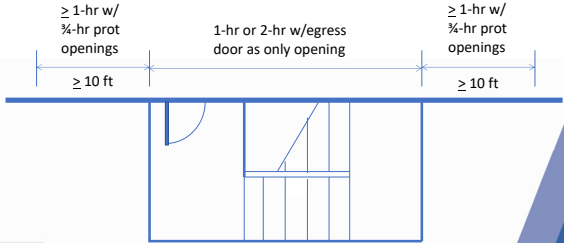
- Exterior stairways and ramps shall be separated from the interior and comply with provisions for interior exit stairways and ramps (Section 1023.2).
- Separation to be:
 - Minimum 1-hour where a stairway/ramp serves three or fewer stories
 - Minimum 2-hour where a stairway/ramp serves four or more stories
- In addition to protection required in an exterior wall common to an exterior stairway/ramp, additional projection is required in walls adjacent to a stairway.



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Exterior Stairway Protection Section 1027.6



≥ 1-hr w/ ¼-hr prot openings 1-hr or 2-hr w/egress door as only opening ≥ 1-hr w/ ¼-hr prot openings

≥ 10 ft ≥ 10 ft





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Open-ended Corridors

Section 1027.6, Exception 3

- Separation from the interior of building is not required where exterior stairways/ramps are connected to open-ended corridors, provided:
 - Building is fully sprinklered
 - Open-ended corridors comply with Section 1020
 - Open-ended corridors connect to complying exterior exit stairways/ramps
 - Exterior walls and openings adjacent to an exterior stairway/ramp comply with Section 1023.7
 - Changes in direction of open-ended corridors are provided with clear openings to minimize accumulation of smoke and toxic gases





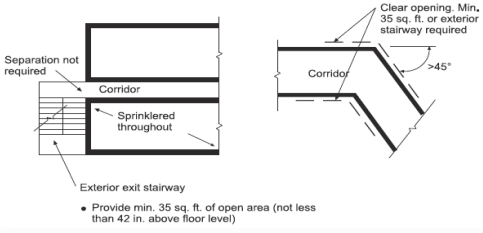
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Open-ended Corridors

Section 1027.6, Exception 3



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Egress Courts

Section 1029.3

- Egress court less than 10 feet in width to be separated from building with:
 - Walls with minimum 1-hour fire-resistance-rated construction to a minimum height of 10 feet
 - Openings protected a minimum ¾-hour
 - Exceptions for egress courts serving:
 - Occupant load of less than 10, or
 - Group R-3 occupancies

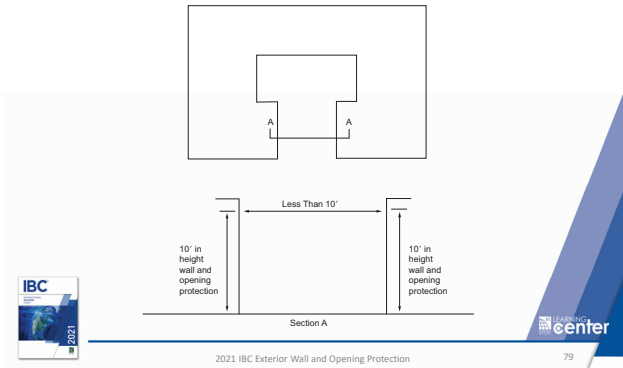


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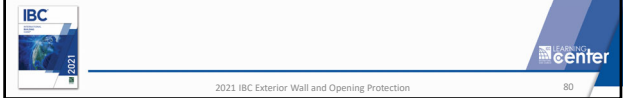
Egress Courts
Section 1029.3



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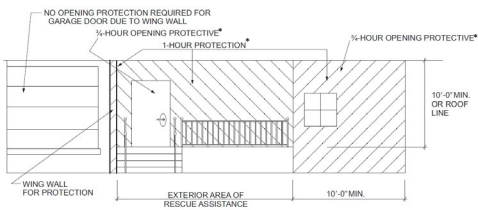
Inaccessible Exit Discharge
Section 1009.7.2

- If exit discharge is not accessible, one of the following components must be provided:
 - Interior area of refuge, or
 - Exterior area of rescue assistance.
- Required fire separation at exterior wall creates 'protect-in-place' condition.
- Fire-resistance rating and opening protectives not required where building is sprinklered throughout



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Exterior Area of Assisted Rescue
Section 1009.7.2



81

Fire Wall Horizontal Continuity Section 706.5

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

18 inches minimum

Fire Wall

18 inches minimum

For 5/8" = 25.4 mm.

