

2021 Washington Building Code Complete



Shums Coda Associates, Inc.

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Instructor Steve Thomas, CBO

- 45 + years' experience in code administration
- ICBO Committees
 - Small Jurisdictions
 - Fire & Life Safety Code Development
 - Means of Egress Review
- ICC Means of Egress Code Development, Codes and Standards and Code Correlation Committees
- Author of Building Code Basics, based on 2009 & 2012 IBC, Building Code Essentials 2015 -2024 IBC, Applying Codes to Cannabis Facilities



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What are we going to discuss?

- Provide an outline of how the building code is set up
- Provide assistance in finding information in the code
- How to effectively use the code



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History of Building Codes

- Hammarabi Code –
 - 228. If a builder build a house for some one and complete it, he shall give him a fee of two shekels in money for each sar of surface.
 - 229 If a builder build a house for some one, and does not construct it properly, and the house which he built fall in and kill its owner, then that builder shall be put to death.
 - 230. If it kill the son of the owner the son of that builder shall be put to death.
 - 231. If it kill a slave of the owner, then he shall pay slave for slave to the owner of the house.
 - 232. If it ruin goods, he shall make compensation for all that has been ruined, and inasmuch as he did not construct properly this house which he built and it fell, he shall re-erect the house from his own means.
 - 233. If a builder build a house for some one, even though he has not yet completed it; if then the walls seem toppling, the builder must make the walls solid from his own means.

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History of Building Codes



- Disasters affecting the building codes in the country
 - Chicago Fire
 - Beverly Hills Country Club
 - Hyatt Hotel Walkway
 - Hurricane Andrew
 - Various Earthquake

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Code Layout

- 12 Areas
 - Administration
 - Building Planning
 - Fire Protection
 - Occupant Movement
 - Building Envelope
 - Structural Design
 - Structural Materials
 - Non-Structural Materials
 - Building Services
 - Special Conditions and Construction
 - Referenced Documents
 - Appendix Chapters

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Administrative

- Chapter 1 Administration
- Chapter 2 Definition



Building Planning

- Chapter 3 Occupancy Classification
- Chapter 4 Detailed Occupancy Requirements
- Chapter 5 Height & Area Limitations
- Chapter 6 Types of Construction



Fire Protection

- Chapter 7 Fire-Resistant Rated Construction
- Chapter 8 Interior Finishes
- Chapter 9 Fire Protection Systems

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Occupant Movement

- Chapter 10 Means of Egress
- Chapter 11 Accessibility



Building Envelope

- Chapter 12 Interior Environment
- Chapter 13 Energy Efficiency
- Chapter 14 Exterior Walls
- Chapter 15 Roofing



Structural

- Chapter 16 Structural Design
- Chapter 17 Structural Testing/Inspections
- Chapter 18 Soils/Foundations

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Structural Materials

- Chapter 19 Concrete
- Chapter 20 Aluminum
- Chapter 21 Masonry
- Chapter 22 Steel
- Chapter 23 Wood



Non-Structural Materials

- Chapter 24 Glass & Glazing
- Chapter 25 Gypsum Board & Plaster
- Chapter 26 Plastic

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Building Services

- Chapter 27 Electrical
- Chapter 28 Mechanical
- Chapter 29 Plumbing
- Chapter 30 Elevators & Conveying Systems



Special Conditions and Construction

- Chapter 31 Special Construction
- Chapter 32 Encroachment on Public Property
- Chapter 33 Construction Safeguards
- Chapter 34 Reserved

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Chapter 35 Referenced Standards



Appendices

- Only applicable if adopted by jurisdiction
- Appendix A-O

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SCOPE

101.2

- The provisions of the IBC shall apply to the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, maintenance, removal and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures.

– Except: 1-2 Family Dwellings and Townhouses (IRC)



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101.3 Purpose



- The purpose of this code is to establish the minimum requirements to provide a reasonable level of safety, health and general welfare through structural strength, means of egress, stability, sanitation, light and ventilation, energy conservation, and for providing a reasonable level of life safety and property protection from the hazards of fire, explosion or dangerous conditions, and to provide a reasonable level of safety to fire fighters and emergency responders during emergency operations.

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101.4 Referenced International Codes

- Other codes listed and referenced elsewhere in the code are considered part of the requirements of the code to the prescribed extent of each such reference.
 - Fuel Gas Code
 - Mechanical Code
 - Plumbing Code
 - Property Maintenance Code
 - Fire Code
 - Energy Code
 - Existing Building Code



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102.6 Existing structures

- The legal occupancy of any structure existing on the date of adoption of the code shall be permitted to continue without change, except as otherwise specifically provided in the code, the International Existing Building Code, the International Property Maintenance Code or the International Fire Code.



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104.10 Modifications

- Where there are practical difficulties involved in carrying out the provisions of this code, the building official shall have the authority to grant modifications for individual cases, upon application of the owner or the owner's authorized agent, provided that the building official shall first find that special individual reason makes the strict letter of this code impractical, the modification is in compliance with the intent and purpose of this code and that such modification does not lessen health, accessibility, life and fire safety or structural requirements.



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104.11 Alternative materials, design and methods of construction and equipment

- The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved.
- An alternative material, design or method of construction shall be approved where the building official finds that the proposed alternative meets all of the following:



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104.11 Alternative materials, design and methods of construction and equipment

- 1. The alternative material, design or method of construction is satisfactory and complies with the intent of the provisions of this code,
- 2. The material, method or work offered is, for the purpose intended, not less than the equivalent of that prescribed in this code as it pertains to the following:
 - 2.1. Quality.
 - 2.2. Strength.
 - 2.3. Effectiveness.
 - 2.4. Fire resistance.
 - 2.5. Durability.
 - 2.6. Safety.



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Permits Required 105.1



- Owner of agent who intends to construct, enlarge, alter, repair, move, demolish or change the occupancy of a building shall first make application to the building official and obtain the required permits.

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Permits Not Required

- Storage Sheds (120 SF)
- Fences not over 7'
- Cabinets
- Countertops
- Sidewalks/Driveways
- Painting, papering
- Movable cases & partitions



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Construction Documents

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- Prepared by registered design professional where required
- Shall be dimensioned and drawn on suitable material
- Digital format permitted when approved
- Fire protection shop drawings
- Means of Egress
- Exterior wall envelope
- Site Plan

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Required Inspections

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- Footing/Foundation
- Under-floor
- Lowest floor elevation
- Frame inspection
- Types IV A-C connections
- Lath/Gypsum board
 - except gypsum board not part of fire assembly
- Weather-exposed balcony and walking surface waterproofing
- Fire-resistant penetrations
- Energy efficiency
- Other Inspections
- Final inspections



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Chapter 2 Definitions

- Unless otherwise expressly stated, the following words and terms shall, for the purposes of this code, have the meanings shown in this chapter.



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201.3

Terms defined in other codes



- Where terms are not defined in this code and are defined in the International Energy Conservation Code, International Fuel Gas Code, International Fire Code, International Mechanical Code or International Plumbing Code, such terms shall have the meanings ascribed to them as in those codes.

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201.4 Terms not defined

- Where terms are not defined through the methods authorized by this section, such terms shall have ordinarily accepted meanings such as the context implies.



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Using the IBC

1. Classify the building
2. Review the building occupancy requirements
3. Review type of construction requirements
4. Review for conformance with means of egress and accessibility requirements
5. Review for conformance with other detailed requirements
6. Review for conformity with structural regulation and construction materials



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Using the IBC

- Classify the building
 - Occupancy Classification:
 - Compute the floor area and occupant load for the building or space being considered.
 - Determine the occupancy group for which the use of the building or space most nearly resembles.



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Chapter 3 Occupancy Classification

- Structures shall be classified into one or more of the occupancy groups listed in this section based on the nature of the hazards and risks to building occupants generally associated with the intended purpose of the building or structure.
- An area, room or space that is intended to be occupied at different times for different purposes shall comply with all applicable requirements associated with such potential multipurpose.



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Occupancy Classifications Chapter 3

- A Assembly
- B Business
- E Educational
- F Factory/Industrial
- H Hazardous
- I Institutional
- M Mercantile
- R Residential
- S Storage
- U Utility/Misc.



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Assembly Group A 303

- Assembly Group A occupancy includes, among others, the use of a building or structure, or a portion thereof, for the gathering together of persons
- Exception
 - A building or tenant space used for assembly purposes by less than 50 persons shall be considered a Group B occupancy.



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Assembly Group A

- Assembly Group A-1
 - Fixed seating, viewing of the performing arts or motion pictures
- Assembly Group A-2
 - Food and/or drink consumption
- Assembly Group A-3
 - Worship, recreation or amusement and other assembly uses not classified elsewhere in Group A



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Assembly Group A

- Assembly Group A-4
 - Viewing of indoor sporting events and activities with spectator seating
- Assembly Group A-5
 - Viewing outdoor activities



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Business Group B 304

- Business Group B occupancy includes, among others, the use of a building or structure, or a portion thereof, for office, professional or service-type transactions, including storage of records and accounts.
- Education over 12th grade



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Educational Group E 305

- Educational Group E occupancy includes, among others, the use of a building or structure, or a portion thereof, by six or more persons at any one time for educational purposes through the 12th grade.
 - Day care facilities



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Factory Industrial Group F 306

- Assembling, disassembling, fabricating, finishing, manufacturing, packaging, repair or processing operations that are not classified as a Group H hazardous or a Group S storage occupancy.
 - F-1 Moderate-Hazard
 - F-2 Low-Hazard



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High-Hazard Group H 307

- The use of a building or structure that involves the manufacturing, processing, generation or storage of materials that constitute a physical or health hazard in quantities in excess of those allowed in control areas constructed and located as required in Section 414.



