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Bill Clayton, CBO

In the construction industry since 1973

- Designer/ builder 16 years
- Combination Inspector 30+ years & Plans examiner 25+ years
- Served on IEBC Committee 2009, & 2012
- Served on IBC General Committee 2015
- 10+ years CBO
- 9+ years as Consultant and Instructor for CCC/Shums Coda Associates
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- 24 ICBO, ICC, FEMA, State of Colorado & State of California certifications & Certified Fire Stop Inspector
- Author of ICC Resource book Firestopping, Joint Systems and Dampers 2024 edition



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The Fine Print!



- There are times when the code is vague.
- You may get my opinion.
- You have yours!
- AHJ makes final determination

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Class Summary



- Design, Construction and Inspection of Multi-Family Structures under the IBC
- R-2 based
- Includes apartments & condominiums with attached garages
- Applicability of code for residential projects.
- Effective use of the code
- Inspection concerns
- Chapters 1-11

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Tools/Equipment

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- Code Book!

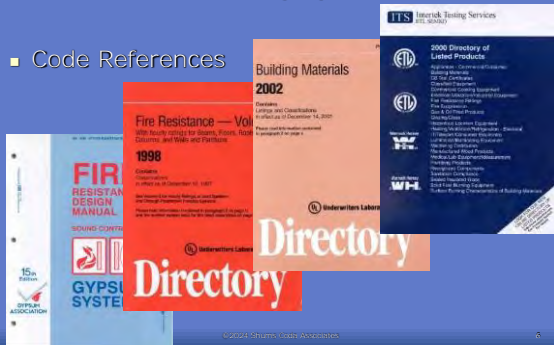


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Tools/Equipment

- Code References



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Residential Group R-2

- Residential Group R-2 occupancies containing more than two dwelling units where the occupants are primarily permanent in nature
 - Familiar with surroundings
 - Apartments (Condominiums)
 - Dormitories
 - Live-Work Units (now in 508.5)
 - Vacation timeshare properties



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Low Hazard Storage S-2

- Storage Group S-2 occupancies include, among others, buildings used for the storage of noncombustible materials such as products on wood pallets or in paper cartons with or without single thickness divisions; or in paper wrappings. Such products are permitted to have a negligible amount of plastic trim, such as knobs, handles or film wrapping. Group S-2 storage uses shall include, but not be limited to, storage of the following:
 - Parking garage



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Storage occupancies 311.1.1

- Accessory Storage spaces: A room or space used for storage purposes that is accessory to another occupancy shall be classified as part of that occupancy
- Does not reference 508.2 Accessory use

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Assembly Group A-3

- Group A-3 occupancy includes assembly uses intended for worship, recreation or amusement and other assembly uses not classified elsewhere in Group A
 - Indoor swimming pool
 - Fitness Center over 50 Occupants
 - Community Rooms over 50 Occupants or over 750 SF



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Business Group B

- The use of a building or structure, or a portion thereof, for office, professional or service-type transactions, including storage of records and accounts.
 - Management Office
 - Small assembly Assembly uses less than 50 occupants.



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Utility/Misc. Group U 312

- Buildings and structures of an accessory character and miscellaneous structures not classified in any specific occupancy shall be constructed, equipped and maintained to conform to the requirements of this code commensurate with the fire and life hazard incidental to their occupancy.
 - Sheds
 - Fences, private garages, retaining walls



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Frontage increase

- To qualify for frontage a building must have a minimum of 20' measured at right angles to any of the following:
 1. The closest interior lot line
 2. The entire width of a street or alley or public way
 3. The exterior face of an adjacent building on the same lot

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Amount of Increase for Frontage Table 506.3.3

TABLE 506.3.3
FRONTAGE INCREASE FACTOR^a

PERCENTAGE OF BUILDING PERIMETER	OPEN SPACE (feet)			
	0 to less than 20	20 to less than 25	25 to less than 30	30 or greater
0 to less than 25	0	0	0	0
25 to less than 50	0	0.17	0.21	0.25
50 to less than 75	0	0.33	0.42	0.50
75 to 100	0	0.50	0.63	0.75

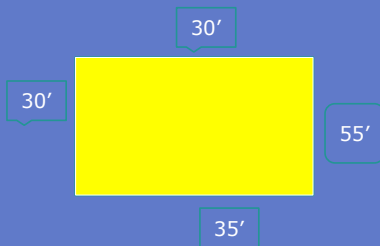
^a Interpolation is permitted.

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Single occupancy single story building w/ frontage all sides Table 506.3.3



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Mixed Occupancies 508.1



- Accessory Occupancies
 - 508.2
- Non-Separated Occupancies
 - 508.3
- Separated Occupancies
 - 508.34
- Combination of these sections
- Incidental uses 509

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Mixed Occupancies 508.1

Exceptions:

1. Occupancies separated in accordance with Section 510.
2. Where required by Table 415.6.2, areas of Group H-1, H-2 and H-3 occupancies shall be located in a separate and detached building or structure.
3. Uses within live/work units, complying with Section 508.5, are not considered separate occupancies.



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Occupancy classification 508.2.1



- Accessory occupancies shall be individually classified in accordance with Section 302.1. The requirements of this code shall apply to each portion of the building based on the occupancy classification of that space.

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Allowable building height 508.2.2

- The allowable height and number of stories of the building containing accessory occupancies shall be in accordance with Section 504 for the main occupancy of the building.



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Allowable building area 508.2.3

- The allowable area of the building shall be based on the applicable provisions of Section 506 for the main occupancy of the building.
- Aggregate accessory occupancies shall not occupy more than 10 percent of the floor area of the story in which they are located and shall not exceed the tabular values for nonsprinklered buildings in Table 506.2 for each such accessory occupancy.



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Separation of occupancies 508.2.4

- No separation is required between accessory occupancies and the main occupancy.

Exceptions:

1. Group H-2, H-3, H-4 and H-5
2. Group I-1, R-1, R-2 and R-3 dwelling units and sleeping units shall be separated from other dwelling or sleeping units and from accessory occupancies contiguous to them in accordance with the requirements of Section 420.



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Nonseparated Uses 508.3.1



- Nonseparated occupancies shall be individually classified.
- Code requirements shall apply to each portion of the building based on the occupancy classification of that space.
- Most restrictive provisions of Chapter 9 that apply to the nonseparated occupancies shall apply to the total nonseparated occupancy area.
- In high-rise buildings, the most restrictive requirements of Section 403 that apply to the nonseparated occupancies shall apply throughout the high-rise building.

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Allowable Area & Height 508.3.2. Non-separated occupancies

- The allowable building area and height of the building or portion thereof shall be based on the most restrictive allowances for the occupancy groups under consideration for the type of construction of the building in accordance with Section 503.1.

	IIA	IIB	VA	VB
R-2	24,000 4	16,000 4	12,000 3	7,000 2
S-2	39,000 5	26,000 3	21,000 4	13,500 2
A-3	13,500 3	9,500 2	11,500 2	6,000 1
S-1	26,000 4	17,500 2	14,000 3	9,000 1

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Separation 508.3.3

- No separation is required between nonseparated occupancies.

Exceptions:

- Group H-2, H-3, H-4 and H-5.
- Group I-1, R-1, R-2 and R-3 dwelling units and sleeping units shall be separated from other dwelling or sleeping units and from other occupancies contiguous to them in accordance with the requirements of Section 420.



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Nonseparated Occupancy Example

- Given:
- 3 story apartment building
 - Parking garage on 1st floor
 - 20,000 SF per floor
 - Minimum 30 ft. open space on all sides
 - NFPA 13R Fire Sprinklers
- Use R-2 Occupancy for each story
 - Try Type VA Construction
 - Equation 5-3
 - $A_a = 12000 + (12000 * 0.75) * 3$
 - $A_a = 12000 + 9000 * 3$
 - $A_a = 63,000$ SF
 - Actual Building Area = 60,000 SF

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Separated Uses 508.4.1



- Separated occupancies shall be individually classified in accordance with Section 302.1.
- Each separated space shall comply with this code based on the occupancy classification of that portion of the building.

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Allowable Area 508.4.2

- In each story, the building area shall be such that the sum of the ratios of the actual building area of each separated occupancy divided by the allowable building area of each separated occupancy shall not exceed 1.

$$\frac{R - 2 \text{ Actual Area}}{R - 2 \text{ Allowable Area}} + \frac{S - 2 \text{ Actual Area}}{S - 2 \text{ Allowable Area}} \leq 1$$

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Multi-Story Mixed Occupancy 506.2.4

- Each story of a mixed-occupancy building with more than one story above grade plane shall individually comply with the applicable requirements of Section 508.1.

Group R-2	
Group R-2	
Group R-2	Group S-2

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Multi-Story Mixed Occupancy 506.2.4

- For buildings with more than three stories above grade plane, the total building area shall be such that the aggregate sum of the ratios of the actual area of each story divided by the allowable area of such stories, determined in accordance with Equation 5-3 based on the applicable provisions of Section 508.1, shall not exceed three.

Group R-2	
Group R-2	
Group R-2	Group A-3
Group S-2	

- $A_b = A_i + (NS \times I_i)$

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Multi-Story Mixed Occupancy 506.2.4

Floor	Occupancy	Actual Area	Allowable Area	Ratio
First	S-2	30,000	63,000	0.476
			Floor Ratio	0.476
Second	A-3	5,000	34,500	0.145
	R-2	25,000	36,000	0.695
		Floor Ratio		0.84
Third	R-2	30,000	36,000	0.833
			Floor Ratio	
Fourth	R-2	30,000	36,000	0.833
			Floor Ratio	
0.476 + 0.840 + 0.833 + 0.833 = 2.982 < 3 OK!				

Type VA Construction, NFPA 13 Sprinklers
No yard increases needed

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Occupied Roof 503.1.4

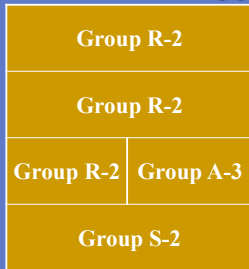
- Does not add to the building area
- Any occupancy is allowed provided it is allowed on the floor immediately below the occupied roof.
- Occupied roof does not contribute to the height of the building
- Occupied roof does not contribute to Stories unless it meets the definition of a story, and any enclosed structures comply with 1511.
- Only counts as a story for purposes of exiting.
- Elements enclosing an occupied roof shall not extend more than 48" above the surface of the occupied roof.

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Allowable Height 508.4.3



- Each separated occupancy shall comply with the building height limitations based on the type of construction of the building in accordance with Section 503.1.

Type VA Construction, sprinklered NFPA 13

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Separation 508.4.4



- Individual occupancies shall be separated from adjacent occupancies in accordance with Table 508.4
 - Fire barriers (706)
 - Horizontal Assembly (711)



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Occupancy classification 509.2



- Incidental uses shall not be individually classified in accordance with Section 302.1.
- Incidental uses shall be included in the building occupancies within which they are located.
- However, they must be identified as Incidental uses

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Area limitations 509.3

- Incidental uses shall not occupy more than 10 percent of the building area of the story in which they are located.