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Fire Wall Horizontal Continuity Section 706.5, Exception 1

4 feet 4 feet

Minimum 1-hour exterior wall with minimum 3/4-hour opening protection

Fire Wall

For 5/8" = 304.8 mm.

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Fire Wall Horizontal Continuity Section 706.5, Exception 2

4 feet 4 feet

Sheathing, siding or other exterior finish of noncombustible materials

Fire Wall

For 5/8" = 304.8 mm.

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Fire Wall Horizontal Continuity Section 706.5, Exception 3

Exterior sheathing of noncombustible materials

Sprinklered Building

Sprinklered Building

Fire Wall

For SI: 1 foot = 304.8 mm.

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center

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Fire Walls at Exterior Walls Section 706.5.1

- Where a fire wall intersects exterior walls and an angle of less than 180 degrees is formed, fire-resistance rating and opening protection of exterior walls shall meet one of two conditions:
 - Protection of wall and openings for distance on each side of intersection, or
 - Assumption of imaginary lot line at fire wall and extending beyond the exterior of the fire wall
 - Regulated in similar manner to that used for two or more buildings on the same lot

For SI: 1 inch = 25.4 mm.

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center

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Fire Walls at Exterior Walls Section 706.5.1

Minimum 1-hour exterior wall with minimum 3/4-hour openings

4 feet minimum

Less than 180°

4 feet minimum

Fire Wall

For SI: 1 foot = 304.8 mm.

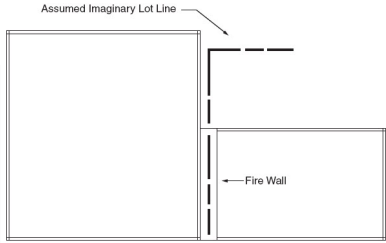
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Fire Walls at Exterior Walls Section 706.5.1




Assumed Imaginary Lot Line

Fire Wall



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Horizontal Projecting Elements Section 706.5.2


- Fire walls to extend to outer edge of horizontal projecting elements that are within 4 feet of fire wall
- Intent is to restrict fire spread around the fire wall at exterior wall surface
- Three exceptions establish alternative means of protection



For SI: 1 inch = 25.4 mm.

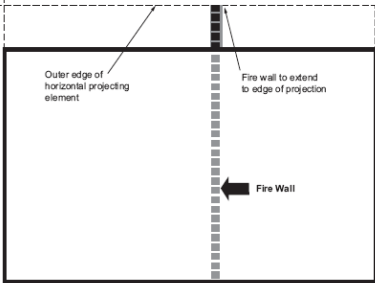
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Horizontal Projecting Elements Section 706.5.2



Outer edge of horizontal projecting element


Fire wall to extend to edge of projection

Fire Wall



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Horizontal Projecting Elements Section 706.5.2, Exception 1

No concealed spaces within projection

Minimum 1-hour wall with minimum 1/2-hour opening protection

Fire Wall

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Horizontal Projecting Elements Section 706.5.2, Exception 2

Concealed spaces within noncombustible projection

1-hour wall extending through concealed space

Minimum 1-hour separation between projection and building with minimum 1/2-hour openings

Fire Wall

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Horizontal Projecting Elements Section 706.5.2, Exception 3