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High-Hazard Group H 307



- Group H-1
 - Contain materials that pose a detonation hazard
- Group H-2 Structures
 - Contain materials that present a deflagration hazard or a hazard from accelerated burning
- Group H-3 Structures
 - Contain materials that readily support combustion or present a physical hazard

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High-Hazard Group H 307

- Group H-4 Structures
 - Contain materials that are health hazards
- Group H-5 Structures
 - Semiconductor fabrication facilities and comparable research and development areas



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Institutional Group I 308

- Includes the use of a building or structure in which people having physical limitations because of health or age are harbored for medical treatment or other care or treatment, or in which people are detained for penal or correctional purposes or in which the liberty of the occupants is restricted.



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308.3 Institutional Group I-1.

- More than 16 persons, excluding staff, who reside on a 24-hour basis in a supervised environment and receive custodial care.
 - Condition 1 –
 - All persons receiving custodial care who, without any assistance, are capable of responding to an emergency situation to complete building evacuation.
 - Condition 2 –
 - any persons receiving custodial care who require limited verbal or physical assistance while responding to an emergency situation to complete building evacuation.

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308.4 Institutional Group I-2

- Medical care on a 24-hour basis for more than five persons who are incapable of self-preservation
- Condition 1
 - Nursing and medical care but do not provide emergency care, surgery, obstetrics or in-patient stabilization units for psychiatric or detoxification
- Condition 2
 - Nursing and medical care and could provide emergency care, surgery, obstetrics or in-patient stabilization units for psychiatric or detoxification

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Institutional Group I 308



- **Group I-3 Structures**
 - Inhabited by more than five persons who are under restraint or security.
- **Group I-4 Structures**
 - Persons of any age who receive custodial care for less than 24 hours by un related individuals

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Mercantile Group M 309



- Buildings and structures or a portion thereof, for the display and sale of merchandise, and involves stocks of goods, wares or merchandise incidental to such purposes and accessible to the public.
 - Motor fuel-dispensing facilities

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Residential Group R 310

- Residential Group R-1
 - Occupants are primarily transient in nature
- Residential Group R-2
 - More than two dwelling units where the occupants are primarily permanent in nature



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Residential Group R 310



- Residential Group R-3
 - Residential occupancies where the occupants are primarily permanent
 - Buildings do not contain more than two dwelling units
 - Adult facilities for five or fewer persons of any age for less than 24 hours.
 - Childcare facilities for five or fewer persons of any age for less than 24 hours.
 - Congregate living facilities with 16 or fewer occupants
- Residential Group R-4
 - Residential Care/Assisted Living Facilities including more than five but not more than 16 occupants, excluding staff.

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Storage Group S 311



- The use of a building or structure, or a portion thereof, for storage that is not classed as a hazardous occupancy
 - Moderate Hazard S-1
 - Motor Vehicle Repair Garages
 - Low Hazard S-2
 - Parking Structures

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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
 - Fences, private garages, retaining walls



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TYPES OF CONSTRUCTION CHAPTER 6



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Type I & II Construction 602.2

- All building elements are of noncombustible materials



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Type III Construction 602.3

- Exterior walls are of noncombustible materials
- Interior Elements are of any materials
- Fire-Retardant-Treated lumber permitted within exterior walls of 2 hr. rating or less



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Type IV Construction 602.4

- Heavy Timber
- Mass Timber
- Exterior walls are of noncombustible materials
- Interior elements are of solid or laminated wood without concealed spaces



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Type V Construction 602.5

- Structural elements, exterior walls and interior walls are of any material permitted by code



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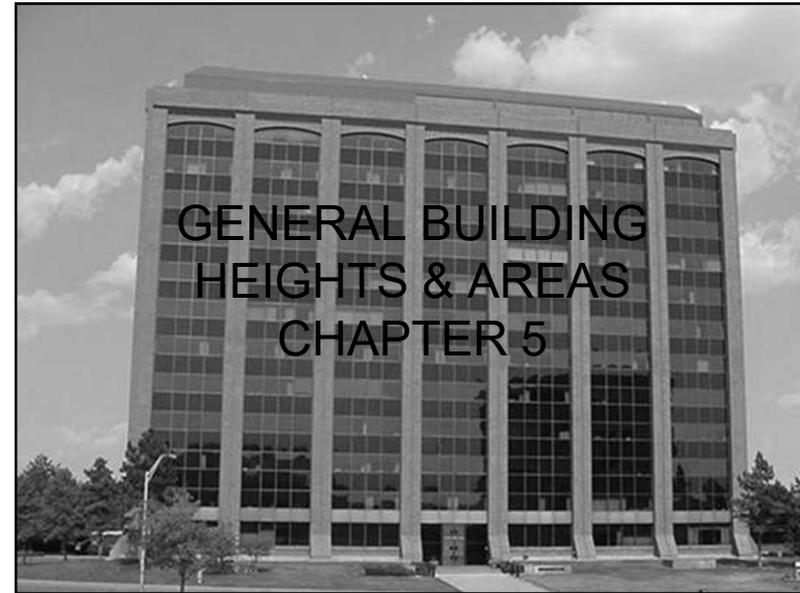
Construction Classification Table 601

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

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV				TYPE V	
	A	B	A	B	A	B	A	B	C	HT	A	B
Primary structural frame ^a (see Section 202)	3 ^{a,b}	2 ^{a,b,c}	1 ^{b,c}	0 ^c	1 ^{b,c}	0	3 ^a	2 ^a	2 ^a	HT	1 ^{b,c}	0
Bearing walls												
Exterior ^d	3	2	1	0	2	2	3	2	2	2	1	0
Interior	3 ^a	2 ^a	1	0	1	0	3	2	2	1/HT ^e	1	0
Nonbearing walls and partitions	See Table 705.5											
Exterior												
Nonbearing walls and partitions	See Section 2304.11.2											
Interior ^d	0	0	0	0	0	0	0	0	0	0	0	0
Floor construction and associated secondary structural members (see Section 202)	2	2	1	0	1	0	2	2	2	HT	1	0
Roof construction and associated secondary structural members (see Section 202)	1 1/2 ^a	1 ^{b,c}	1 ^{b,c}	0 ^c	1 ^{b,c}	0	1 1/2	1	1	HT	1 ^{b,c}	0

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504 Building Height And Number Of Stories

- The height, in feet, and the number of stories of a building shall be determined based on the type of construction, occupancy classification and whether there is an automatic sprinkler system installed throughout the building.



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504.3 Height in feet

**TABLE 504.3
ALLOWABLE BUILDING HEIGHT IN FEET ABOVE GRADE PLANE^a**

OCCUPANCY CLASSIFICATION	See Footnotes	TYPE OF CONSTRUCTION											
		Type I		Type II		Type III		Type IV			Type V		
		A	B	A	B	A	B	A	B	C	HT	A	B
A, B, E, F, M, S, U	NS ^b	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85	75	85	75	270	180	85	85	70	60
H-1, H-2, H-3, H-5	NS ^{b,d}	UL	160	65	55	65	55	120	90	65	65	50	40
	S												
H-4	NS ^{b,d}	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85	75	85	75	140	100	85	85	70	60
I-1 Condition 1, I-3	NS ^{b,d}	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85	75	85	75	180	120	85	85	70	60
I-1 Condition 2, I-2	NS ^{b,d,e}	UL	160	65		65	55	65	65	65	65	50	40
	S	UL	180	85									
I-4	NS ^{b,d}	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85	75	85	75	180	120	85	85	70	60
R ^b	NS ^b	UL	160	65	55	65	55	65	65	65	65	50	40
	S13D	60	60	60	60	60	60	60	60	60	60	60	60
	S13R	60	60	60	60	60	60	60	60	60	60	60	60
	S	UL	180	85	75	85	75	270	180	85	85	70	60