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Separation 509.4.1

- Where Table 509 specifies a fire-resistance-rated separation, the incidental uses shall be separated from the remainder of the building by a fire barrier and/or a horizontal assembly.

GA FILE NO. WP 3510	GENERIC	1 HOUR FIRE	35 to 28 STC SOUND
GYPSUM WALLBOARD, WOOD STUDS One layer 1/2" type X gypsum wallboard or gypsum veneer board applied parallel or at right angles to each side of 2 x 4 wood studs 24" o.c. with fill cavity walls, 1 1/2" long, 600FS studs, 5/8" rods, 7" air.			
Joints staggered 24" on opposite sides. (LOAD-BEARING)			
Thickness: 4 1/2" Approx. Weight: 7 psf Per Test: UL 263-147, IBC 5-17.45; UL Design U200; UL 911-147, IBC 7-10; UL Design U214, IBC 7-10; ULC 2004, IBC 7-10		Build (in):	

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Separation 509.4.1

- Construction supporting 1-hour fire barriers or horizontal assemblies used for incidental use separations in buildings of Type IIB, IIIB and VB construction is not required to be fire-resistance rated unless required by other sections of this code.



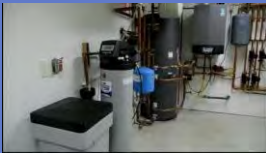
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Protection 509.4.2

- Where Table 509.1 permits an automatic sprinkler system without a fire barrier, the incidental uses shall be separated from the remainder of the building by construction capable of resisting the passage of smoke.
- The walls shall extend from the top of the foundation or floor assembly below to the underside of the ceiling that is a component of a fire-resistance-rated floor assembly or roof assembly above or to the underside of the floor or roof sheathing, deck or slab above.



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Protection 509.4.2

- Doors shall be self- or automatic-closing upon detection of smoke in accordance with Section 716.5.9.3.
- Doors shall not have air transfer openings and shall not be undercut in excess of the clearance permitted in accordance with NFPA 80.
- Walls surrounding the incidental use shall not have air transfer openings unless provided with smoke dampers in accordance with Section 710.7.

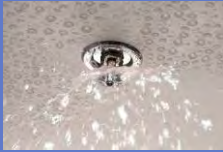


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Protection Limitation 509.4.2.1



- Where an automatic sprinkler system is provided in accordance with Table 509, only the space occupied by the incidental use need be equipped with such a system.

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Special Provisions 510

- The provisions in this section shall permit the use of special conditions that are exempt from, or modify, the specific requirements of this chapter regarding the allowable heights and areas of buildings based on the occupancy classification and type of construction, provided the special condition complies with the provisions specified in this section for that special condition and other applicable requirements of this code.

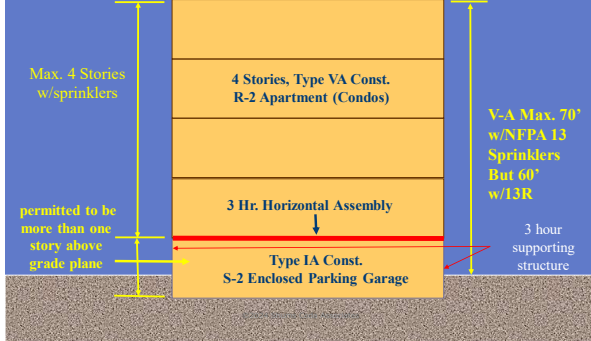


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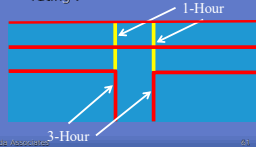
S-2 Parking Garage under A, B, M, or R - 510.2



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Horizontal Building separation - 510.2

- Shaft, stairway, ramp and escalator enclosures through the horizontal assembly shall have not less than a 2-hour fire-resistance rating with opening protectives in accordance with Section 716
 - Exception: Where the enclosure walls below the horizontal assembly have not less than a 3-hour fire-resistance rating with opening protectives in accordance with Section 716, the enclosure walls extending above the horizontal assembly shall be permitted to have a 1-hour fire-resistance rating, provided:
 1. The building above the horizontal assembly is not required to be of Type I construction;
 2. The enclosure connects less than four stories; and
 3. The enclosure opening protectives above the horizontal assembly have a minimum 1-hour fire protection rating.



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Horizontal Building separation 510.2

- #5 The building or buildings above the horizontal assembly shall be permitted to have multiple Group A occupancy uses, each with an occupant load of less than 300, or Group B, M, R or S occupancies.



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Horizontal building separation - 510.4

- The building below the horizontal assembly shall be protected throughout by an approved automatic sprinkler system in accordance with Section 903.3.1.1, and shall be permitted to be any occupancy allowed by this code except Group H.



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Parking Beneath Group R 510.4

- S-2 parking garage under a Group R building
 - Garage
 - Type I open, enclosed or combination
 - Type IV open
 - Grade entrance
- Stories measured at floor above S-2
- floor between S-2 & R complies w/ S-2 type of construction
 - not less than occupancy separation in 508.4



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Private Garages/Carports 406.3.1

- Definition of Private Garage (202)
- A building or portion of a building in which motor vehicles used by the tenants of the building or buildings on the premises are stored or kept, without provisions for repairing or servicing such vehicles for profit.



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Private Garages/Carports 406.3.1

- Private garages and carports shall be classified as Group U occupancies.
- Each private garage shall be not greater than 1,000 square feet in area.
- Multiple private garages are permitted in a building where each private garage is separated from the other private garages by 1-hour fire barriers or 1-hour horizontal assemblies.
- Allowable building area based on Section 503 for Group U Occupancy.



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Dwelling Unit Separation 406.3.4.1



- The private garage shall be separated from the dwelling unit and its attic area
 - ½-inch gypsum board applied to the garage side.
 - Garages beneath habitable rooms separated by 5/8-inch Type X gypsum board or equivalent.

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Dwelling Unit Separation 406.3.4.1

- Door openings
 - 1 3/8" solid wood doors
 - 1 3/8" solid or honeycomb core steel doors
 - 20 minute door assemblies
- Doors shall be self-closing and self-latching.
- Openings directly into a room used for sleeping purposes not permitted.



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Garages and carports 406.3.3

- Carports shall be open on at least two sides.
- Carport floor surfaces shall be of approved noncombustible material.
- Carports not open on at least two sides shall be considered a garage and shall comply with the provisions of this section for garages.
 - Exception: Asphalt surfaces shall be permitted at ground level in carports.
- The area of floor used for parking of automobiles or other vehicles shall be sloped to facilitate the movement of liquids to a drain or toward the main vehicle entry doorway.
- A separation is not required between a Group R-3 and U carport, provided the carport is entirely open on two or more sides and there are not enclosed areas above.



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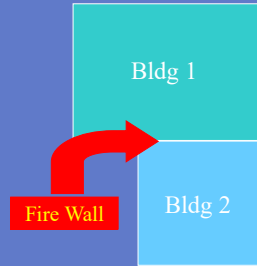
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Fire Walls 706

- Each portion of a building separated by one or more fire walls that comply with the provisions of this section shall be considered a separate building
- Language about separate building now found in section 503.1



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Fire Barriers 707



- Shaft enclosures
- Interior exit stairways
- Enclosures of exit access stairways
- Exit passageways
- Horizontal exits
- Atriums
- Incidental uses
- Control areas
- Separated occupancies
- Separate a single occupancy into different fire areas

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Fire Partitions 708



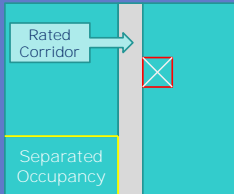
- Dwelling/Sleeping unit separations in I-1, R-1, R-2 & R-3
- Tenant separations in mall buildings
- Corridor walls
- Elevator lobby separation
- Egress balconies

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702.1 – Multiple Use Fire Assemblies



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

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Fire-Resistance Rating of Structural Members – 704.1

- The fire-resistance rating of structural members and assemblies shall comply with the requirements for the type of construction and shall not be less than the rating required for the fire-resistance-rated assemblies supported.
- Individual protection is required except for Light frame construction Boundary elements.
- Designers, please note any primary structural diagonal frame members that are there for purpose of supporting gravity loads!



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705.2 - Projections

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	24 inches plus 8 inches for every foot of FSD beyond 3 feet or fraction thereof
5 or greater	40 inches

- Projections shall not extend any closer to the line used to determine the fire separation distance than shown in Table 705.2.



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705.2.3 – Combustible Projections



- Combustible projections extending to within 5 feet of the line used to determine the fire separation distance shall be of not less than 1-hour fire-resistance-rated construction, Type IV construction, fire-retardant-treated wood or as required by Section 1406.3.



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Light-Frame Construction

704.4.1

- Studs and boundary elements that are integral elements in load-bearing walls of light-framed construction and are located entirely between the top and bottom plates or tracks shall be permitted to have required fire-resistance ratings provided by the membrane protection provided for the load-bearing wall.



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Exterior Wall Fire Ratings

705.5

- Exterior walls shall be fire-resistance rated in accordance with Tables 601 & 705.5.

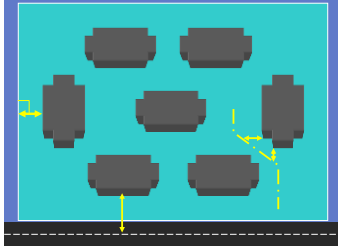
**TABLE 705.5
FIRE-RESISTANCE RATING REQUIREMENTS FOR EXTERIOR WALLS BASED ON FIRE SEPARATION DISTANCE^{a, b, c, d}**

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

For SI: 1 foot = 304.8 mm.
a. Load-bearing exterior walls shall also comply with the fire-resistance rating requirements of Table 601.
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 II 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 (1524 mm) or greater.
i. For a Group R-1 building of Type II-B or Type V-B construction, the exterior wall shall not be required to have a fire-resistance rating where the fire separation distance is 5 feet (1524 mm) or greater.

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Fire Separation Distance 202



- The distance measured from the building face to one of the following:
 - The closest interior lot line.
 - To the centerline of a street, an alley or public way.
 - To an imaginary line between two buildings on the lot.
- The distance shall be measured at right angles from the face of the wall.