Concealed spaces within combustible projection

Fire wall extending through concealed space

Minimum 1-hour wall with minimum 1/2-hour opening protection

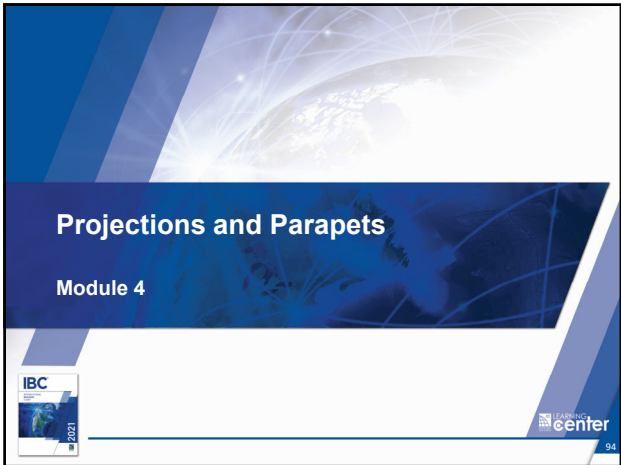
Fire Wall

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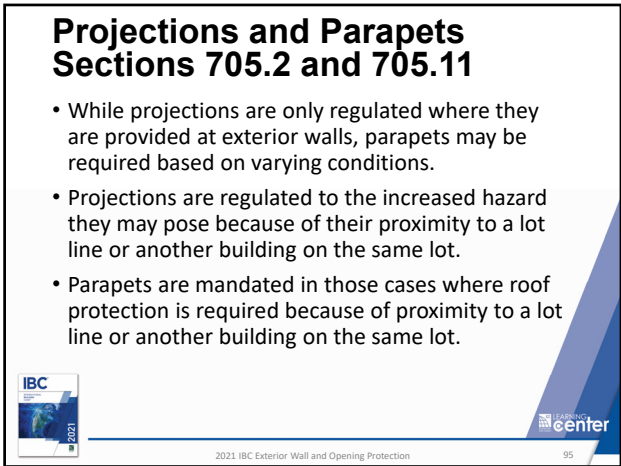
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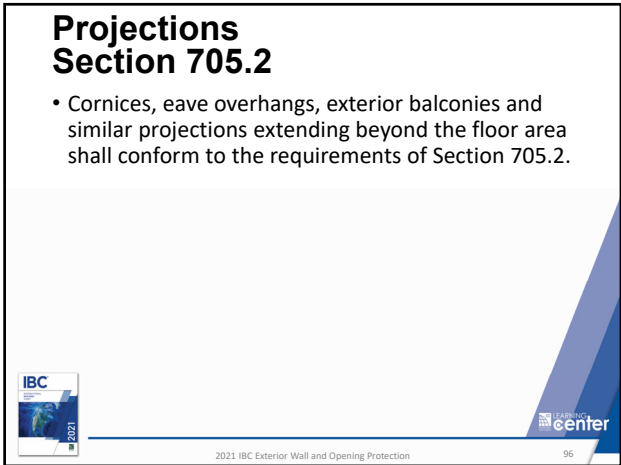
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Projection Limits at Exterior Walls


Section 705.2


- Table 705.2 sets forth the limitations regarding the permitted extent of projections.
- Assuming a projection adjacent to an interior lot line, no projection beyond the building's exterior wall is permitted where the exterior wall is less than 2 feet from the lot line.

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.





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Projection Limits at Exterior Walls

Table 705.2

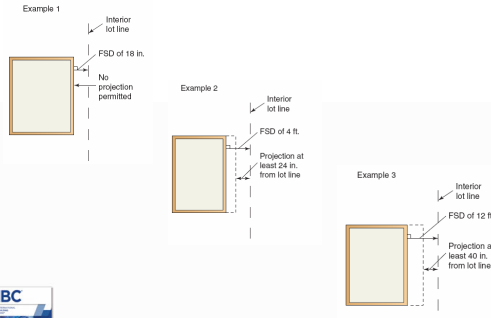




TABLE 705.2
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0 to less than 2	Projections not permitted
2 to less than 3	24 inches
3 to less than 5	Two-thirds of FSD
5 or greater	40 inches

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





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Projections


Section 705.2


- Projections from walls of Type I or II construction shall be of noncombustible materials or combustible materials where allowed by Sections 705.2.3.1 and 705.2.4
- Projections from walls of Type III, IV or V construction shall be of any approved material
- Combustible projections extending to within 5 feet of fire separation distance line shall be:
 - 1-hour fire-resistance-rated construction, or
 - heavy-timber construction, or
 - fire-retardant-treated wood, or
 - as permitted by Section 705.2.3.1

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.