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504.4 Number of stories

TABLE 504.4
ALLOWABLE NUMBER OF STORIES ABOVE GRADE PLANE^{a,b}

OCCUPANCY CLASSIFICATION	See Footnotes	TYPE OF CONSTRUCTION												
		Type I		Type II		Type III		Type IV			Type V			
		A	B	A	B	A	B	A	B	C	HT	A	B	
A-1	NS	UL	5	3	2	3	2	3	3	3	3	3	2	1
	S	UL	6	4	3	4	3	9	6	4	4	3	2	2
A-2	NS	UL	11	3	2	3	2	3	3	3	3	3	2	1
	S	UL	12	4	3	4	3	18	12	6	4	3	2	2
A-3	NS	UL	11	3	2	3	2	3	3	3	3	3	2	1
	S	UL	12	4	3	4	3	18	12	6	4	3	2	2
A-4	NS	UL	11	3	2	3	2	3	3	3	3	3	2	1
	S	UL	12	4	3	4	3	18	12	6	4	3	2	2
A-5	NS	UL	UL	UL	UL	UL	UL	1	1	1	UL	UL	UL	UL
	S	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL
B	NS	UL	11	5	3	5	3	5	5	5	5	3	2	
	S	UL	12	6	4	6	4	18	12	9	6	4	3	
E	NS	UL	5	3	2	3	2	3	3	3	3	1	1	
	S	UL	6	4	3	4	3	9	6	4	4	2	2	
F-1	NS	UL	11	4	2	3	2	3	3	3	4	2	1	
	S	UL	12	5	3	4	3	10	7	5	5	3	2	
F-2	NS	UL	11	5	3	4	3	5	5	5	5	3	2	
	S	UL	12	6	4	5	4	12	8	6	6	4	3	

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506.2 Allowable area determination

- The allowable area of a building shall be determined in accordance with the applicable provisions of Sections 506.2.1, 506.2.2 and 506.3.
- 506.2.1 Single-occupancy buildings
- 506.2.2 Mixed-occupancy buildings
- 506.3 Frontage increase

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506.2.1 Single-occupancy buildings

Equation 5-1

- $A_a = A_t + (NS \times I_f)$
- where:
- A_a = Allowable area (square feet).
- A_t = Tabular allowable area factor (NS, S1, S13R or S13D value, as applicable) in accordance with Table 506.2.
- NS = Tabular allowable area factor in accordance with Table 506.2 for nonsprinklered building (regardless of whether the building is sprinklered).
- I_f = Area factor increase due to frontage (percent) as calculated in accordance with Section 506.3.



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506.2.1 Single-occupancy buildings

- The total allowable area of a single-occupancy building more than three stories above grade plane shall be determined in accordance with Equation 5-2:
 - $A_a = A_t + (NS \times I_f) \times S_a$
 - where:
 - $S_a = 3$ where the actual number of stories above grade plane exceeds three, or
 - $S_a = 4$ where the building is equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2.
 - The actual area of any individual floor shall not exceed the allowable area per Equation 5-1.



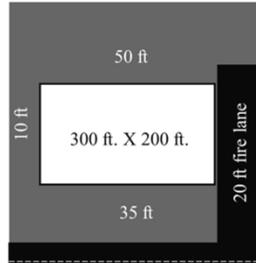
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506.3.2

Minimum frontage distance

- The frontage increase shall be based on the smallest public way or open space that is 20 feet or greater, and the percentage of building perimeter having a minimum 20 feet public way or open space.



Perimeter with > 20' yard = 800'
 Total Perimeter = 1000'
 $800/1000 = 80\%$
 Smallest Yard = 20'

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506.3.3

Amount of increase

- The area factor increase based on frontage shall be determined in accordance with Table

TABLE 506.3.3
FRONTAGE INCREASE FACTOR*

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

90% Building Perimeter
 Yard Dimension = 21' 3"
 Frontage Increase = 50%

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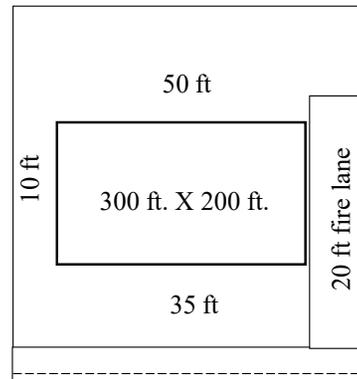
TABLE 506.2
ALLOWABLE AREA FACTOR (A_a = NS, S1, S13R, S13D or SM, as applicable) IN SQUARE FEET^{a,b}

OCCUPANCY CLASSIFICATION	SEE FOOTNOTES	TYPE OF CONSTRUCTION											
		Type I		Type II		Type III		Type IV			Type V		
		A	B	A	B	A	B	A	B	C	HT	A	B
A-1	NS	UL	UL	15,500	8,500	14,000	8,500	45,000	30,000	18,750	15,000	11,500	5,500
	S1	UL	UL	62,000	34,000	56,000	34,000	180,000	120,000	75,000	60,000	46,000	22,000
	SM	UL	UL	46,500	25,500	42,000	25,500	135,000	90,000	56,250	45,000	34,500	16,500
A-2	NS	UL	UL	15,500	9,500	14,000	9,500	45,000	30,000	18,750	15,000	11,500	6,000
	S1	UL	UL	62,000	38,000	56,000	38,000	180,000	120,000	75,000	60,000	46,000	24,000
	SM	UL	UL	46,500	28,500	42,000	28,500	135,000	90,000	56,250	45,000	34,500	18,000
A-3	NS	UL	UL	15,500	9,500	14,000	9,500	45,000	30,000	18,750	15,000	11,500	6,000
	S1	UL	UL	62,000	38,000	56,000	38,000	180,000	120,000	75,000	60,000	46,000	24,000
	SM	UL	UL	46,500	28,500	42,000	28,500	135,000	90,000	56,250	45,000	34,500	18,000
A-4	NS	UL	UL	15,500	9,500	14,000	9,500	45,000	30,000	18,750	15,000	11,500	6,000
	S1	UL	UL	62,000	38,000	56,000	38,000	180,000	120,000	75,000	60,000	46,000	24,000
	SM	UL	UL	46,500	28,500	42,000	28,500	135,000	90,000	56,250	45,000	34,500	18,000
A-5	NS												
	S1	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL
	SM												
B	NS	UL	UL	37,500	23,000	28,500	19,000	108,000	72,000	45,000	36,000	18,000	9,000
	S1	UL	UL	150,000	92,000	114,000	76,000	432,000	288,000	180,000	144,000	72,000	36,000
	SM	UL	UL	112,500	69,000	85,500	57,000	324,000	216,000	135,000	108,000	54,000	27,000
E	NS	UL	UL	26,500	14,500	23,500	14,500	76,500	51,000	31,875	25,500	18,500	9,500
	S1	UL	UL	106,000	58,000	94,000	58,000	306,000	204,000	127,500	102,000	74,000	38,000
	SM	UL	UL	79,500	43,500	70,500	43,500	229,500	153,000	95,625	76,500	55,500	28,500
F-1	NS	UL	UL	25,000	15,500	19,000	12,000	100,500	67,000	41,875	33,500	14,000	8,500
	S1	UL	UL	100,000	62,000	76,000	48,000	402,000	268,000	167,500	134,000	56,000	34,000
	SM	UL	UL	75,000	46,500	57,000	36,000	301,500	201,000	125,625	100,500	42,000	25,500

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Allowable area Determination 506



- Given:
 - Fabrication Facility
 - Type II-B Construction
 - Fire Sprinklers
 - One-Story
- $A_a = 62,000 + (15,500 * 0.48)$
 $A_a = 62,000 + 7750$
 $A_a = 69,750$

60,000 < 69,750
OK

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Unlimited Area Buildings 507

- Specific Occupancies
- Typically provided with fire sprinklers
- Large spaces around the building



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Unlimited Area Buildings 507.3

- The area of a one-story, Group B, F, M or S building or a one-story Group A-4 building of other than Type V construction shall not be limited when the building is provided with an automatic sprinkler system throughout in accordance with Section 903.3.1.1, and is surrounded and adjoined by public ways or yards not less than 60 feet in width.



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Mixed Use and Occupancy 508

- Where a building or portion thereof contains two or more occupancies or uses, the building or portion thereof shall comply with applicable provisions of this section.



67

67

Mixed Occupancies 508.1

- Where a building contains more than one occupancy group, the building shall comply with:
 - Section 508.2 (Accessory Occupancies)
 - 508.3 (Nonseparated Occupancies)
 - 508.4 (Separated Occupancies)
 - Combination of these sections.



68

68

Accessory Occupancies 508.2



- Accessory occupancies are those occupancies that are ancillary to the main occupancy of the building or portion thereof.
- Individually classified
- Less than 10% of story
- Allowable area based on main occupancy.
- No Separation between occupancies

69

69

Nonseparated Uses 508.3



- 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 provision of 403 and Chapter 9 shall apply to entire building.
- No separation is required between non-separated occupancies.

70

70

Separated Uses 508.4



- Separated occupancies shall be individually classified.
- Each fire area shall comply based on the occupancy classification of that portion of the building.

71

71

508.4.2 Allowable building area

- 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.



72

72

506.2.2 Mixed-occupancy buildings

■ 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.



Type VA Construction, sprinklered,
Separated Occ.