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Fire Separation Distance



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Exterior Wall Fire Ratings 705.5

- Fire separation < 10 feet
 - fire exposure both sides
- Fire separation > 10 feet
 - fire exposure from inside

GA FILE NO. WP 9124	PROPRIETARY	1 HOUR FIRE
GYPSUM WALLBOARD, POLYETHYLENE FILM WOOD STUDS, GLASS FIBER INSULATION, FOAM PLASTIC BOARDS, PLYWOOD SIDING		
EXTERIOR SIDE: One layer 1/2" proprietary gypsum half board, glass reinforced polyethylene film plastic sheathing applied parallel to 2" x 4 wood studs, 1/2" a.s.c. with 1/2" galvanized metal studs, 1/2" long, 0.125" thick, 14.425" faces of c/c, 48 perimeter and 12" c/c, 48 intermediate studs, 1/2" polyisocyanurate panels applied parallel to studs with 1/2" galvanized corner studs, 1/2" long, 1/2" thick, 0.125" faces of c/c, 48 perimeter and 12" c/c, 48 intermediate studs. Rating based on the basis of loading to 2307 marked at 80% of full design load.		
INTERIOR SIDE: 1/2" proprietary type X gypsum wallboard applied over 1/2" polyethylene film and parallel to studs with 60 smooth-bright nails, 2" long, 0.111" thick, 1.260" faces of c/c, 48 perimeter and glass fiber insulation, 3.50" thick, 1/2" thick in stud space. (LIMITED LOAD-BEARING)		
PROPRIETARY GYPSUM BOARD 1/2" Thickness - Type X Gypsum Panels		FIRE SIDE
Thickness: 1/2" Area: Weight: 0.260 Fire Test: GBC-955A-3-13-19		



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Buildings on Same Lot 705.3



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

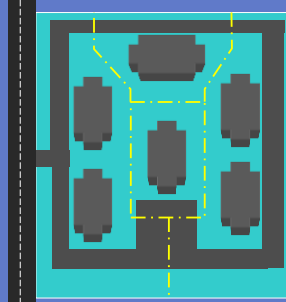
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Buildings on Same Lot 705.3 Exceptions

- 1. Two or more buildings on the same lot shall either be regulated as separate buildings or shall be considered as portions of one building if the aggregate area of such buildings is within the limits specified in Chapter 5 for a single building.



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Buildings on Same Lot 705.3 Exceptions

- 2. Where an S-2 parking garage of Construction Type I or IIA is erected on the same lot as a Group R-2 building, and there is no fire separation distance between these buildings, then the adjoining exterior walls between the buildings are permitted to have occupant use openings in accordance with Section 706.8.
- However, opening protectives in such openings shall only be required in the exterior wall of the S-2 parking garage, not in the exterior wall openings in the R-2 building, and these opening protectives in the exterior wall of the S-2 parking garage shall be not less than 1-hr/2-hour fire protection rating.



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Parapet Exceptions

1. Wall is not required to be fire-resistance rated
2. The building < 1,000 square feet.
3. Walls terminating at 2-hour roof or noncombustible materials.



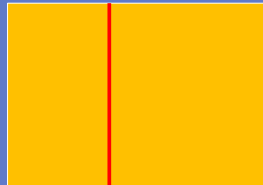
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Fire Walls 706

- Each portion of a building separated by one or more fire walls that comply with the provisions of this section shall be considered a separate building



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Structural Stability 706.2

- Fire walls shall be designed and constructed to allow collapse of the structure on either side without collapse of the wall under fire conditions.
- Fire walls designed and constructed in accordance with NFPA 221 shall be deemed to comply with this section.



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Materials 706.3

- Noncombustible materials except Type V



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Fire Resistance Rating Table 706.4

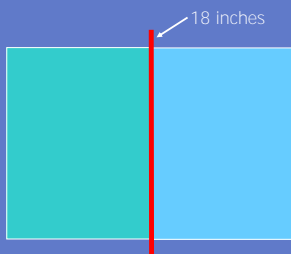
**TABLE 706.4
FIRE WALL FIRE-RESISTANCE RATINGS**

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

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Horizontal Continuity 706.5

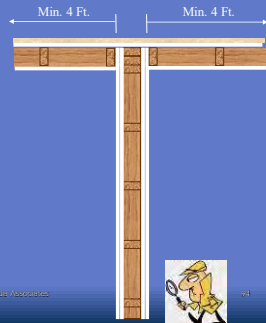


- Fire walls shall be continuous from exterior wall to exterior wall and shall extend not less than 18 inches beyond the exterior surface of exterior walls.

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Horizontal Continuity 706.5, Exception 1

- Shall be permitted to terminate at the interior surface of combustible exterior sheathing or siding provided the exterior wall has a fire-resistance rating of not less than 1 hour for a horizontal distance of not less than 4 feet on both sides of the fire wall.
- Openings within such exterior walls shall be protected by fire assemblies having a fire-protection rating of not less than 3/4 hour.



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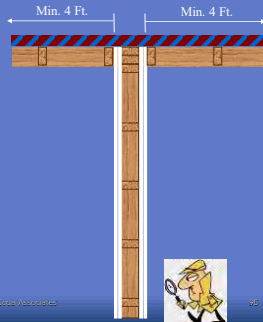


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Horizontal Continuity 706.5, Exception 2

- Shall be permitted to terminate at the interior surface of noncombustible exterior sheathing, exterior siding or other noncombustible exterior finishes provided the sheathing, siding, or other exterior noncombustible finish extends a horizontal distance of not less than 4 feet on both sides of the fire wall.



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Horizontal Continuity 706.5, Exception 3



- Fire walls shall be permitted to terminate at the interior surface of noncombustible exterior sheathing where the building on each side of the fire wall is protected by an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.



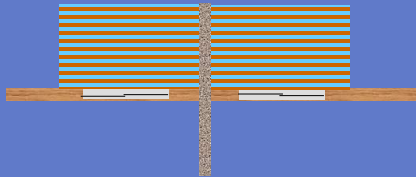
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Horizontal Projecting Elements 706.5.2

- Fire walls shall extend to the outer edge of horizontal projecting elements such as balconies, roof overhangs, canopies, marquees and architectural projections that are within 4 feet of the fire wall.
- Exceptions!



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Exceptions

- 1. Horizontal projecting elements without concealed spaces, provided that the exterior wall behind and below the projecting element has not less than 1-hour fire-resistance-rated construction for a distance not less than the depth of the projecting element on both sides of the fire wall. Openings within such exterior walls shall be protected by opening protectives having a fire protection rating of not less than 3/4 hour.

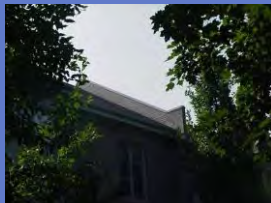


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Vertical continuity 706.6

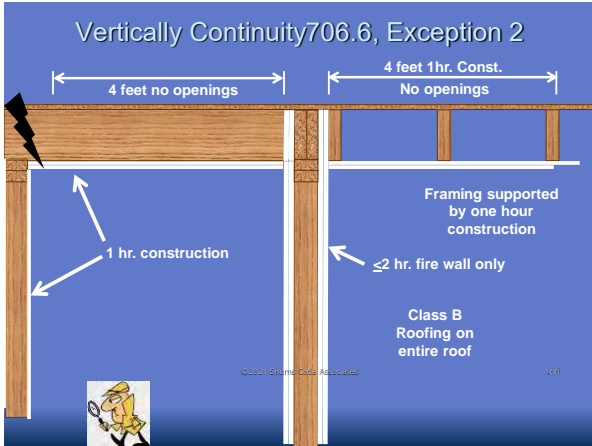


- Fire walls shall extend from the foundation to a termination point not less than 30 inches above both adjacent roofs.

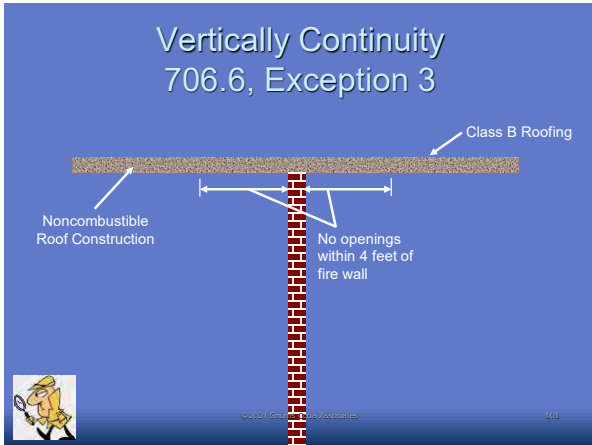
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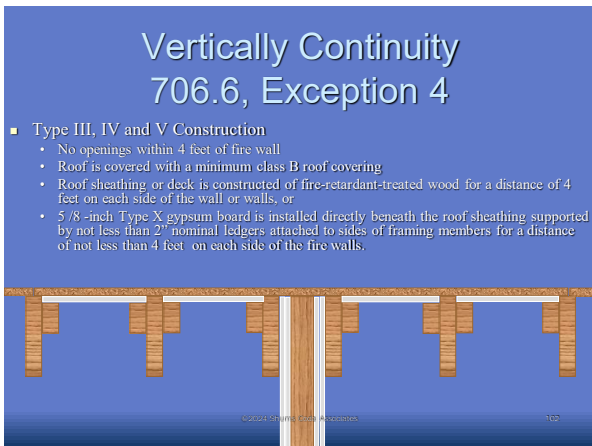
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Stepped Buildings 706.6.1

- Where a fire wall serves as an exterior wall for a building and separates buildings having different roof levels, such wall shall terminate at a point not less than 30 inches above the lower roof level, provided the exterior wall for a height of 15 feet above the lower roof is not less than 1-hour fire-resistance-rated construction from both sides with openings protected by assemblies having a 3/4-hour fire protection rating.

1 hr. const.
3/4 Hr. Openings
Fire Wall
15'
30"

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Fire Barriers 707

- Shaft Enclosures 713
- Interior Exit Stairways 1023
- Enclosures for Exit Access Stairways 713.4
- Exit passageways 1024
- Horizontal exits 1026
- Incidental Accessory Occupancies 509
- Separation of mixed occupancies 508.4

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Continuity 707.5

- Top of floor/ceiling to underside of floor/roof
- Continuous through concealed spaces such as suspended ceilings
- The supporting construction must be protected to afford the required fire-resistance rating of the fire barrier supported.

Same rating as shaft

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Fire Partitions 708



- Dwelling separations
- Corridor walls

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Fire Resistance Rating 708.3

- One Hour
 - Except: Corridor walls per Table 1016.1 (1/2 hr.)
 - Dwelling unit & guestroom separation Types IIB, IIIB and VB permitted to be 1/2 hour rated with NFPA 13 sprinkler system



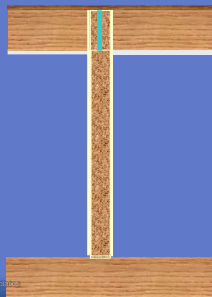
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Fire Partitions Continuity 708.4

- From the top of the floor assembly below to the underside of the floor/roof slab or deck above, or
- to the fire-resistance-rated floor/ceiling or roof/ceiling assembly above
- must be securely attached thereto.
- If not continuous to the deck, the space between the ceiling and the deck above shall be fire-blocked or draft stopped at the partition line.