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Combustible Projections Section 705.2.3

Noncombustible materials or combustible materials allowed by Sections 705.2.3.1 and 705.2.4

Any approved material

Type I or II construction

Type III, IV or V construction

For 1" = 304.8 mm.

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Combustible Projections Section 705.2.3

Combustible projection to be:

- Minimum 1-hour construction, or
- Heavy timber construction, or
- Fire-retardant-treated wood, or
- As permitted by Section 705.2.3.1

5 ft.

Lot line

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Protection of Projections vs. Roof Construction

1-hour roof construction

Nonrated projection

Type VA sprinklered

Protection of projection not required

Interior lot line

A

For 1" = 304.8 mm.

Nonrated roof construction

1-hour projection

Type VB sprinklered

Protection of projection required

Interior lot line

B

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Balconies and Similar Projections

Sections 705.2.3.1, 705.2.4

- Section 705.2.3.1 regulates combustible projections on the exterior side of exterior walls, including balconies and similar elements such as porches, decks and exterior stairways.
- Combustible balconies and similar projections to be of FRT wood, Type IV materials, or fire-resistance rated per Table 601 for floor construction (with exceptions).
- Section 705.4 deals with combustible bay and oriel windows.





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Parapets

Section 705.11

- Parapet wall is defined as “a part of any wall completely above the roof line.”
- As a base requirement, parapets shall be provided on all exterior walls unless specifically exempted.
- Multiple exceptions eliminate the mandate for parapets.
- Where one or more exceptions are met, the provisions of Section 705.11 do not apply.





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Parapet Exceptions

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 705.5 because of fire separation distance.
 2. The building has an area of not more than 1,000 square feet (93 m²) on any floor.
 3. Walls that terminate at roofs of not less than 2-hour fire-resistance-rated construction or where the roof, including the deck and supporting construction, is constructed entirely of noncombustible materials.





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Parapet Exceptions Section 705.11, Exception 4

- Parapets are not required on one-hour exterior walls that terminate at underside of roof sheathing, deck or slab, where:
 - Roof has minimum Class B roof covering, are
 - Openings in roof do not occur within 10 feet of exterior wall (5 feet in Groups R and U), and
 - Where roof/ceiling framing elements are of minimum 1-hour construction for minimum:
 - 10 feet (4 feet in Groups R and U) where framing is parallel to exterior wall
 - Full span where framing not parallel to exterior wall





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Parapet Exceptions Section 705.11, Exception 4

For SI: 1 foot = 304.8 mm.





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Parapet Exceptions Section 705.11, Exception 5

- Parapets to be provided on exterior walls of Group R-2 and R-3 buildings, except where:
 - Roof has minimum Class C roof covering;
 - Walls terminate at roof deck, and
 - Building is of Type III, IV or V construction; and
 - Roof deck is of noncombustible materials or fire-retardant-treated wood, for a distance of 4 feet; or
 - Roof protected with $\frac{5}{8}$ -inch Type X gypsum board directly beneath underside of deck, for a distance of 4 feet.



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Parapet Exceptions

Section 705.11, Exception 6

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

- For fully sprinklered buildings, this distance would be 5 feet (1524 mm) or greater.
- For nonsprinklered buildings, this distance would be 15 feet (4572 mm) or greater.





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Parapet Construction

Section 705.11.1

- Parapets shall have the same fire-resistance rating as required for supporting wall.
- Noncombustible faces for the uppermost 18 inches.
- Minimum height of 30 inches.