73

Mixed-occupancy buildings 506.2.2

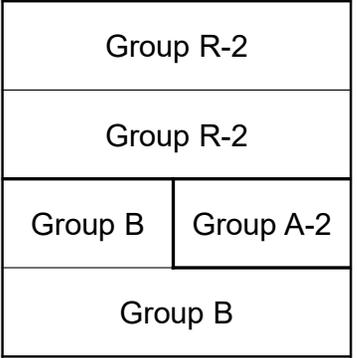
Floor	Occupancy	Actual Area	Allowable Area	Ratio
First	M	25,000	42,000	0.60
Second	A-2	25,000	35,400	0.71
Third	R-2	25,000	36,000	0.69
Fourth	R-2	20,000	36,000	0.69

$0.60 + 0.71 + 0.69 + 0.69 = 2.69 < 3$

No yard increase used

74

Separation 508.4.4



■ Individual occupancies shall be separated from adjacent occupancies in accordance with Table 508.4

- Fire barriers (706)
- Horizontal Assembly (711)

75

Required Separation Table 508.4

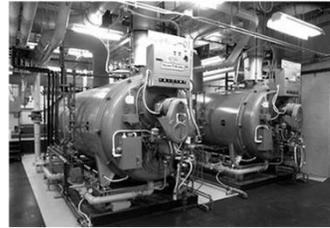
TABLE 508.4
REQUIRED SEPARATION OF OCCUPANCIES (HOURS)¹

OCCUPANCY	A, E		I-1, I-3, I-4		I-2		R'		F-2, S-2 ² , U		B ³ , F-1, M, S-1		H-1		H-2		H-3, H-4		H-5		
	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	
A, E	N	N	1	2	2	NP	1	2	N	1	1	2	NP	NP	3	4	2	3	2	NP	
I-1 ¹ , I-3, I-4	1	2	N	N	2	NP	1	NP	1	2	1	2	NP	NP	3	NP	2	NP	2	NP	
I-2	2	NP	2	NP	N	N	2	NP	2	NP	2	NP	NP	NP	3	NP	2	NP	2	NP	
R'	1	2	1	NP	2	NP	N	N	1 ¹	2 ²	1	2	NP	NP	3	NP	2	NP	2	NP	
F-2, S-2 ² , U	N	1	1	2	2	NP	1 ¹	2 ²	N	N	1	2	NP	NP	3	4	2	3	2	NP	
B ³ , F-1, M, S-1	1	2	1	2	2	NP	1	2	1	2	N	N	NP	NP	2	3	1	2	1	NP	
H-1	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	N	NP	NP	NP	NP	NP	NP	NP	
H-2	3	4	3	NP	3	NP	3	NP	3	4	2	3	NP	NP	N	NP	1	NP	1	NP	
H-3, H-4	2	3	2	NP	2	NP	2	NP	2	3	1	2	NP	NP	1	NP	1 ¹	NP	1	NP	
H-5	2	NP	2	NP	2	NP	2	NP	2	NP	1	NP	NP	NP	1	NP	1	NP	N	NP	

76

509.1 Incidental uses

- Incidental uses located within single occupancy or mixed occupancy buildings shall comply with the provisions of this section.
- Incidental uses are ancillary functions associated with a given occupancy that generally pose a greater level of risk to that occupancy and are limited to those uses listed in Table 509.1.



77

77

(TABLE 509.1
INCIDENTAL USES)

ROOM OR AREA	SEPARATION AND/OR PROTECTION
Furnace room where any piece of equipment is over 400,000 Btu per hour input	1 hour or provide automatic sprinkler system
Rooms with boilers where the largest piece of equipment is over 15 psi and 10 horsepower	1 hour or provide automatic sprinkler system
Refrigerant machinery room	1 hour or provide automatic sprinkler system
Hydrogen fuel gas rooms, not classified as Group H	1 hour in Group B, F, M, S and U occupancies; 2 hours in Group A, E, I and R occupancies.
Incinerator rooms	2 hours and provide automatic sprinkler system
Paint shops, not classified as Group H, located in occupancies other than Group F	2 hours; or 1 hour and provide automatic sprinkler system
In Group E occupancies, laboratories and vocational shops not classified as Group H	1 hour or provide automatic sprinkler system
In Group I-2 occupancies, laboratories not classified as Group H	1 hour and provide automatic sprinkler system
In ambulatory care facilities, laboratories not classified as Group H	1 hour or provide automatic sprinkler system
Laundry rooms over 100 square feet	1 hour or provide automatic sprinkler system
In Group I-2, laundry rooms over 100 square feet	1 hour
Group I-3 cells and Group I-2 patient rooms equipped with padded surfaces	1 hour
In Group I-2, physical plant maintenance shops	1 hour
In ambulatory care facilities or Group I-2 occupancies, waste and linen collection rooms with containers that have an aggregate volume of 10 cubic feet or greater	1 hour
In other than ambulatory care facilities and Group I-2 occupancies, waste and linen collection rooms over 100 square feet	1 hour or provide automatic sprinkler system
In ambulatory care facilities or Group I-2 occupancies, storage rooms greater than 100 square feet	1 hour
Electrical installations and transformers	See Sections 110.26 through 110.34 and Sections 450.8 through 450.48 of NFPA 70 for protection and separation requirements.

Dry-type transformers over 112.5 kVA and required to be in a fire-resistant room per NEC – 1-hour or provide automatic sprinklers.

78

78

509.4.1 Separation

- 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 or a horizontal assembly, or both.
- 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.

GA FILE NO. WP 1070	GENERIC	1 HOUR FIRE	45 to 49 STC SOUND
GYPSUM WALLBOARD, STEEL STUDS, MINERAL FIBER INSULATION			
<p>One layer 1/2" type X gypsum wallboard or gypsum veneer base applied parallel to each side of 2x4" steel studs 24" o.c. with 1" Type S drywall screws 8" o.c. at vertical joints and 12" o.c. at intermediate studs, 2" mineral fiber insulation, 2.5 pcf, friction fit in stud space. Also fire tested with 1 1/2" mineral fiber insulation, 3.0 pcf, stapled to board in stud space.</p> <p>Joints staggered 24" on opposite sides. (NLB)</p>			
		Thickness: 3 1/2"	
		Approx. Weight: 5 pcf	
		Fire Test: FM WP 51-1, 9-22-66;	
		OSU T-3362, 11-23-65	
		Sound Test: RAL TL69-42, 10-17-68	

79

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509.4.2 Protection

- Where Table 509 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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Special Detailed Requirements Based On Use And Occupancy Chapter 4



81

81

High-Rise Buildings 403

- A building with an occupied floor located more than 75 feet above the lowest level of fire department vehicle access.
- For the purposes of this definition, an occupied roof with an occupant load of 50 or more is considered to be an occupied floor.



82

82

Atriums 404.1



- The provisions of Sections 404.1 through 404.11 shall apply to buildings containing atriums.
- Atriums are not permitted in buildings or structures classified as Group H.
 - Exception: Vertical openings that comply with Sections 712.1.1 through 712.1.3, and Sections 712.1.9 through 712.1.14.

83

83

Motor-Vehicle-Related Occupancies 406



- Private garages/carports
- Public parking structures
- Open parking garages
- Enclosed parking garages
- Motor fuel-dispensing facilities
- Repair garages

84

84

Hazardous Materials 414



- Control areas
- Ventilation
- Hazardous materials systems
- Inside storage, dispensing and use
- Outdoor storage, dispensing and use
- References IFC

85

85

FIRE RESISTANCE-RATED CONSTRUCTION CHAPTER 7



86

86

703.2.1 Tested assemblies

- A fire-resistance rating of building elements, components or assemblies shall be determined by the test procedures set forth in ASTM E119 or UL 263.
- The fire-resistance rating of penetrations and fire-resistant joint systems shall be determined in accordance with Sections 714 and 715, respectively.



87

87

Analytical Methods 703.2.2



- Fire-resistance designs documented in sources.
- Prescriptive designs as prescribed in Section 721.
- Calculations in accordance with Section 722.
- Engineering analysis
- Fire-resistance designs certified by an approved agency.
- Approved alternate method

88

88

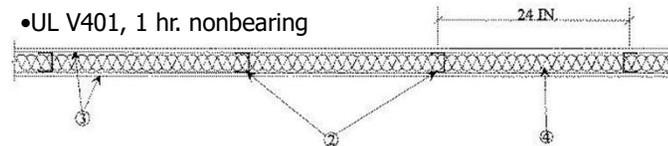
Prescriptive Designs 721 (Tables 721.1(1) - 721.1(3))

RATED FIRE-RESISTANCE PERIODS FOR VARIOUS WALLS AND PARTITIONS ^{A-D,P}

MATERIAL	ITEM NUMBER	CONSTRUCTION	MINIMUM FINISHED THICKNESS FACE-TO-FACE ^a (inches)			
			4 hour	3 hour	2 hour	1 hour
13. Noncombustible studs — interior partition with gypsum wallboard each side	13-1.1	0.018 inch (No. 25 carbon sheet steel gage) channel-shaped studs 24" on center with one full-length layer of 5/8" Type X gypsum wallboard ^d applied vertically attached with 1" long No. 6 drywall screws to each stud. Screws are 8" on center around the perimeter and 12" on center on the intermediate stud. The wallboard may be applied horizontally when attached to 3 1/2" studs and the horizontal joints are staggered with those on the opposite side. Screws for the horizontal application shall be 8" on center at vertical edges and 12" on center at intermediate studs.				2 7/8"
	13-1.2	0.018 inch (No. 25 carbon sheet steel gage) channel-shaped studs 25" on center with two full-length layers of 1/2" Type X gypsum wallboard ^d applied vertically each side. First layer attached with 1" long, No. 6 drywall screws, 8" on center around the perimeter and 12" on center on the intermediate stud. Second layer applied with vertical joints offset one stud space from first layer using 1 1/2" long, No. 6 drywall screws spaced 9" on center along vertical joints, 12" on center at intermediate studs and 24" on center along top and bottom runners.			3 3/8"	