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Fire Partitions Continuity 708.4

- Supporting construction shall be protected to afford the required fire-resistance rating of the wall supported,
- except for tenant and sleeping room separation walls and exit access corridor walls in buildings of Types IIB, IIIB, and VB construction.



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Fire Partition Continuity Exceptions

- Need not extend into crawl space w/1 hr floor above crawl space
- Fireblocking or draftstopping is not required at the partition line in Group R-2 buildings that do not exceed four stories in height provided the attic space is subdivided by draftstopping into areas not exceeding 3,000 square feet or above every two dwelling units, whichever is smaller.
- Fireblocking Draftstop not required w/sprinklers inside combustibles spaces



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Horizontal Assemblies 711

- Floor and roof assemblies required to have a fire-resistance rating



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Fire Resistance Ratings 711.2.4

- Type of Construction
 - V-B – non-rated
- Type of Separation
 - Occupancy Separation
 - Incidental Accessory Occupancies
- I-1, R-1, R-2
 - One-hour
- Other Occupancies
 - One-hour or as req'd by tbl 508.4



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Vertical Openings 712



- The provisions of this section shall apply to the vertical opening applications listed in Sections 712.1.1 through 712.1.16.



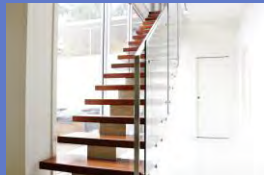
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Individual dwelling unit 712.1.2

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



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Two-story openings 712.1.9

- In other than Groups I-2 and I-3, a vertical opening that is not used as one of the applications listed in this section shall be permitted if the opening complies with all of the items below:

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



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Shaft Enclosure 713.4



- Constructed as req'd for a fire barrier in 707
- Four or more stories
 - two-hour
- Less than four stories
 - one-hour
- Includes basements
- Not less than the floor assembly penetrated, but need not exceed 2 hours

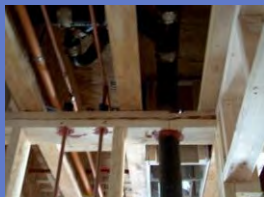
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Penetrations 714.1

- The provisions of this section shall govern the materials and methods of construction used to protect through penetrations and membrane penetrations of horizontal assemblies and fire-resistance-rated wall assemblies.



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UL Penetrations

- Penetrations through all or a portion of an assembly can significantly affect the rating.
- Firestop systems developed to protect openings created by penetration items are covered in Volume 2 of the Fire Resistance Directory.



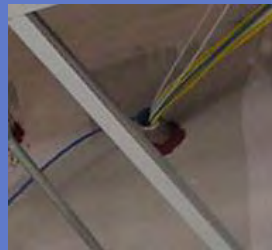
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Installation Details 714.2

- Where sleeves are used, they shall be securely fastened to the assembly penetrated.
- The space between the item contained in the sleeve and the sleeve itself and any space between the sleeve and the assembly penetrated shall be protected in accordance with this section.



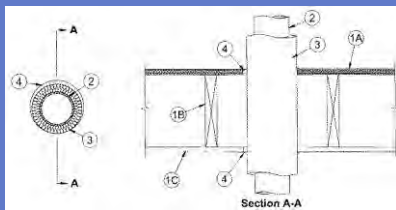
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Installation Details 714.2

- Insulation and coverings on or in the penetrating item shall not penetrate the assembly unless the specific material used has been tested as part of the assembly in accordance with this section.

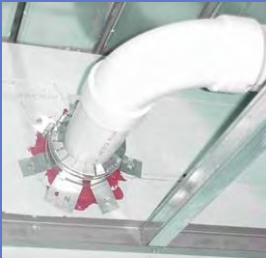


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Fire-Resistance-Rated Walls 714.3



- Penetrations into or through
 - fire walls
 - fire barriers
 - smoke barrier walls
 - fire partitions
- F rating same as wall fire rating



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Membrane penetrations 714.3.2

- Membrane penetrations shall comply with Section 711.3.1. Where walls and partitions are required to have a minimum 1-hour fire-resistance rating, recessed fixtures shall be installed such that the required fire resistance will not be reduced.



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Membrane Penetration Exceptions

- Steel electrical boxes
 - do not exceed 16 square inches
 - total area of boxes doesn't 100 square inches for any 100 square feet of wall area.
- Steel Outlet boxes on opposite sides of the wall shall be separated by:
 - Horizontal distance of not less than 24 inches;
 - Horizontal distance of not less than the depth of the wall cavity where the wall cavity is filled with cellulose loose fill, rock wool or slag mineral wool insulation;
 - By solid fireblocking per Section 717.2.1;
 - Protect both boxes by listed gully plates; or
 - Other listed materials and methods.



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Membrane Penetration Exceptions

- Listed electrical outlet boxes tested for use in fire-resistance-rated assemblies and installed in accordance with the listing instructions
 - Outlet boxes on opposite sides of the wall shall be separated as shown;
 - Horizontal distance of not less than 24 inches;
 - Horizontal distance of not less than the depth of the wall cavity where the wall cavity is filled with cellulose loose fill, rock wool or slag mineral wool insulation;
 - By solid fireblocking per Section 717.2.1;
 - Protect both boxes by listed putty pads; or
 - Other listed materials and methods.
- Sprinkler escutcheons



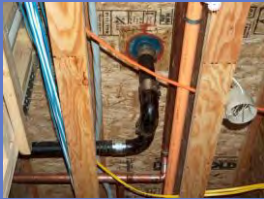
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Horizontal assemblies 714.4

- Penetrations of a fire-resistance-rated floor, floor/ceiling assembly or the ceiling membrane of a roof/ceiling assembly not required to be enclosed in a shaft by Section 712.1 shall be protected in accordance with Sections 714.4.1 through 714.4.4.
 - Through penetrations
 - Membrane penetrations
 - Dissimilar materials
 - Penetrations in smoke barriers



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Through-Penetration Firestop System - 714.4.1.2

- Through penetrations shall be protected by an approved through-penetration firestop system installed and tested in accordance with ASTM E 814 or UL1479, with a minimum positive pressure differential of 0.01 inch of water. The system shall have an F rating and a T rating of not less than 1 hour but not less than the required rating of the floor penetrated.
 - Exception: Floor penetrations contained and located within the cavity of a wall do not require a T rating.



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714.5.1.2 – Floor Penetration of Horizontal Assemblies



- Exception:
- 2. Floor penetrations by floor drains, tub drains, or shower drains contained and located within the concealed space of a horizontal assembly do not require a T rating.



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Membrane Penetration Exceptions

- 16 sq. in. steel electrical boxes
- Max. 100 sq. in. in every 100 sq. ft.
- Boxes on opposite side of wall separated
- Listed outlet boxes
- Sprinkler escutcons



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716.5 – Opening Protection

TYPE OF ASSEMBLY	TABLE 716.5 OPENING FIRE PROTECTION ASSEMBLY RATING AND MARKINGS				FIRE RESISTANCE PERIOD (minutes)				
	REQUIRED RATING	MINIMUM RATING	MINIMUM RATING	MINIMUM RATING	MINIMUM RATING	MINIMUM RATING	MINIMUM RATING	MINIMUM RATING	
Fire walls and fire partitions having a required fire-resistance rating greater than 1 hour	4	3	See Note 4	See Note 4	4:10 W-180	Not Permitted	4	Not Permitted	W-180
	3	2	See Note 4	See Note 4	3:10 W-180	Not Permitted	3	Not Permitted	W-180
	2	1 1/2	100 sq. in.	100 sq. in.	2:10 W-180	Not Permitted	2	Not Permitted	W-120
	1 1/2	1 1/2	100 sq. in.	100 sq. in.	1:10 W-180	Not Permitted	1 1/2	Not Permitted	W-90
Single-wall assembly rating 1-hour	Each wall of the double-wall assembly	3	3	See Note 4	See Note 4	See Note 4	See Note 4	See Note 4	See Note 4
Double fire walls constructed in accordance with NFPA 211	4	3	3	See Note 4	See Note 4	See Note 4	See Note 4	See Note 4	See Note 4
	3	2	1 1/2	100 sq. in.	100 sq. in.	100 sq. in.	100 sq. in.	100 sq. in.	100 sq. in.
	2	1	1	100 sq. in.	100 sq. in.	100 sq. in.	100 sq. in.	100 sq. in.	100 sq. in.
Enclosures for shafts, interior exit stairways and ramps	2	1 1/2	100 sq. in.	100 sq. in.	1:10 W-180	Not Permitted	2	Not Permitted	W-120



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Labeling Requirements 716.5.7.1

- Fire doors shall be labeled showing the name of the manufacturer, the name of the third-party inspection agency, the fire-protection rating and for exit enclosure doors, the maximum transmitted temperature end point.
 - Smoke and draft control doors
 - Approved and permanently affixed.
 - Applied at the factory



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Smoke & Draft Control Doors 716.5.7.3

- Smoke and draft control doors complying with UL 1784 shall be labeled in accordance with Section 716.5.7.1 and shall show the letter "S" on the fire rating label of the door.
- This marking shall indicate that the door and frame assembly are in compliance where listed or labeled gasketing is also installed.



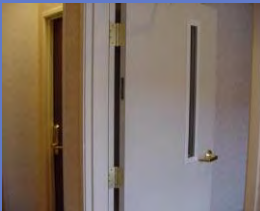
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Fire Door Frames 716.5.7.4

- Fire door frames shall be labeled showing the names of the manufacturer and the third-party inspection agency.



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Door Closing 716.5.9



- Fire doors shall be self-closing or automatic-closing in accordance with this section.
 - Self-closing
 - Automatic closing
 - NFPA 80
 - Smoke activated closing
 - Latching required



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Concealed Spaces 718

- Combustible concealed locations
 - Fireblocking
 - Draftstopping in floors
 - Draftstopping in attics



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Fireblocking 718.2

- In combustible construction, fireblocking shall be installed to cut off concealed draft openings (both vertical and horizontal) and shall form an effective barrier between floors, between a top story and a roof or attic space.



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Fireblocking Materials 718.2.1

- 2-inch nominal lumber
- Two thicknesses of 1-inch nominal w/lapped joints
- One thickness of 0.719-inch wood structural panel w/joints backed
- One thickness of 0.75-inch particleboard w/ joints blocked
- Gypsum board
- Cement fiber board
- Batts or blankets of mineral wool or glass fiber
- Other approved materials installed in such a manner as to be securely retained in place
- Loose-fill insulation material shall not be used unless tested
- The integrity of fire blocks shall be maintained



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Concealed Wall Spaces 718.2.2

- Fireblocking shall be provided in concealed spaces of stud walls and partitions, including furred spaces, and parallel rows of studs or staggered studs, as follows:
 - a. Vertically at the ceiling and floor levels.
 - b. Horizontally at intervals not exceeding 10 feet.