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Parapet Construction

Section 705.11.1

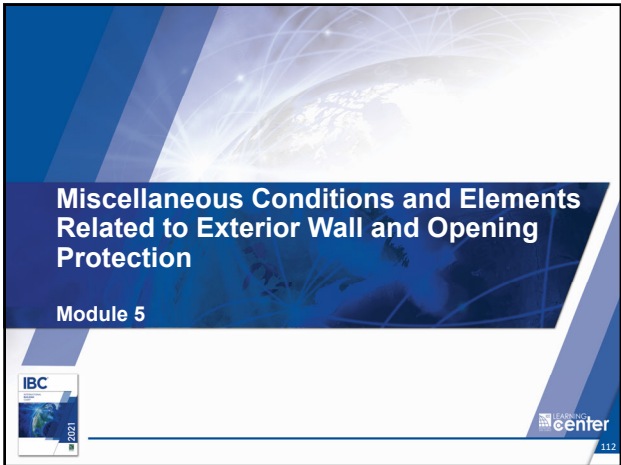
Additional parapet height may be required for roofs sloping toward the parapet at a slope greater than 2:12

For 1" = 25.4 mm.

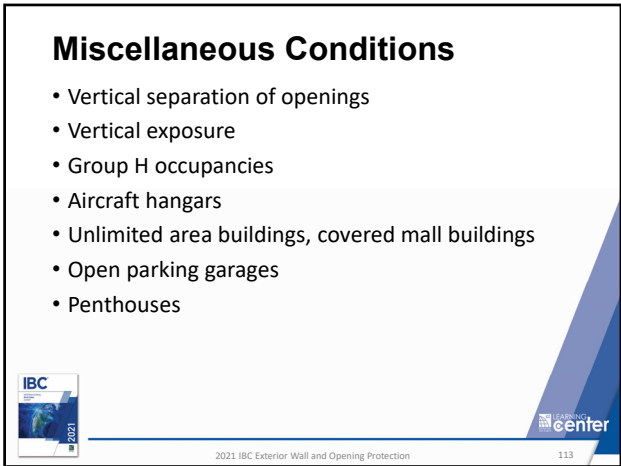


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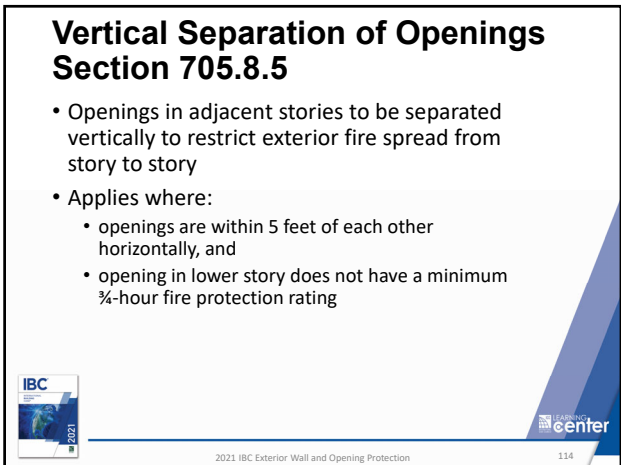
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Vertical Separation of Openings

Section 705.8.5

- Two methods available to restrict the spread of fire:
 - Vertical separation of 3 feet minimum with spandrel construction of at least 1-hour construction (rated for exposure from both sides), or
 - Horizontal flame barriers of at least 1-hour construction that extend a minimum of 30 inches beyond exterior wall
- Vertical separation not required for:
 - Buildings no more than three stories in height above grade plane
 - Fully-sprinklered buildings
 - Open parking garages

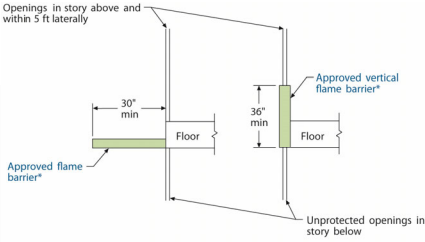


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Vertical Separation of Openings

Section 705.8.5



* Barriers not less than 1-hour rated. Flame barriers not required in sprinklered buildings, in buildings three stories or less in height, or in open parking garages.
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.