89

89



- Floor and Ceiling Runners** Steel channels, 1 in. deep by 2-1/2 in. wide, fabricated from No. 25 MSG galv steel, attached to concrete or masonry with fasteners 24 in. on centers.
- Steel Studs** 2-1/2 in. wide with 1-3/8 in. legs, 1/4 in. flange in legs, fabricated from No. 25 ga galv steel, 1-1/2 in. wide by 1-3/4 in. high conduit cutouts spaced 24 in. OC. Studs 1/2 in. less in length than assembly height.
- Gypsum Board*** 1/2 in. thick, paper or vinyl surfaced. Wallboard sheets applied vertically or horizontally with vertical joints located over studs attached to studs with 1 in. self-drilling, self-tapping steel screws located 12 in. OC in the field and 8 in. OC at joints. Joints covered with paper tape and joint compound. Exposed screw heads covered with joint compound. **NATIONAL GYPSUM CO** — Types FSW-1, FSW-G and FSW-C.
- Batts and Blankets*** 2 in. thick batts, supplied in 24 in. widths, placed to fill interior of wall. Any mineral wool batt bearing the UL Classification Marking as to Fire Resistance. See Batts and Blankets (BZJZ) Category For Names of Classified Companies.
- 4A. Fiber, Sprayed*** As an alternate to Batts and Blankets (Item 4) — Spray applied cellulose insulation material. The fiber is applied with water to completely fill the enclosed cavity in accordance with the application instructions supplied with the product. Nominal dry density of 3.0 lb/ft³.
U S GREENFIBER L L C — Cocoon stabilized cellulose insulation.

90

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Fire-Resistance Rating of Structural Members – 704.1

- The fire-resistance ratings of structural members and assemblies shall comply with this section and the requirements for the type of construction as specified in Table 601.
- The fire-resistance ratings shall be not less than the ratings required for the fire-resistance-rated assemblies supported by the structural members.
 - Exception: Fire barriers, fire partitions, smoke barriers and horizontal assemblies as provided in Sections 707.5, 708.4, 709.4 and 711.2, respectively.



91

91

Individual Protection 704.2 & 704.3

- Individual Protection Required
 - Columns
 - Member supporting more than two floors
 - or one floor and roof,
 - or support a load-bearing wall
 - or a non load-bearing wall more than two stories high



92

92

705.5

Exterior Wall Fire-resistance ratings

- Exterior walls shall be fire-resistance rated in accordance with Table 601, based on the type of construction, and Table 705.5, based on the fire separation distance.

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

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

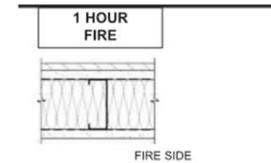
93

93

705.5

Fire-resistance ratings

- The required fire-resistance rating of exterior walls with a fire separation distance of greater than 10 feet shall be rated for exposure to fire from the inside.
- The required fire-resistance rating of exterior walls with a fire separation distance of less than or equal to 10 feet shall be rated for exposure to fire from both sides.



Thickness: 4 1/4"
Approx. Weight: 6 psf
Fire Test: UL R3660/R15187, 01NK21103, 2-4-02; ULR6937, 07NK08079, 9-19-08; UL Design U425

94

94

705.8.1

Allowable area of openings

- The maximum area of unprotected and protected openings permitted in an exterior wall in any story of a building shall not exceed the percentages specified in Table 705.8 based on the fire separation distance if each individual story.



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**TABLE 705.8
MAXIMUM AREA OF EXTERIOR WALL OPENINGS BASED ON FIRE SEPARATION DISTANCE AND DEGREE OF OPENING PROTECTION**

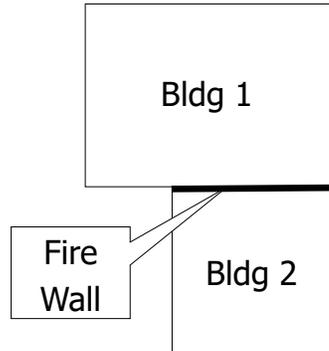
FIRE SEPARATION DISTANCE (feet)	DEGREE OF OPENING PROTECTION	ALLOWABLE AREA ^a
0 to less than 3 ^{b, c}	Unprotected, Nonsprinklered (UP, NS)	Not Permitted
	Unprotected, Sprinklered (UP, SP)	Not Permitted
	Protected (P)	Not Permitted
3 to less than 5 ^{d, e}	Unprotected, Nonsprinklered (UP, NS)	Not Permitted
	Unprotected, Sprinklered (UP, SP)	15%
	Protected (P)	15%
5 to less than 10 ^{f, g}	Unprotected, Nonsprinklered (UP, NS)	10% ^h
	Unprotected, Sprinklered (UP, SP)	25%
	Protected (P)	25%
10 to less than 15 ^{f, g, h}	Unprotected, Nonsprinklered (UP, NS)	15% ^h
	Unprotected, Sprinklered (UP, SP)	45%
	Protected (P)	45%
	Unprotected, Nonsprinklered (UP, NS)	25%
15 to less than 20 ^{f, h}	Unprotected, Sprinklered (UP, SP)	75%
	Protected (P)	75%
	Unprotected, Nonsprinklered (UP, NS)	45%
20 to less than 25 ^{f, h}	Unprotected, Sprinklered (UP, SP)	No Limit
	Protected (P)	No Limit
	Unprotected, Nonsprinklered (UP, NS)	70%
25 to less than 30 ^{f, h}	Unprotected, Sprinklered (UP, SP)	No Limit
	Protected (P)	No Limit
	Unprotected, Nonsprinklered (UP, NS)	No Limit
30 or greater	Unprotected, Sprinklered (UP, SP)	Not Required
	Protected (P)	Not Required
	Unprotected, Nonsprinklered (UP, NS)	Not Required

96

96

503.1 Fire Walls

- For the purposes of determining area limitations, height limitations and type of construction, each portion of a building separated by one or more fire walls complying with Section 706 shall be considered to be a separate building.



97

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706.2 Structural Stability

- 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.



98

98

706.3 Materials

- Fire walls that separate a building of Type I or II construction from a building of any construction type shall be of any approved noncombustible materials.
- Other fire walls shall be built of materials consistent with the types permitted for the type of construction of the building.



99

99

Table 706.4 Fire Resistance Rating

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.

100

100

Fire Wall Continuity

- 706.5 Horizontal continuity.
 - 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.
 - Exceptions
- 706.6 Vertical continuity.
 - Fire walls shall extend from the foundation to a termination point not less than 30 inches above both adjacent roofs.
 - Exceptions



101

101

706.8 Fire Wall Openings

- Section 716.1
- Each opening limited to 120 square feet
- Aggregate width at any floor limited to 25 % of length of wall

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

TYPE OF ASSEMBLY	REQUIRED WALL ASSEMBLY RATING (hours)	MINIMUM FIRE DOOR AND FIRE SHUTTER ASSEMBLY RATING (hours)	DOOR VISION PANEL SIZE ^a	FIRE-RATED GLAZING MARKING DOOR VISION PANEL ^{b,c}	MINIMUM SIDELIGHT/TRANSOM ASSEMBLY RATING (hours)		FIRE-RATED GLAZING MARKING SIDE-LIGHT/TRANSOM PANEL	
					Fire protection	Fire resistance	Fire protection	Fire resistance
Fire walls and fire barriers having a required fire-resistance rating greater than 1 hour	4	3	See Note a	D-H-W-240	Not Permitted	4	Not Permitted	W-240
	3	3 ^d	See Note a	D-H-W-180	Not Permitted	3	Not Permitted	W-180
	2	1½	100 sq. in.	≤100 sq. in. = D-H-90 >100 sq. in. = D-H-W-90	Not Permitted	2	Not Permitted	W-120
	1½	1½	100 sq. in.	≤100 sq. in. = D-H-90 >100 sq. in. = D-H-W-90	Not Permitted	1½	Not Permitted	W-90

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707 Fire Barriers

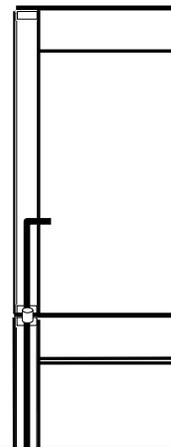


- Shaft Enclosures
- Interior Exit Stairway/ramp
- Exit access stairway/ramp enclosures
- Exit passageways
- Horizontal exits
- Atriums
- Incidental uses
- Control areas
- Separated occupancies
- Fire areas

103

103

707.5 Fire Barrier Continuity



- Fire barriers shall extend from the top of the floor/ceiling assembly below to the underside of the floor or roof slab or deck above
- Continuous through concealed spaces such as suspended ceilings

104

104

707.5.1 Supporting construction

- The supporting construction for a fire barrier shall be protected to afford the required fire-resistance rating of the fire barrier supported.
- Hollow vertical spaces within a fire barrier shall be fireblocked in accordance with Section 718.2 at every floor level.