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Connections Between Horizontal & Vertical Spaces – 718.2.3

- Interconnections between concealed vertical stud wall or partition stud spaces and concealed horizontal spaces
- Between concealed vertical and horizontal spaces such as occur at soffits, drop ceilings, cove ceilings and similar locations.



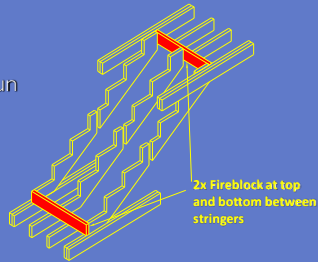
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Stairways 718.2.4

- In concealed spaces between stair stringers at the top and bottom of the run



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Ceiling & Floor Openings 718.2.5

- At openings around vents, pipes, ducts, chimneys and fireplaces at ceiling and floor levels, with an approved material to resist the free passage of flame and the products of combustion



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Architectural Trim 718.2.6

- Within concealed spaces of exterior wall finish and other exterior combustible architectural elements or where erected with combustible frames
- at maximum intervals of 20 feet.
 - Except one family cornice
 - Two Family at intersection



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Draftstopping In Floors 718.3

- In combustible construction, draftstopping shall be installed to subdivide floor/ceiling assemblies





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Draftstopping Materials 718.3.1

- 0.5-inch gypsum board,
- 0.375-inch wood structural panel,
- 0.375-inch particleboard
- other approved materials adequately supported
- The integrity of draftstops shall be maintained.





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Groups R-1, R-2, R-3 and R-4 718.3.2

- In floor/ceiling spaces in Group R-1 buildings, in Group R-2 buildings with three or more dwelling units, in Group R-3 buildings with two dwelling units and in Group R-4 buildings.
- Above and in line with the dwelling unit and sleeping unit separations
 - Exceptions:
 - NFPA 13 throughout building
 - NFPA 13R with sprinklers in concealed spaces

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Groups R-1 and R-2 718.4.2

- Attics, mansards, overhangs or other concealed roof spaces of Group R-2 buildings with three or more dwelling units and in all Group R-1 buildings.
- Draftstopping shall be installed above, and in line with, sleeping unit and dwelling unit separation walls that do not extend to the underside of the roof sheathing above.



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Groups R-1 and R-2 717.4.2, Exceptions



- Where corridor walls provide a sleeping unit or dwelling unit separation, draftstopping only required on corridor wall.
- Buildings equipped throughout with NFPA 13R system.
- Group R-2 that do not exceed four stories in height, the attic space shall be subdivided into areas not exceeding 3,000 square feet or above every two dwelling units, whichever is smaller.
- Buildings equipped throughout with NFPA 13R system with sprinklers installed in the combustible concealed spaces.

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FIRE PROTECTION SYSTEMS CHAPTER 9

- Sprinklers
- Standpipes
- Fire Alarms
- Special Fire Protection Equipment
- Fire Extinguishers
- Smoke Control Systems



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Group R 903.2.8



- shall be provided throughout all buildings with a Group R fire area.



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Group S-2 903.2.10



- Group S-2
 - Where the fire area of the enclosed parking garage exceeds 12,000 square feet; or
 - Where the enclosed parking garage is located beneath other groups.



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Installation Requirements 903.3



- 903.3.1.1
 - NFPA 13
- 903.3.1.2
 - NFPA 13 R
 - Group R up to 4 stories
- 903.3.1.3
 - NFPA 13 D
 - One-Two family dwellings

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Balconies 903.3.1.2.1



- Sprinkler protection shall be provided for exterior balconies and ground-floor patios of dwelling units where the building is of Type V construction.



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Open-ended corridors 903.3.1.2.2

- Sprinkler protection shall be provided in open-ended corridors and associated exterior stairways and ramps as specified in Section 1027.6, Exception 3.



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[F] Attics 903.3.1.2.3

- Attic protection shall be provided as follows:
1. Attics that are used or intended for living purposes or storage shall be protected by an automatic sprinkler system.
 2. Where fuel-fired equipment is installed in an unsprinklered attic, not fewer than one quick-response intermediate temperature sprinkler shall be installed above the equipment.



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Attics 903.3.1.2.3

3. Where located in a building of Type III, Type IV or Type V construction designed in accordance with Section 510.2 or 510.4, attics not required by Item 1 to have sprinklers shall comply with one of the following if the roof assembly is located more than 55 feet (16 764 mm) above the lowest level of required fire department vehicle access:

3.1. Provide automatic sprinkler system protection.

3.2. Construct the attic using noncombustible materials.

3.3. Construct the attic using fire-retardant-treated wood complying with Section 2303.2.

3.4. Fill the attic with noncombustible insulation.



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Quick-Response & Residential Sprinklers – 903.3.2



- Installed in accordance with 903.3.1 and their listing
 - Dwelling units and sleeping units in R and I-1
 - Light-hazard occupancies

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- Four or more stories are above or below grade plane
- Class III standpipe systems shall be installed throughout buildings where the floor level of the highest story is located more than 30 feet above the lowest level of fire department vehicle access, or where the floor level of the lowest story is located more than 30 feet below the highest level of fire department vehicle access.

Height 905.3.1



- Class I permitted in sprinklered building (13 or 13R).

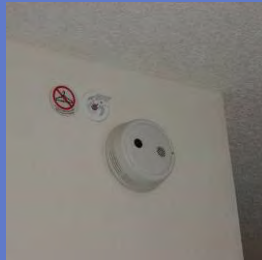
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Fire Alarm and Detection System 907.2

- An approved fire alarm system installed in accordance with the provisions of this code and NFPA 72 shall be provided in new buildings and structures in accordance with Sections 907.2.1 through 907.2.23 and provide occupant notification in accordance with Section 907.5, unless other requirements are provided by another section of this code.



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Group R-2 907.2.9.1

- Manual Fire Alarm System required where:
 - Any dwelling unit or sleeping unit is located 3 or more stories above exit discharge
 - Any dwelling unit located more than one story below exit discharge
 - Building with more than 16 dwelling units or sleeping units
- Exceptions!



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Single- & Multiple-Station Smoke Alarms – 907.2.10.2

- Ceiling or wall outside each sleeping area in immediate vicinity
- Rooms used for sleeping purposes
- Each story in dwelling unit, including basements and cellars, but not including crawl spaces and uninhabitable attics



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Installation near cooking appliances - 907.2.10.3

- Smoke alarms shall not be installed in the following locations unless this would prevent placement of a smoke alarm in a location required by Section 907.2.10.1 or 907.2.10.2:
 - Tionization smoke alarms shall not be installed less than 20 feet horizontally from a permanently installed cooking appliance.
 - Tionization smoke alarms with an alarm-silencing switch shall not be installed less than 10 feet horizontally from a permanently installed cooking appliance.
 - Photoelectric smoke alarms shall not be installed less than 6 feet horizontally from a permanently installed cooking appliance.



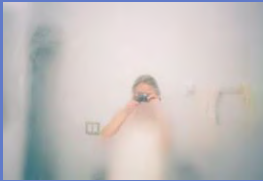
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Installation near bathrooms 907.2.11.4

- Smoke alarms shall be installed not less than 3 feet horizontally from the door or opening of a bathroom that contains a bathtub or shower unless this would prevent placement of a smoke alarm required by Section 907.2.10.1 or 907.2.10.2.



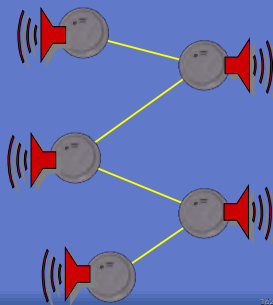
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Interconnection 907.2.11.5

- Detectors must be interconnected so activation of one alarm activates others in dwelling
- Audible in all bedrooms over background noise levels with intervening doors closed



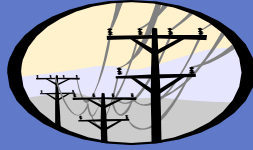
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Power Source 907.2.11.6

- In new construction, required smoke alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source and shall be equipped with a battery backup.
- Smoke alarms shall emit a signal when the batteries are low.
- Wiring shall be permanent and without a disconnecting switch other than as required for over-current protection.



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Carbon Monoxide Alarms 915

- Carbon monoxide detection shall be provided in Group I-1, I-2, I-4 and R occupancies and in classrooms in Group E occupancies in the locations specified in Section 915.2 where any of the conditions in Sections 915.1.2 through 915.1.6 exist.
 - Fuel-burning appliance and fireplaces
 - Forced-air furnace
 - Fuel-burning appliances outside of dwelling units, sleeping units and classrooms
 - Private garages attached to dwelling



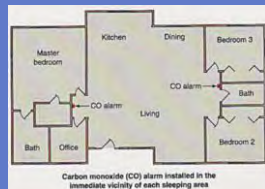
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Locations 915.2.1

- Carbon monoxide detection shall be installed in dwelling units outside of each separate sleeping area in the immediate vicinity of the bedrooms.
- Where a fuel-burning appliance is located within a bedroom or its attached bathroom, carbon monoxide detection shall be installed within the bedroom.



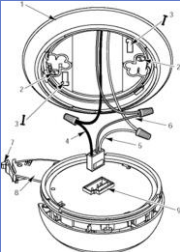

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Power source 915.4.1

- Carbon monoxide alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source, and when primary power is interrupted, shall receive power from a battery. Wiring shall be permanent and without a disconnecting switch other than that required for overcurrent protection.
- Exception: Where installed in buildings without commercial power, battery-powered carbon monoxide alarms shall be an acceptable alternative.

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Means of Egress



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Floor Area per Occupant Table 1004.1.2

FUNCTION OF SPACE	OCCUPANT LOAD FACTOR ^a
Parking garages	200 gross
Residential	200 gross

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Outdoor Areas 1004.7

- Shall be provided with means of egress per Chapter 10
- Occupant load assigned by building official
- If path of egress travels through building, sum of occupant loads used.
 - Exception 2. Both outdoor areas associated with Group R-3 and individual dwelling units of Group R-2.