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Vertical Exposure

Section 705.8.6

- For buildings of different roof heights located on the same lot, minimum ¾-hour fire protection rating, opening shall be for openings in exterior wall of building adjacent to a lower building where the:
 - openings in the taller wall are less than 15 feet above roof of the lower building
 - fire separation distance is less than 15 feet.





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Vertical Exposure

Section 705.8.6

- Requirements do not apply where:
 - Buildings are regulated as portions of a single building per Section 705.3, or where
 - Roof assembly of the lower building has a minimum 1-hour fire-resistance rating.





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Vertical Exposure

Section 705.8.6

For SI: 1 foot = 304.8 mm.



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Group H Occupancies

Section 415.6.4

- Regardless of any other provisions, buildings containing Group H occupancies shall be set back a minimum fire separation as set forth in Sections 415.6.4.1 through 415.6.4.4.
 - Group H-1 75 feet minimum
 - Group H-2 30 feet minimum (where Group H-2 exceeds 1000 sf)
50 feet if a detached building*
 - Group H-3 50 feet if a detached building*

*no wall and opening protection required based on fire separation distance (Section 415.6.5.1)



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Group H Occupancies

Section 415.6.4

* and not less than that required by IFC
For SI: 1 foot = 304.8 mm.

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Aircraft Hangars

Section 412.3.1

- Exterior walls shall have a minimum 2-hour fire-resistance rating where located less than 30 feet from lot lines or a public way
 - Measurement not necessarily related to fire separation distance
 - Provision not applicable to opposing walls of hangars where two or more hangars occur on same lot.
 - IBC Sections 503.1.2 and 705.3 address multiple hangars on the same lot
 - Measurement taken to nearest public way, not its center line

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Unlimited Area Buildings

Section 507.2.1

- Reduction in the required open space surrounding the perimeter of unlimited area buildings is permitted provided:
 - Exterior walls have a minimum 3-hour fire-resistance rating, and
 - Openings in exterior walls have a minimum 3-hour fire-resistance rating.
- The base requirement of a minimum of 60 feet of open space may be reduced to not less than 40 feet for a maximum of 75 percent of the perimeter.

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Unlimited Area Buildings Section 507.2.1

Minimum of 3 hours with 3-hour opening protectives

≥ 40'

≥ 60'

60-ft street

Unlimited area Building per Section 507.3, 507.4, 507.5, 507.6 and 507.12

*Reduced open space permitted:

- Up to 75 percent of building perimeter
- Where exterior wall facing reduced open space has minimum 3-hour fire-resistance rating
- Openings in such walls are protected for minimum 3 hours

For SI: 1 foot = 304.8 mm.

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Covered and Open Mall Buildings Section 402.2, Exception

- Reduction in required open space also permitted in a similar manner for covered mall buildings and open mall buildings

Minimum of 3 hours with 3-hour opening protectives

≥ 40'

≥ 60'

60-ft street

Covered mall building including associated parking garages and anchor stores

*Reduced open space permitted:

- Up to 75% of building perimeter
- Where exterior wall facing reduced open space has minimum 3-hour fire-resistance rating
- Openings in such walls are protected for minimum 3 hours
- Not applicable for Group E, H, I, and R occupancies.

Reduced open space

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Open Parking Garages Section 406.5.6

- Based on Note c to Table 705.5, exterior walls of open parking garages are not required to have a fire-resistance rating based on fire separation where such distance is 10 feet or more.
- Unlimited unprotected openings are permitted where fire separation distance is at least 10 feet.
- Provisions are applicable to all construction types.