105

105

708 Fire Partitions

- Group I-1 & R separations
- Tenant separations in mall buildings
- Corridor walls
- Elevator lobbies
- Egress balconies
- Ambulatory care facilities
- Exit discharge vestibules

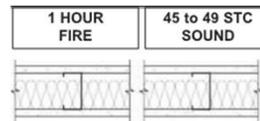


106

106

708.3 Fire-resistance rating

- Fire partitions shall have a fire-resistance rating of not less than 1 hour.



Thickness: 3 1/2"
 Approx. Weight: 5 psf
 Fire Test: FM WP 51-1, 9-22-66;
 OSU T-3362, 11-23-65
 Sound Test: RAL TL69-42, 10-17-68

- Exceptions

107

107

708.4 Continuity

- Fire partitions shall extend from the top of the foundation or floor/ceiling assembly below and be securely attached to one of the following:
 - 1. The underside of the floor or roof sheathing, deck or slab above.
 - 2. The underside of a floor/ceiling or roof/ceiling assembly having a fire-resistance rating that is not less than the fire-resistance rating of the fire partition.



108

108

709 Smoke Barriers

- 1-hour fire-resistance rated
- Continuous from outside wall to outside wall and slab to floor/roof deck above
- Supporting structure, the same
- 20-minute opening protectives
- Except I-2 occupancies where doors are installed across the corridors

HOSPITAL COMPARTMENTATION

109

109

710 Smoke Partitions

- Glass atrium separation
- I-2 corridor walls
- Elevator lobbies in sprinklered buildings

110

110

711 Floor and roof assemblies

- Horizontal assemblies shall comply with Section 711.2. Nonfire-resistance-rated floor and roof assemblies shall comply with Section 711.3.

111

111

711.2.4 Fire-resistance rating

- The fire-resistance rating of horizontal assemblies shall comply with Sections 711.2.4.1 through 711.2.4.6 but shall be not less than that required by the building type of construction.
 - Separating mixed occupancies
 - Separating fire areas
 - Dwelling unit and sleeping unit separations
 - Separating smoke compartments
 - Separating incidental uses
 - Other separations

1 HOUR FIRE	50 to 54 STC SOUND
----------------	-----------------------

Approx. Ceiling Weight: 5 psf
Fire Test: NRCC A-4440.1 (Revised), 6-24-97
Sound Test: NRCC B-3150.2, 6-30-00 (65 C & P)
IIC & Test: NRCC B-3150.2, 6-30-00

112

112

712 Vertical Openings



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

113

113

712.1.1 Shaft enclosures

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



114

114

713.4 Fire-Resistance Rating



- Four stories or more
 - two-hour
- Less than four stories
 - one-hour
- Includes basements, but not mezzanines
- Not less than the floor assembly penetrated, but need not exceed 2 hours

115

115

712.1.7 Atriums

- Atriums complying with Section 404 that connect two or more stories in Group I-2 or I-3 occupancies or three or more stories in other occupancies shall be permitted.

- Exceptions



116

116

712.1.9 Two-story openings



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

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

117

117

714.1 Penetrations

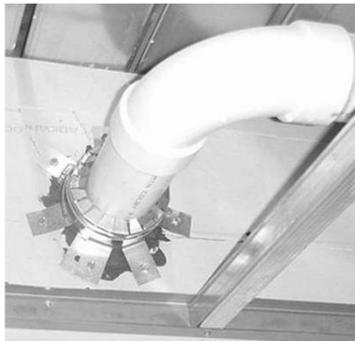
- The provisions of this section shall govern the materials and methods of construction used to protect through penetrations and membrane penetrations



118

118

714.4 Fire-Resistance-Rated Walls



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

119

119

714.5 Horizontal assemblies



- Penetrations of a fire-resistance-rated floor, floor/ceiling assembly or the ceiling membrane of a roof/ceiling assembly not required to be enclosed in a shaft by Section 712.1 shall be protected in accordance with Sections 714.5.1 through 714.5.4.

120

120

Joint

- 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.



NOT A JOINT!

121

121

715 Fire-Resistant Joint System

- Joints installed in or between fire-resistance-rated walls, floor or floor/ceiling assemblies and roofs or roof/ceiling assemblies shall be protected by an approved fire-resistant joint system designed to resist the passage of fire for a time period not less than the required fire-resistance rating of the wall, floor or roof in or between which the system is installed.
- Exceptions



122

122

716.1 Opening Protectives

- Opening protectives required by other sections of this code shall comply with the provisions of this section and shall be installed in accordance with NFPA 80.



123

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716.1(2) – Opening Protection

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

TYPE OF ASSEMBLY	REQUIRED WALL ASSEMBLY RATING (hours)	MINIMUM FIRE DOOR AND FIRE SHUTTER ASSEMBLY RATING (hours)	DOOR VISION PANEL SIZE ^a	FIRE-RATED GLAZING MARKING DOOR VISION PANEL ^{b,c}	MINIMUM SIDELIGHT/TRANSOM ASSEMBLY RATING (hours)		FIRE-RATED GLAZING MARKING SIDE-LIGHT/TRANSOM PANEL	
					Fire protection	Fire resistance	Fire protection	Fire resistance
Other fire barriers	1	1/4	Maximum size tested	D-H	1/4 ^a		D-H ^b	
Fire partitions: Corridor walls	1	1/2 ^a	Maximum size tested	D-20	1/2 ^a		D-H-OH-45	
	0.5	1/2 ^a	Maximum size tested	D-20	1/2		D-H-OH-20	
Other fire partitions	1	1/4	Maximum size tested	D-H-45	1/4		D-H-45	
	0.5	1/4	Maximum size tested	D-H-20	1/4		D-H-20	
Exterior walls	3	1 1/2	100 sq. in. ^c	≤100 sq. in. = D-H-90	Not Permitted	3	Not Permitted	W-180
				>100 sq. in. = D-H-W-90				
	2	1 1/2	Maximum size tested	D-H-90 or D-H-W-90	1 1/2 ^a	2	D-H-OH-90 ^b	W-120
					Fire protection			
1	1/4	Maximum size tested	D-H-45	1/4 ^a		D-H-45 ^b		
Smoke barriers	1	1/4	Maximum size tested	D-20	Fire protection		D-H-OH-45	
					1/4			

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716.1(3) – Fire Windows

TABLE 716.1(3)
FIRE WINDOW ASSEMBLY FIRE PROTECTION RATINGS

TYPE OF WALL ASSEMBLY	REQUIRED WALL ASSEMBLY RATING (hours)	MINIMUM FIRE WINDOW ASSEMBLY RATING (hours)	FIRE-RATED GLAZING MARKING
Interior walls			
Fire walls	All	NP ^a	W-XXX ^b
Fire barriers	>1	NP ^a	W-XXX ^b
	1	NP ^a	W-XXX ^b
Atrium separations (Section 707.3.6), Incidental use areas (Section 707.3.7), ^c Mixed occupancy separations (Section 707.3.9)	1	1/4	OH-45 or W-60
Fire partitions	1	1/4	OH-45 or W-60
	0.5	1/5	OH-20 or W-30
Smoke barriers	1	1/4	OH-45 or W-60
	>1	1 1/2	OH-90 or W-XXX ^b
Exterior walls	1	3/4	OH-45 or W-60
	0.5	1/3	OH-20 or W-30
Party wall	All	NP	Not Applicable

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716.2.6.1 Door Closing



- Fire doors shall be latching and self- or automatic-closing in accordance with this section.
 - Exceptions:
 - 1. Fire doors located in common walls separating sleeping units in Group R-1 shall be permitted without automatic- or self-closing devices.
 - 2. The elevator car doors and the associated hoistway enclosure doors at the floor level designated for recall in accordance with Section 3003.2 shall be permitted to remain open during Phase I emergency recall operation.
 - 3. In Group I-1, Condition 2 Assisted living facilities with 5 conditions

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716.2.6.2 Latch required



- Unless otherwise specifically permitted, single side-hinged swinging fire doors and both leaves of pairs of side-hinged swinging fire doors shall be provided with an active latch bolt that will secure the door when it is closed.

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716.2.9.1 Labeling Requirements



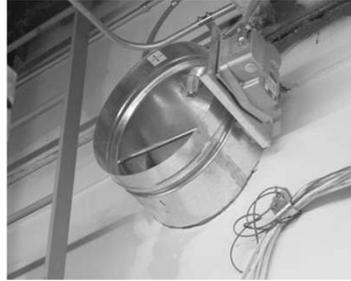
- Fire doors shall be labeled showing the name of the manufacturer or other identification readily traceable back to the manufacturer, the name or trademark of the third-party inspection agency, the fire protection rating and, where required for fire doors in interior exit stairways and ramps and exit passageways by Section 716.5.5, the maximum transmitted temperature end point.