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Egress Width 1005.1

- The minimum width, in inches, of any means of egress components shall be not less than that specified for such component, elsewhere in this code.
- Stairways
 - 0.3 inch per occupant
- Other egress components
 - 0.2 inch per occupant
- Apartment Example
 - 12,000 sq. ft.
- Occ. Load
 - $12,000 \div 200 = 60$
- Stair Width
 - $60 \times 0.3 = 18"$
 - Minimum width 44"
- Corridor/Door Width
 - $60 \times 0.2 = 12"$
 - Door minimum clear width 32"
 - Corridor minimum clear width 44"

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Exit Access Doorways Required 1006.2

TABLE 1006.2.1
SPACES WITH ONE EXIT OR EXIT ACCESS DOORWAY

OCCUPANCY	MAXIMUM OCCUPANT LOAD OF SPACE	MAXIMUM COMMON PATH OF EGRESS TRAVEL DISTANCE (feet)			
		Without Sprinkler System (feet)		With Sprinkler System (feet)	
		Occupant Load		Occupant Load	
A-1, B, M	49	OR: 50	OR: > 50	75	75 ^a
		75	75	100	100 ^a
B	49	75	75	100	100 ^a
B-1	49	75	75	100	100 ^a
B-1.1, B-2, B-3	3	HP ^b	HP ^b	20 ^b	20 ^b
B-1.4, B-5	10	HP ^b	HP ^b	20 ^b	20 ^b
B-1.5, B-2.1, B-2.2	10	HP ^b	HP ^b	75 ^a	75 ^a
B-3	10	HP ^b	HP ^b	100 ^a	100 ^a
B-5	10	HP ^b	HP ^b	75 ^a	75 ^a
B-2	20	HP ^b	HP ^b	100 ^a	100 ^a
B-2.1	20	HP ^b	HP ^b	100 ^{a, b}	100 ^{a, b}
B-2.2	20	HP ^b	HP ^b	100 ^{a, b}	100 ^{a, b}
B-3	20	HP ^b	HP ^b	100 ^a	100 ^a
B-5	49	100	75	100 ^a	100 ^a
U	49	100	75	75 ^a	75 ^a

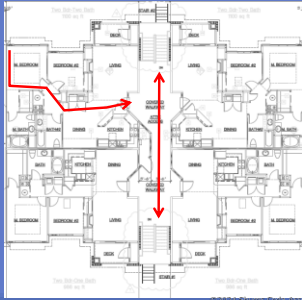
Two exits or exit access doorways from any space shall be provided where the design occupant load or the common path of egress travel distance exceeds the values listed in Table 1006.2.1.

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Common Path of Egress Travel 202



- That portion of exit access which the occupants are required to traverse before two separate and distinct paths of egress travel to two exits are available.

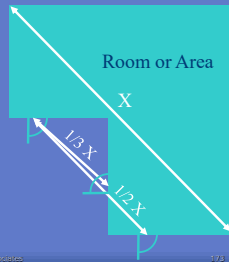
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Exit or Exit Access Doorways Configuration - 1007.1.1

- Two exits
 - A distance apart equal to not less than 1/2 the longest diagonal
 - Exception 2
 - sprinklered building 1/3 diagonal



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Exit Access Travel Distance Table 1017.2

- Measured from the most remote point within a story along the natural and unobstructed path of horizontal and vertical egress travel to the entrance to an exit.

TABLE 1017.2 EXIT ACCESS TRAVEL DISTANCE ^a		
OCCUPANCY	WITHOUT SPRINKLER SYSTEM (Feet)	WITH SPRINKLER SYSTEM (Feet)
A, E, F-1, M, R, S-1	200 ^b	250 ^b
I-1	Not Permitted	250 ^b
B	200	300 ^c
F-2, S-2, U	300	400 ^b
H-1	Not Permitted	75 ^d
H-2	Not Permitted	100 ^d
H-3	Not Permitted	150 ^d
H-4	Not Permitted	175 ^d
H-5	Not Permitted	200 ^d
I-2, I-3	Not Permitted	200 ^d
I-4	150	200 ^d

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Egress Through Intervening Spaces 1016.2

- An exit access shall not pass through a room that can be locked to prevent egress.
- Means of egress from dwelling units or sleeping areas shall not lead through other sleeping areas, toilet rooms or bathrooms.



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Single exits 1006.3.4

TABLE 1006.3.4(1)
STORIES WITH ONE EXIT OR ACCESS TO ONE EXIT FOR R-2 OCCUPANCIES

STORY	OCCUPANCY	MAXIMUM NUMBER OF DWELLING UNITS	MAXIMUM EXIT ACCESS TRAVEL DISTANCE
Basement, first, second or third story above grade plane	R-2 ¹	4 dwelling units	125 feet
Fourth story above grade plane and higher	NP	NA	NA

For SI: 1 foot = 304.8 mm.
 NP = Not Permitted.
 NA = Not Applicable.
 a. Buildings classified as Group R-2 equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 and provided with emergency escape and rescue openings in accordance with Section 1011.
 b. This table is used for R-2 occupancies consisting of dwelling units. For R-2 occupancies consisting of sleeping units, see Table 1006.3.4(2).

- A single exit or access to a single exit shall be permitted from any story or occupied roof where one of the following conditions exists:
 - The occupant load, number of dwelling units and exit access travel distance do not exceed the values in Table 1006.3.2(1) or 1006.3.2(2).

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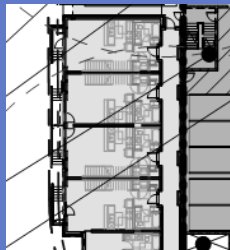
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Single exits 1006.3.4

- 5. Individual single-story or multistory dwelling units shall be permitted to have a single exit or access to a single exit from the dwelling unit provided that both of the following criteria are met:

1. The dwelling unit complies with Section 1006.2.1 as a space with one means of egress.
2. Either the exit from the dwelling unit discharges directly to the exterior at the level of exit discharge, or the exit access outside the dwelling unit's entrance door provides access to not less than two approved independent exits.



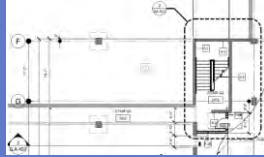
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Exit Discharge 1028

- Exits shall discharge directly to the exterior of the building.
- The exit discharge shall be at grade or shall provide direct access to grade.
- The exit discharge shall not reenter a building.



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Accessible Means of Egress 1009

- Accessible spaces shall be provided with not less than one accessible means of egress.
- Where more than one means of egress is required from any accessible space, each accessible portion of the space shall be served by not less than two accessible means of egress.



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Continuity and Components 1007.2



- Continuous to public way and consist of one or more components
 - Accessible routes
 - Interior exit stairways
 - Exit access stairways
 - Exterior exit stairways
 - Elevators
 - Platform lifts
 - Horizontal exits
 - Ramps
 - Areas of Refuge
 - Exterior area of assisted rescue

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Two-Way Communication 1009.8

- A two-way communication system shall be provided at the elevator landing on each accessible floor that is one or more stories above or below the story of exit discharge complying with Sections 1007.8.1 and 1007.8.2.



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System requirements 1009.8.1

- Must provide communication between each required location and the fire command center or a central control point location approved by the fire department.
- Where the central control point is not constantly attended, a two-way communication system shall have a timed automatic telephone dial-out capability to a monitoring location or 911.
- The two-way communication system shall include both audible and visible signals.



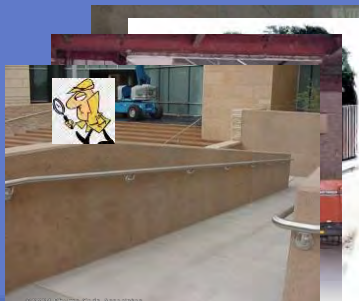
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Means of Egress Components

- Doors
- Gates
- Stairways
- Ramps

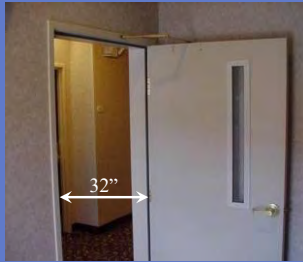


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Size of Doors 1010.1.1

- Minimum width
 - sufficient for the occupant load
 - Provide a clear width of not less than 32 inches.
 - measured between the face of the door and the stop, door open 90 degrees.
- Maximum width
 - door leaf 48"
- Height
 - Minimum 80"



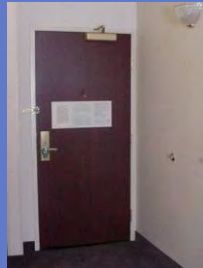
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Locks & Latches 1010.1.9.4

- Doors from individual dwelling units and sleeping units having an occupant load of 10 or less are permitted to be equipped with a night latch, dead bolt or security chain, provided such devices are operable from the inside without the use of a key or tool.



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Gates 1010.2

- Gates used as a component in a means of egress shall conform to the applicable requirements for doors.



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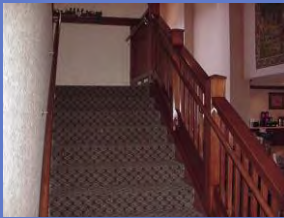
Stairways - 1011



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Stairway Width 1011.2



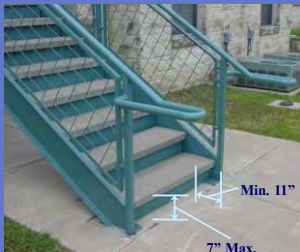
- As determined by Section 1005.1
- Minimum 44"
- Exceptions:
 - occupant load 50 or less - 36" permitted
 - spiral stairways
 - stairway lift in dwelling units



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Stair Treads & Risers 1011.5



- Stair riser heights shall be 7 inches maximum and 4 inches minimum.
 - Measured vertically between leading edges of adjacent tread
- Stair tread depths shall be 11 inches minimum.
 - Measured horizontally between vertical planes of the foremost projection of adjacent treads and at a right angle to the tread's leading edge



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Stair Treads & Risers Exceptions

- Group R-3, within dwelling units in occupancies in Group R-2, and in Group U, which are accessory to an occupancy in Group R-3,
 - maximum riser 7 ¾ inches
 - minimum tread depth 10 inches
 - minimum winder tread depth at the walk line shall be 10 inches, and the minimum winder tread depth shall be 6 inches
 - nosing ¾ inch – 1 ¼ inches shall be provided on stairways with solid risers where the tread depth is less than 11 inches.

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Stairway Construction 1011.7

- Materials consistent with type of construction
- Walking surface
 - not to be sloped steeper than 1:48 (2%)
 - Treads & landings must be solid surface
 - Finish floor surfaces shall be securely attached



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Stairway Handrails 1011.11

- Handrail both sides of stair and comply with Section 1014
 - Except: Stairways within dwelling units and spiral stairways are permitted to have a handrail on one side only.
 - Decks, patios and walkways that have a single change in elevation where the landing depth on each side of the change of elevation is greater than what is required for a landing do not require handrails



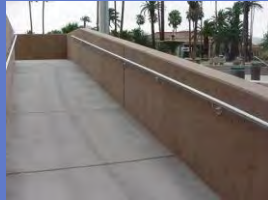
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Ramps 1012

- Means of Egress
 - 1:12 units horizontal (8%)
- Other Ramps
 - 1:8 units horizontal (12.5%)
- Cross Slope
 - 1:48 units horizontal (2%)
- 30 inches maximum rise.