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Open Parking Garages

Table 705.5, Note c

Unprotected exterior wall and unlimited unprotected openings permitted

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Penthouses

Section 151.2.4

- General provisions require penthouse exterior walls to be constructed consistent with the type of construction of the building
- Exceptions address three conditions:
 - Type I buildings
 - Type I buildings no more than two stories in height and all Type II buildings
 - Type III, IV and V buildings
- Exceptions only need be applied where other provisions mandate a higher degree of protection

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Type I and II buildings

Penthouse to be of minimum 1-hour noncombustible construction*

Interior lot line $\geq 5'$

Penthouse walls and roof to be of noncombustible construction* (no rating required)

Interior lot line $\geq 5'$

Penthouse constructed as for walls, floor and roof of building

Type III, IV, and V construction

Penthouse wall and roof to be of minimum 1-hour construction*

Interior lot line $\geq 5'$

Penthouse walls to be of noncombustible, fire-retardant-treated wood or Type IV construction (see Table 601)

Interior lot line $\geq 5'$

Penthouse constructed as for walls, floor and roof of building

For SI: 1 ft = 304.8 mm

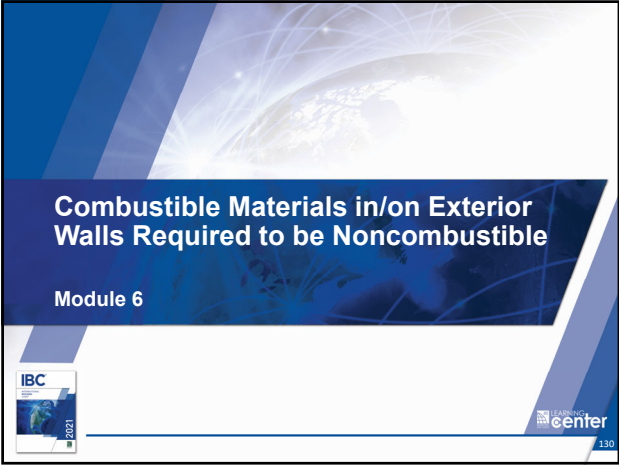
Use of fire-retardant-treated wood in penthouses

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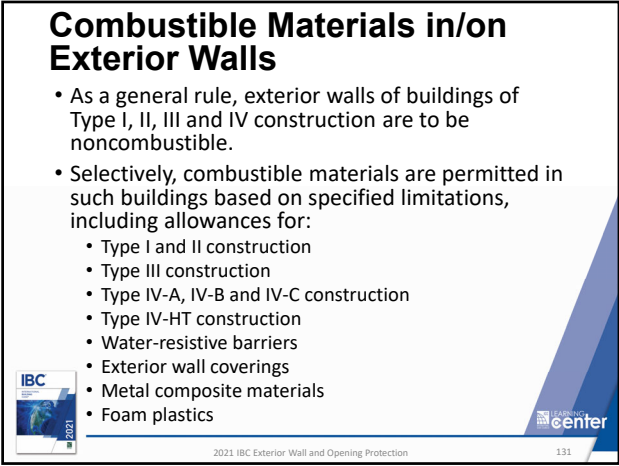
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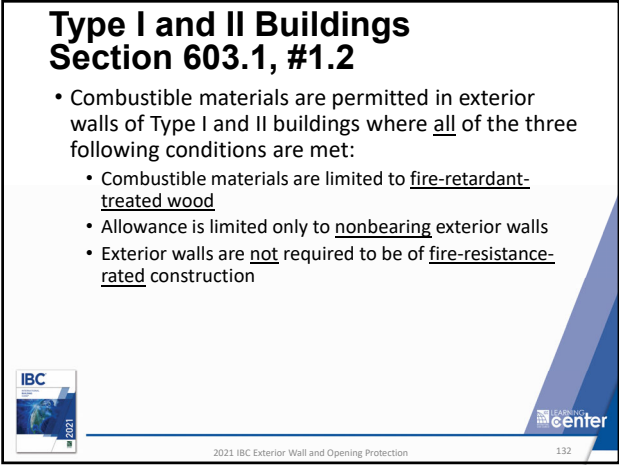
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Type III Buildings Section 602.3

- Combustible materials are permitted in exterior walls of Type III buildings where both of the following conditions are met:
 - Combustible materials are limited to fire-retardant-treated wood framing and sheathing
 - Exterior walls have a fire-resistance-rating of two hours or less