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717.1 Ducts And Air Transfer Openings

- The provisions of this section shall govern the protection of duct penetrations and air transfer openings in assemblies required to be protected and duct penetrations in nonfire-resistance-rated floor assemblies.

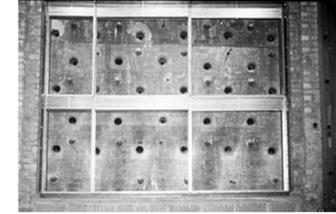


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717.5 Where Required

- Fire Walls
 - Fire damper
- Fire Barriers
 - Fire damper*
- Shaft Enclosures
 - Fire/smoke damper*
- Fire Partitions
 - Fire damper*
- Corridors
 - Smoke damper*
- Smoke Barriers
 - Smoke damper*
- Horizontal Assemblies
 - Shaft enclosure*



*contains exceptions

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718.2 Fireblocking

- 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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718.3 Draftstopping In Floors

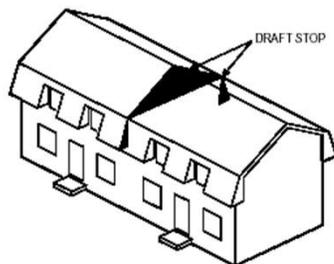
- Draftstopping shall be installed to subdivide floor/ceiling assemblies where required by Section 708.4.2. In other than Group R occupancies, draftstopping shall be installed to subdivide combustible floor/ceiling assemblies so that horizontal floor areas do not exceed 1,000 square feet (93 m²).



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718.4 Draftstopping In Attics



- In combustible construction, draftstopping shall be installed to subdivide attic spaces and concealed roof spaces

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803.1.1 Interior wall and ceiling finish materials per NFPA 286

- Interior wall and ceiling finish materials shall be classified in accordance with NFPA 286 and comply with Section 803.1.1.1.
- Materials complying with Section 803.1.1.1 shall be considered to also comply with the requirements of Class A.

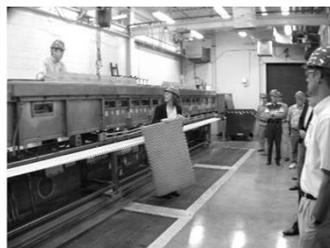


134

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803.1.2 - Interior wall and ceiling finish materials per ASTM E84 or UL 723

- Interior wall and ceiling finish materials shall be classified in accordance with ASTM E 84 or UL 723.
 - Class A:= Flame spread index 0-25; smoke developed index 0-450.
 - Class B:= Flame spread index 26-75; smoke developed index 0-450.
 - Class C:= Flame spread index 76-200; smoke developed index 0-450.



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803.13 - Interior finish requirements based on occupancy

- Interior wall and ceiling finish shall have a flame spread index not greater than that specified in Table 803.13 for the group and location designated.
- Interior wall and ceiling finish materials tested in accordance with NFPA 286 and meeting the acceptance criteria of Section 803.1.1.1, shall be permitted to be used where a Class A classification in accordance with ASTM E84 or UL 723 is required.



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Table 803.13 Interior finish

- Interior wall and ceiling finish shall have a flame spread index not greater than that specified in Table 803.13 for the group and location designated.

TABLE 803.13
INTERIOR WALL AND CEILING FINISH REQUIREMENTS BY OCCUPANCY*

GROUP	SPRINKLERED			NONSPRINKLERED		
	Interior exit stairways and ramps and exit passageways ^{a, b}	Corridors and enclosures for exit access stairways and ramps	Rooms and enclosed spaces ^c	Interior exit stairways and ramps and exit passageways ^{a, b}	Corridors and enclosures for exit access stairways and ramps	Rooms and enclosed spaces ^c
A-1 & A-2	B	B	C	A	A ^c	B ^c
A-3 ^d , A-4, A-5	B	B	C	A	A ^c	C
B, E, M, R-1	B	C ^e	C	A	B	C
R-4	B	C	C	A	B	B
F	C	C	C	B	C	C
H	B	B	C ^e	A	A	B
I-1	B	C	C	A	B	B
I-2	B	B	B ^{h, i}	A	A	B
I-3	A	A ⁱ	C	A	A	B
I-4	B	B	B ^{h, i}	A	A	B
R-2	C	C	C	B	B	C
R-3	C	C	C	C	C	C
S	C	C	C	B	B	C
U	No restrictions			No restrictions		

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903 Automatic Sprinkler Systems



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202 Definitions

FIRE AREA

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



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903.2.1.2 Group A-2 Sprinklers



- One of the following
 - Fire area exceeds 5,000 sq. ft.
 - Fire area with occupant load 100 or more
 - Fire area on floor other than exit discharge
- Nightclubs

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903.2.7 Group M Sprinklers



- Fire area exceeds 12,000 sq. ft.
- Fire area more than 3 stories above grade plane
- Combined fire area exceeds 24,000 sq. ft.
- High-piled storage
- Upholstered furniture display & sale area exceeds 2,500 sq. ft.

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903.2.8 Group R Sprinklers



- All Group R occupancies



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903.3 Installation Requirements



- 903.3.1.1
 - NFPA 13
- 903.3.1.2
 - NFPA 13 R
- 903.3.1.3
 - NFPA 13 D

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907 Fire Alarm & Detection Systems

- An approved automatic fire detection system shall be installed in accordance with the provisions of this code and NFPA 72.
- The automatic fire detectors shall be smoke detectors, except that an approved alternative type of detector shall be installed in spaces such as boiler rooms where, during normal operation, products of combustion are present in sufficient quantity to actuate a smoke detector.



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907.2.1 Group A

- A manual fire alarm system that activates the occupant notification system shall be installed in Group A occupancies where the occupant load due to the assembly occupancy is 300 or more,
- or where the Group A occupant load is more than 100 persons above or below the lowest level of exit discharge.
- Group A occupancies not separated from one another in accordance with Section 707.3.10 shall be considered as a single occupancy for the purposes of applying this section.



– Sprinkler exception

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907.2.8.2 Group R-1 - Automatic smoke detection system

- An automatic smoke detection system that activates the occupant notification system in accordance with Section 907.5 shall be installed throughout all interior corridors serving sleeping units.



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907.2.8.3 Smoke alarms

- Single- and multiple-station smoke alarms shall be installed in accordance with Section 907.2.11.

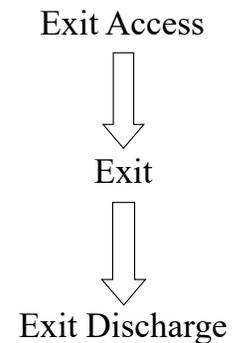


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Means of Egress Chapter 10

- A continuous and unobstructed path of vertical and horizontal egress travel from any point in a building or structure to a public way.



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Design Occupant Load 1004

- Actual number of occupants
- Number by Table 1004.1
 - Gross Floor Area
 - Net Floor Area
- Number by combination
 - Accessory space through primary space



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1004.5 Areas without fixed seating

- The number of occupants shall be computed at the rate of one occupant per unit of area as prescribed in Table 1004.5.
- For areas without fixed seating, the occupant load shall be not less than that number determined by dividing the floor area under consideration by the occupant load factor assigned to the function of the space as set forth in Table 1004.5.
- Where an intended function is not listed in Table 1004.5, the building official shall establish a function based on a listed function that most nearly resembles the intended function.

**TABLE 1004.5
MAXIMUM FLOOR AREA ALLOWANCES PER OCCUPANT**

FUNCTION OF SPACE	OCCUPANT LOAD FACTOR ^a
Accessory storage areas, mechanical equipment room	300 gross
Agricultural building	300 gross
Aircraft hangars	500 gross
Airport terminal	
Baggage claim	20 gross
Baggage handling	300 gross
Concourse	100 gross
Waiting areas	15 gross
Assembly	
Gaming floors (keno, slots, etc.)	11 gross
Exhibit gallery and museum	30 net
Assembly with fixed seats	See Section 1004.6
Assembly without fixed seats	
Concentrated (chairs only—not fixed)	7 net
Standing space	5 net
Unconcentrated (tables and chairs)	15 net
Bowling centers, allow 5 persons for each lane including 15 feet of runway, and for additional areas	7 net
Business areas	150 gross
Concentrated business use areas	See Section 1004.8
Courtrooms—other than fixed seating areas	40 net

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1004.6 Fixed seating

- For areas having fixed seats and aisles, the occupant load shall be determined by the number of fixed seats installed therein.
- Fixed seating without dividing arms
 - one person for each 18 inches of seating length.
- Seating booths
 - one person for each 24 inches of booth seat length measured at the backrest of the seating booth.