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Minimum Dimensions 1012.5

- Width
 - not less than corridors (1020.2)
 - 36" clear width between handrails
- Headroom
 - all parts 80"
- Restrictions
 - projections prohibited
 - doors shall not reduce clear width to less than 42"
- Edge protection per Section 1010.9
- Handrails per 1012



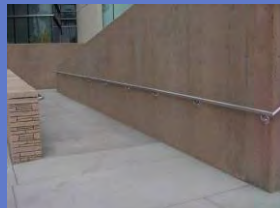
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Landings 1012.6

- Located at top, bottom, points of turning, entrance, exit and doors
 - maximum slope 1:48
 - width same as ramp
 - minimum length 60"
 - 60" X 60" at change of direction
 - Doors per ANSI A117.1



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Handrail Height 1014.2



- 34 inches to 38 inches
- Measured above stair tread nosings, or finish surface of ramp slope



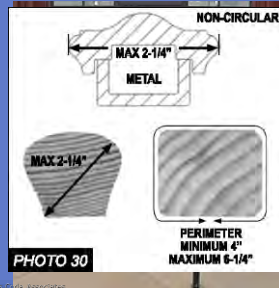
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Handrail Graspability 1014.3.1

- Circular cross section of 1.25" - 2"
- Not circular
 - 4" - 6.25" perimeter dimension
 - 2.25" cross-section dimension
 - edges - minimum radius of 0.01"

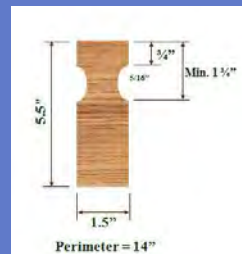


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Handrail Graspability 1014.3.2

- R-3
- Inside R-2 Dwelling
- U associated w/ R-3
- Type III Handrail Permitted



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Continuity 1014.4

- Handrail-gripping surfaces shall be continuous, without interruption by newel posts or other obstructions.

- 1. Handrails within dwelling units are permitted to be interrupted by a newel post at a stair landing.
- 2. Within a dwelling unit, the use of a volute, turnout or starting easing is allowed on the lowest tread.



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Handrail Extensions 1014.6

- Handrails shall return to a wall, guard or the walking surface or shall be continuous to the handrail of an adjacent stair flight.
- Where handrails are not continuous between flights, the handrails shall extend horizontally at least 12 inches beyond the top riser and continue to slope for the depth of one tread beyond the bottom riser.



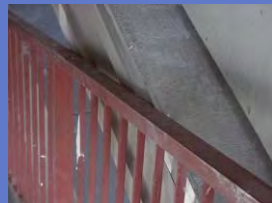
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Clearance 1014.7

- Clear space between a handrail and a wall or other surface shall be a minimum of 1.5 inches
- A handrail and a wall or other surface adjacent to the handrail shall be free of any sharp or abrasive elements.



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Handrail Projections 1014.8

- Ramps – 36" clear width between handrails
- Stairways - Projections into the required width at each handrail shall not exceed 4.5 inches at or below the handrail height.
- Projections into the required width shall not be limited above the minimum headroom height required in Section 1009.2.



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Guards 1015.2

- Open sided walking surfaces more than 30 inches above floor or grade below at any point within 36 inches horizontally to the edge of the open side



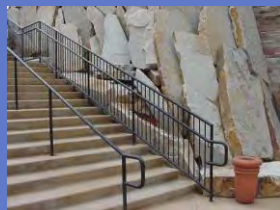
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Guard Height 1015.3

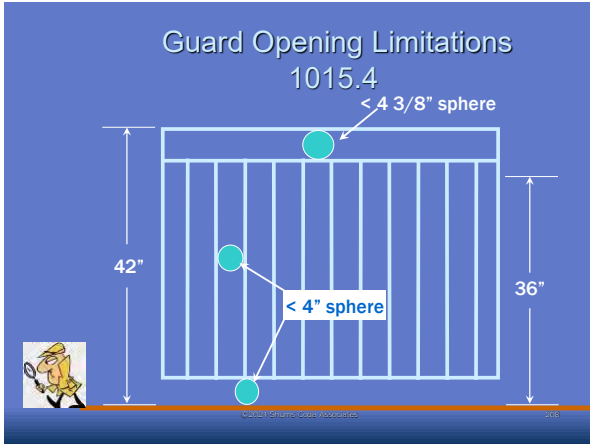
- 42 inches vertically as follows:
 1. From the adjacent walking surfaces.
 2. On stairways and stepped aisles, from the line connecting the leading edges of the tread nosings.
 3. On ramps and ramped aisles, from the ramp surface at the guard.
- Exceptions:
 - R-3 & within R-2 dwelling units may be 34" - 38" above tread if used as handrail



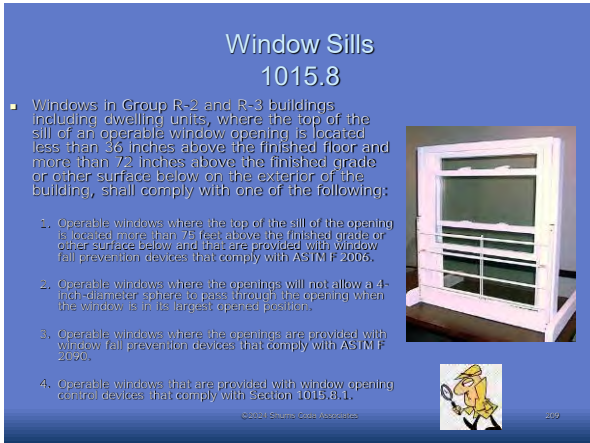
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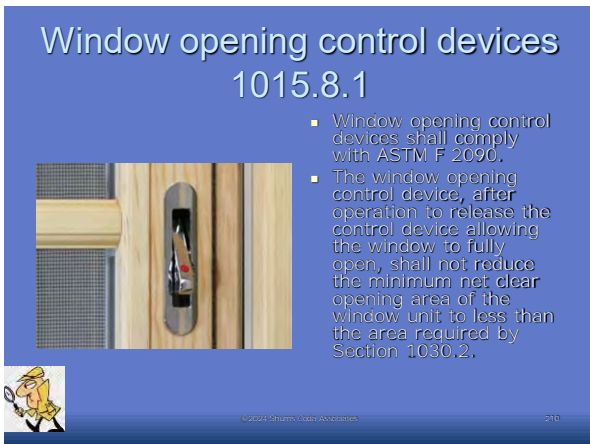
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Egress Balconies 1021.1

- Balconies used for egress purposes shall conform to the same requirements as corridors for width, headroom, dead ends and projections.



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Wall Separation 1021.2

- Exterior egress balconies shall be separated from the interior of the building by walls and opening protectives as required for corridors.
 - Not required where balcony is served by at least 2 stairs and a dead-end travel condition does not require travel past an unprotected opening to reach a stair.



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Corridor Construction 1020.1

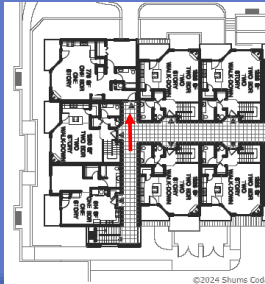
- Corridors shall be fire-resistance rated in accordance with Table 1020.1
- The corridor walls required to be fire-resistance-rated shall comply with Section 703 for fire partitions.

OCCUPANCY	OCCUPANT LOAD SERVED BY CORRIDOR	REQUIRED FIRE-RESISTANCE RATING (hours)	
		Without sprinkler system	With sprinkler system ^a
H-1, H-2, H-3	All	Not Permitted	1
H-4, H-5	Greater than 30	Not Permitted	1
A, B, E, F, M, S, U	Greater than 30	1	0
IR	Greater than 10	Not Permitted	0.5 ^b
I-2 ^c	All	Not Permitted	0
I-1, I-3	All	Not Permitted	0 ^d
I-4	All	1	0

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Dead Ends 1020.5



- Where more than one exit or exit access doorway is required, the exit access shall be arranged such that there are no dead ends in corridors more than 20 feet in length.

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Dead Ends 1020.5, Exception

- In occupancies in Groups B, E, F, I-1, M, R-1, **R-2**, R-4, S and U, where the building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1, the length of the dead-end corridors shall not exceed **50 feet**.



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Exits 1022

- An exit shall not be used for any purpose that interferes with its function as a means of egress.
- Once a level of exit protection is achieved, such level of protection shall not be reduced until arrival at the exit discharge.
- Exits shall be continuous from the point of entry into the exit to the exit discharge.



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Interior Exit Stairways & Ramps 1023.2

- Fire Barrier Construction
- 4+ stories - 2 hr. fire rated
- < 4 stories - 1 hr. fire rated
- all floor levels used to compute stories, including basements
 - excluding mezzanines



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Exterior Exit Ramps & Stairways 1027

- Open on at least one side
 - Minimum 35 sq. ft., 42" above floor level
 - open areas yards, courts, public ways
- Separated per 1023.2



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Emergency Escape and Rescue 1030.1

1. Group R-2 occupancies located in stories with only one exit or access to only one exit as permitted by Tables 1006.3.3(1) and 1006.3.3(2).



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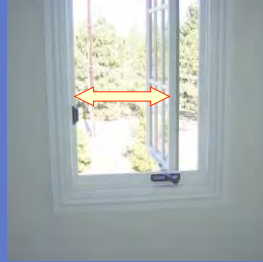
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Minimum Dimensions 1030.2 – 1030.4

- 5.7 square feet net clear opening
 - grade floor openings may be 5 square feet
- > 24 inches height
- > 20 inches wide
- 44" to bottom of opening
- Operational from inside w/o key or tools



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Window Wells 1030.5



- Minimum 9 square feet horizontal area
 - Minimum dimension of 36"
 - Shall allow emergency escape and rescue opening to be fully opened
- Ladder or steps required if deeper than 44 inches
 - inside width 12 inches
 - 3 inches from wall
 - 18 inches O,C, vertically

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Accessibility Chapter 11



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Design 1107.2

- Type A and Type B units
 - Chapter 10 of ICC A117.1.



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Accessible spaces 1107.3



- Rooms and spaces available to the general public or available for use by residents and serving Accessible units, Type A units or Type B Units shall be accessible.
- Accessible spaces shall include toilet and bathing rooms, kitchen, living and dining areas and any exterior spaces, including patios, terraces and balconies.

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Accessible route 1107.3

- At least one accessible route shall connect accessible building or facility entrances with the primary entrance of each Accessible unit, Type A unit and Type B unit within the building or facility and with those exterior and interior spaces and facilities that serve the units.
- Exceptions:
 - 3. In Group R-2 facilities with Type A units complying with Section 1107.6.2.2.1, an accessible route is not required to connect stories or mezzanines where Type A units, all common use areas serving Type A units and all public use areas are on an accessible route.

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Fire-Resistant Ratings & Fire Tests - 703

- The fire-resistance rating of building elements shall be determined in accordance with the test procedures set forth in ASTM E 119 or UL 263 or in accordance with Section 703.3.