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Type IV-A, IV-B and IV-C Buildings Section 602.4.1.1, 602.4.2.1, 602.4.3.1

- Mass timber is permitted in exterior walls of Type IV-A, IV-B and IV-C buildings where both of the following conditions are met:
 - The outside face is protected with noncombustible protection with a minimum assigned time of 40 minutes.
 - Components of the exterior wall covering shall be noncombustible, except:
 - Combustible water-resistive barriers are permitted where required conditions for heat release, flame spread and smoke development





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Type IV-HT Buildings Sections 602.4.4.1, 602.4.4.2

- Combustible materials are permitted in exterior walls of Type III buildings where both of the following conditions are met:
 - Combustible materials are limited to fire-retardant-treated wood framing and sheathing, or minimum 4-inch-thick cross-laminated timber (CLT)
 - Exterior walls have a fire-resistance-rating of two hours or less
- Exterior walls may also comply with allowances established for such walls of Type IV-A and IV-B buildings.





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Water-Resistive Barriers in Exterior Walls

Section 1402.5

- Exterior walls of Type I, II, III and IV buildings that are greater than 40 feet in height above grade plane and contain a combustible water-resistive barrier to be tested and comply with acceptance criteria of NFPA 285, except:
 - Where a water-resistive barrier is the only combustible component in the exterior wall, and:
 - There is a wall covering of brick, concrete, stone, terra cotta, stucco or steel, or
 - The barrier has complying heat release rates, a flame spread index ≤ 25 , a smoke-developed index ≤ 450 , and a complying heat release rate.





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Combustible Materials on the Exterior Side of Exterior Walls

Section 1405.1.1

- Section 1405.1.1 permits combustible wall coverings on the exterior side of exterior walls of buildings of Type I, II, III and IV where limited to:
 - 10% of the wall surface where fire separation distance is less than 5 feet, and
 - 40 feet in height above grade plane regardless of fire separation distance
- No limit on surface area and allowed to 60 feet in height where of fire-retardant-treated wood.





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Combustible Materials on the Exterior Side of Exterior Walls

Sections 1405.1.1, 1404.5

- Wood veneers may also be installed on the exterior side of exterior walls of Type I, II, III and IV buildings provided:
 - Veneer is limited in thickness as specified in Section 1404.5
 - Veneer is limited to 40 feet in height above grade
 - 60 feet where FRT wood is used
 - Veneer is attached to, or furred from, a noncombustible backing
 - Where open or space wood veneers (without concealed spaces) are used, they shall project no more than 24 inches.





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Metal Composite Materials (MCM) Section 1406.10

- Metal composite material is *a factory-manufactured panel consisting of metal skins bonded to both faces of a solid plastic core.*
- In buildings of Types I, II, III and IV construction, MCMs to comply with:
 - Flame spread index of 25 or less, and
 - Smoke-developed index of 450 or less, and
 - Separation from interior of building by an approved thermal barrier consisting of ½" gypsum wallboard
 - Alternate membrane permitted where in compliance with both Temperature Fire Test and Integrity Fire Test of NFPA 275





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Metal Composite Materials (MCM) Section 1406.10

- Further regulation is established where MCMs are installed more than 40 feet above grade plane on buildings of Type I, II, III or IV construction.
- In addition to the general mandate regulating flame spread, smoke development and thermal barrier protection, such MCM systems are to be tested and comply with acceptance criteria of NFPA 285.
 - Testing to be performed with the MCM in the maximum thickness intended for use.





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Foam Plastics in Exterior Walls Section 2603.5

- Where foam plastic insulation is located within an exterior wall assembly of a Type I, II, III or IV building, the walls shall be regulated for:
 - Fire-resistance rating
 - Thermal barrier*
 - Potential heat*
 - Flame spread index
 - Smoke-developed index
 - Vertical and lateral fire propagation*
 - Labeling
 - Ignition




*Not required for one-story buildings complying with Section 2603.4.1.4
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