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ASTM E 119 or UL 263 Documentation



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IBC table 721.1(1) footnote m

- Generic fire-resistance ratings (those not designated as PROPRIETARY* in the listing) in the GA 600 shall be accepted as if herein listed.

GA FILE NO. WP 3390	GENERIC	1 HOUR FIRE	40 to 44 STC SOUND
GYPSUM WALLBOARD, WOOD STUDS			
<p>One layer 5/8" type X gypsum wallboard or gypsum mineral lanax applied parallel or at right angles to each side of 2" x 4" wood studs 16" o.c. staggered at 90° or 2" x 6" wood joists with 2x4 ceiling joists, 17 1/2" long, 0.0018" thick, 1/2" flange, 7" o.c. Joints staggered 24" on opposite sides. Horizontal bracing required at mid height. (LOAD-BEARING)</p>			

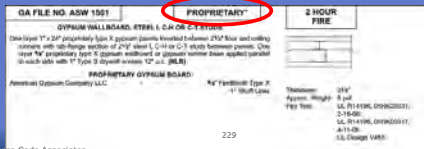
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GA Proprietary Systems

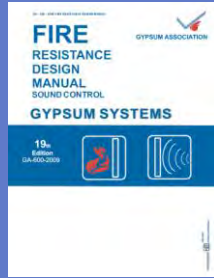
- Where the word "proprietary" appears in system descriptions either the system or one or more of its components is considered proprietary.
- Each proprietary system shall be built utilizing the components specified by the company or companies listed under the detailed description for that system.
- All other systems are generic.
- Generic systems are applicable to the products of any manufacturer, whether a member of the gypsum association or not, provided the products meet the appropriate standards.



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GA Explanatory Notes

- 22 Notes!
- 2. Nails shall comply with ASTM F 547 or ASTM C 514. Other nails, suitable for the intended use, and having dimensions not less than those specified in this Manual shall be permitted as substitutions.



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Exterior Wall

GA FILE NO. WP 8006	PROPRIETARY*	1 HOUR FIRE																		
<p>GYPHUM WALLBOARD, GLASS MAT GYPHUM SUBSTRATE, STEEL STUDS, MINERAL OR GLASS FIBER INSULATION</p> <p>EXTERIOR SIDE: One layer 1/2" proprietary type X glass mat gypsum substrate (sheathing) applied parallel to 3/4" x 20 gage steel studs 24" o.c. with 1" Type S-12, self-drilling, corrosion resistant, bugle head, drywall screws 12" o.c. Studs attached to both vertical legs of floor and ceiling joists either by welding or with 1/2" Type S-12 pan head screws. Mineral or glass fiber insulation fitted into the stud space. Exterior cladding to be attached through glass mat gypsum panel to studs.</p> <p>INTERIOR SIDE: One layer 1/2" proprietary type X gypsum board applied parallel to studs with 1" Type S-12 drywall screws 12" o.c.</p> <p>Bracing: Lateral bracing spaced not over 40" o.c. shall be 1" by 18 gage steel straps attached to each side or channel bracing attached to each stud with a clip angle. For studs with holes or punch-outs in the web the "Q" factor shall be determined by means of slab column tests. Tested at 100 percent of design load. (LOAD-BEARING)</p> <p>PROPRIETARY GYPHUM PANEL PRODUCTS</p> <table border="1"> <tr> <td>CertainTeed Gypsum Inc.</td> <td>1/2" ProRoC® Type X Gypsum Panels</td> </tr> <tr> <td></td> <td>1/2" GlassRoC® Sheathing Type X Gypsum Panels</td> </tr> <tr> <td>CertainTeed Gypsum Canada Inc.</td> <td>1/2" ProRoC® Type X Gypsum Panels</td> </tr> <tr> <td>Georgia-Pacific Gypsum LLC</td> <td>1/2" ToughRoC® Fireguard®</td> </tr> <tr> <td>National Gypsum Company</td> <td>1/2" DevaGlass G040® Fireguard®</td> </tr> <tr> <td></td> <td>1/2" eXP® FIRE-SHIELD® Gypsum Sheathing</td> </tr> <tr> <td></td> <td>1/2" Gold Bond® Brand FIRE-SHIELD® Gypsum Board</td> </tr> <tr> <td>Tampac-Island</td> <td>1/2" GreenGlass Type X</td> </tr> <tr> <td></td> <td>1/2" Type X</td> </tr> </table>			CertainTeed Gypsum Inc.	1/2" ProRoC® Type X Gypsum Panels		1/2" GlassRoC® Sheathing Type X Gypsum Panels	CertainTeed Gypsum Canada Inc.	1/2" ProRoC® Type X Gypsum Panels	Georgia-Pacific Gypsum LLC	1/2" ToughRoC® Fireguard®	National Gypsum Company	1/2" DevaGlass G040® Fireguard®		1/2" eXP® FIRE-SHIELD® Gypsum Sheathing		1/2" Gold Bond® Brand FIRE-SHIELD® Gypsum Board	Tampac-Island	1/2" GreenGlass Type X		1/2" Type X
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	1/2" Gold Bond® Brand FIRE-SHIELD® Gypsum Board																			
Tampac-Island	1/2" GreenGlass Type X																			
	1/2" Type X																			
		<p>Thickness: 1/2"</p> <p>Approx. Weight: 6 psf</p> <p>Fire Test: UL F360/R15187, 01NR21153, 2-4-02, UL20537, 07NR30019, §-19-06, UL Design U425</p>																		

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I-Joist Floor System

GA FILE NO. FC 5407	GENERIC	1 HOUR FIRE	35 to 39 STC SOUND
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WOOD I-JOISTS, GYPSUM WALLBOARD

Base layer 5/8" type X gypsum wallboard applied at right angles to wood I-joists 24" o.c. with 1 1/4" Type W or S drywall screws 24" o.c. Face layer 5/8" type X gypsum wallboard or gypsum veneer base applied at right angles to I-joists with 1 1/4" Type W or S drywall screws 12" o.c. at joints and intermediate I-joists and 1 1/2" Type G drywall screws 12" o.c. placed 2" back on either side of end joints. Joints offset 24" from base layer joints. Wood I-joists supporting 1/2" wood structural panels applied at right angles to joists with 8d nails.

Approx. Ceiling Weight: 5 pcf
Fire Test: FM FC 172, 2-25-72; ITS, 8-6-98
Sound Test: Estimated

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Truss Roof-Ceiling

GA FILE NO. RC 2803	PROPRIETARY*	1 HOUR FIRE
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WOOD ROOF TRUSSES, RESILIENT CHANNELS, GLASS OR MINERAL FIBER INSULATION, CEILING DAMPER, GYPSUM WALLBOARD

One layer 5/8" proprietary type X gypsum wallboard or gypsum veneer base applied at right angles to resilient framing channels 12" o.c. with 1 1/4" Type S drywall screws 8" o.c. Gypsum board end joints attached with screws 8" o.c. to additional pieces of channel 60" long located 3" back on either side of end joint. Resilient channels applied at right angles to bottom chord of pitched wood trusses 24" o.c. with 1 1/4" Type S or W screws. Glass fiber or mineral fiber batt or loose fill insulation applied directly over gypsum board. Trusses supporting 1/2" plywood or OSB roof sheathing applied at right angles to trusses with construction adhesive and 8d ring shank nails 12" o.c. Optional ceiling damper (refer to manufacturer for information on the type of damper).

PROPRIETARY GYPSUM BOARD
National Gypsum Company - 5/8" Gold Bond® Brand FIRE-SHIELD C™ Gypsum Board

Approx. Ceiling Weight: 3 pcf
Fire Test: UL R3501, 00NK42886, 8-16-01, UL Design P553

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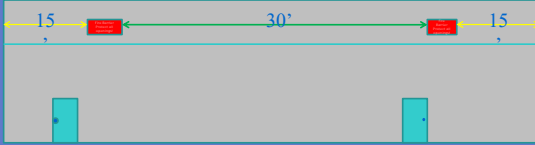
Prescriptive Fire Resistance 721

- The provisions of this section contain prescriptive details of fire-resistance-rated building elements, components or assemblies.
- The materials of construction listed in Table 720.1(1), Table 720.1(2), and Table 720.1(3) shall be assumed to have the fire-resistance ratings prescribed therein.
- Where materials that change the capacity for heat dissipation are incorporated into a fire-resistance-rated assembly, fire test results or other substantiating data shall be made available to show that the required fire-resistance rating time period is not reduced.

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703.7 – ID of Fire and Smoke Separation Walls

- "Fire and/or Smoke Barrier – Protect All Openings"
- Within 15' from end walls, 30' maximum spacing
- 3" high with 3/8" stroke
- Within accessible above ceiling spaces



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Spray-applied Fire Resistive Materials – 704.13.1

- The application of SFRM shall be consistent with the fire-resistance rating and the listing, including, but not limited to, minimum thickness and dry density of the applied SFRM, method of application, substrate surface conditions and the use of bonding adhesives, sealants, reinforcing or other materials.



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Surface Conditions 704.13.3.1

- Substrates to receive SFRM shall be free of dirt, oil, grease, release agents, loose scale and any other condition that prevents adhesion.
- The substrates shall also be free of primers, paints and encapsulants other than those fire tested and listed by a nationally recognized testing agency.
- Primed, painted or encapsulated steel shall be allowed, provided that testing has demonstrated that required adhesion is maintained.



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Temperature 704.13.4

- A minimum ambient and substrate temperature of 40°F shall be maintained during and for a minimum of 24 hours after the application of the SFRM, unless the manufacturer's installation instructions allow otherwise.



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Finished Condition 704.13.5



- The finished condition of SFRM applied to structural members or assemblies shall not, upon complete drying or curing, exhibit cracks, voids, spalls, delamination or any exposure of the substrate.
- Surface irregularities of SFRM shall be deemed acceptable.

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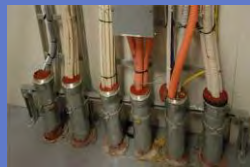
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Horizontal assemblies 714.5.1

Exceptions

2. Penetrations in a single concrete floor by steel, ferrous or copper conduits, pipes, tubes or vents with a maximum 6-inch nominal diameter, provided the concrete, grout or mortar is installed the full thickness of the floor or the thickness required to maintain the fire-resistance rating.
3. Penetrations by listed electrical boxes of any material

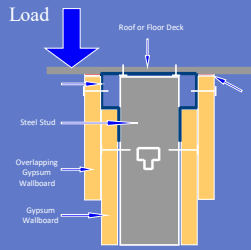


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Joint (Definition) 202



- The opening in or between adjacent assemblies that is created due to building tolerances, or is designed to allow independent movement of the building in any plane caused by thermal, seismic, wind or any other loading.

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Installation 715.2

- A fire-resistant joint system shall be securely installed in accordance with the listing criteria in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to accommodate expected building movements and to resist the passage of fire and hot gases.



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Questions?

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