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1005 Egress Width

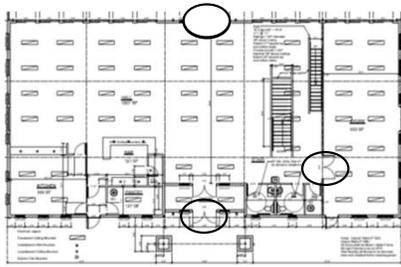
- Stairways
 - 0.3 inches per occupant
 - 0.2 inches per occupant if sprinklers and VACS is provided
- Other egress components
 - 0.2 inches per occupant
 - 0.15 inches per occupant if sprinklers and VACS is provided



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Distribution of egress capacity 1005.5

- Where more than one exit, or access to more than one exit, is required, the means of egress shall be configured such that the loss of any one exit, or access to one exit, shall not reduce the available capacity to less than 50 percent of the required capacity.



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1006.1

Number of exits and exit access doorways

- The number of exits or exit access doorways required within the means of egress system shall comply with the provisions of **Section 1006.2 for spaces**, including mezzanines, and **Section 1006.3 for stories**.

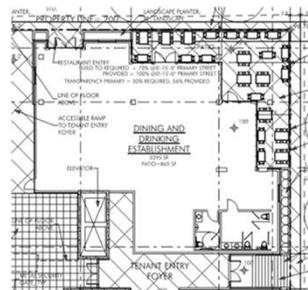


158

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1006.2.1 - Egress based on occupant load and common path of egress travel distance

- 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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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		
		OL ≤ 30	OL > 30	
A ^c , E, M	49	75	75	75 ^a
B	49	100	75	100 ^a
F	49	75	75	100 ^a
H-1, H-2, H-3	3	NP	NP	25 ^b
H-4, H-5	10	NP	NP	75 ^b
I-1, I-2 ^c , I-4	10	NP	NP	75 ^a
I-3	10	NP	NP	100 ^a
R-1	10	NP	NP	75 ^a
R-2	10	NP	NP	125 ^a
R-3 ^a	10	NP	NP	125 ^a
R-4 ^a	10	75	75	125 ^a
S ^d	29	100	75	100 ^a
U	49	100	75	75 ^a

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1006.2.1.1 - Three or more exits or exit access doorways

- Three exits or exit access doorways shall be provided from any space with an occupant load of 501 to 1,000.
- Four exits or exit access doorways shall be provided from any space with an occupant load greater than 1,000.



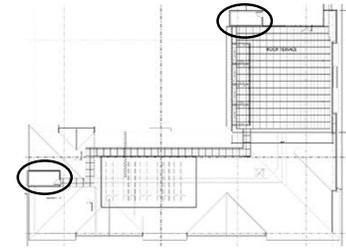
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1006.3

Egress from stories or occupied roofs

- The means of egress system serving any story or occupied roof shall be provided with the number of separate and distinct exits or access to exits based on the aggregate occupant load served in accordance with this section.
- The path of egress travel to an exit shall not pass through more than one adjacent story.



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1006.3.3

Egress based on occupant load

- Each story and occupied roof shall have the minimum number of separate and distinct exits, or access to exits, as specified in Table 1006.3.3.
- A single exit or access to a single exit shall be permitted in accordance with Section 1006.3.4.
- The required number of exits, or exit access stairways or ramps providing access to exits, from any story or occupied roof shall be maintained until arrival at the exit discharge or a public way.

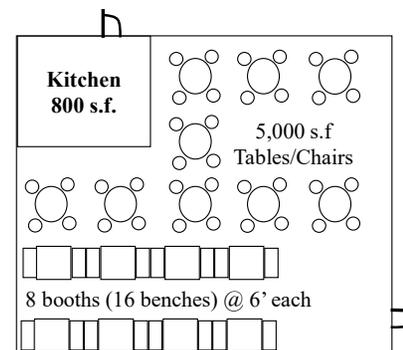
TABLE 1006.3.3
MINIMUM NUMBER OF EXITS OR ACCESS TO EXITS PER STORY

OCCUPANT LOAD PER STORY	MINIMUM NUMBER OF EXITS OR ACCESS TO EXITS FROM STORY
1-500	2
501-1,000	3
More than 1,000	4

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Means of Egress Design



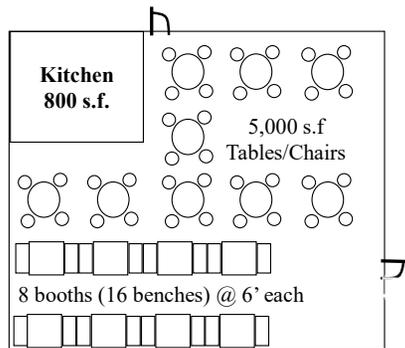
- Kitchen**
– 800/200 = 4
- Dining Area**
– 5,000/15 = 333
- Booths**
– 6'24" = 3/bench
– 3 X 16 = 48
- Total = 385**
- 2 exits required**

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Means of Egress Design

Building is sprinklered, no fire alarm



- Exit Width
 - 385 X 0.2 = 77"
 - 38.5"/exit

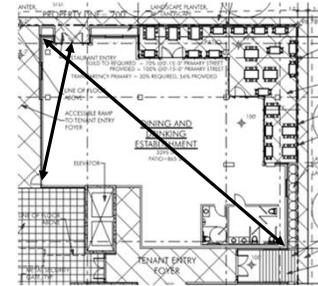
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1007.1.1

Two exits or exit access doorways

- Where two exits, exit access stairways or ramps, or any combination thereof, are required from any portion of the exit access, they shall be placed a distance apart equal to not less than one-half of the length of the maximum overall diagonal dimension of the building or area to be served measured in a straight line between them.
 - 1/3 the longest diagonal with NFPA 13 or 13R sprinkler system



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1017

Exit Access Travel Distance

- Exit access travel distance shall not exceed the values given in Table 1017.2.
- Exit access travel distance shall be 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

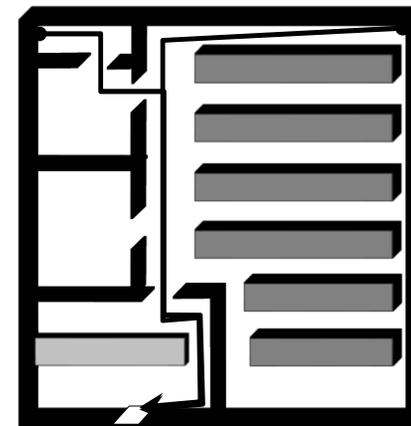
OCCUPANCY	WITHOUT SPRINKLER SYSTEM (feet)	WITH SPRINKLER SYSTEM (feet)
A, E, F-1, M, R, S-1	300	250 ^b
I-1	Not Permitted	250 ^b
B	200	300 ^c
F-2, S-2, U	300	400 ^c
H-1	Not Permitted	75 ^d
H-2	Not Permitted	100 ^d
H-3	Not Permitted	150 ^d
H-4	Not Permitted	175 ^d
H-5	Not Permitted	200 ^c
I-2, I-3, I-4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

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1017

Travel Distance

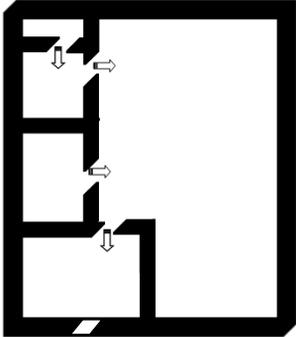


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1016.2 Egress Through Intervening Spaces

- Egress from a room or space shall not pass through adjoining or intervening rooms or areas, except where such adjoining rooms or areas are:
 - accessory to one another;
 - are not an H occupancy;
 - and provide a discernible path of egress travel to an exit.



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1016.2 Egress Through Intervening Spaces

- Egress shall not pass through kitchens, storage rooms, closets or spaces used for similar purposes
- 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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1009 Accessible Means of Egress

- 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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1009.2 Continuity and Components



- Continuous to public way
- Must consist of one or more components
 - Accessible routes
 - Interior exit stairways
 - Exit access stairways
 - Exterior exit stairways serving levels other than the level of exit discharge.
 - Elevators
 - Platform lifts
 - Horizontal exits
 - Ramps
 - Areas of refuge
 - Exterior areas for assisted rescue

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Means of Egress Components

- Doors
- Gates
- Stairways
- Ramps



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1010 Doors

- Width sufficient for the occupant load
- Provide a clear width of not less than 32 inches.
- Minimum 80" height
- Swing in direction of egress travel
- ≥ 50 occupants or a Group H occupancy
- Must have floor or landing on each side of a door at the same elevation



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1010.2 Door Operations

- Except as specifically permitted by this section egress doors shall be readily openable from the egress side without the use of a key or special knowledge or effort.
- Door handles, pulls, latches, locks and other operating devices on doors required to be accessible by Chapter 11 shall not require tight grasping, tight pinching or twisting of the wrist to operate.



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1010.2.9 Panic & Fire Exit Hardware

- Required in Group A or E having an occupant load of 50 or more and any occupancy of any Group H



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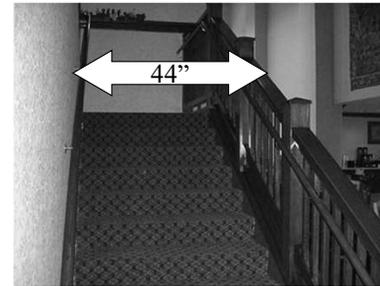
1011 Stairways



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1011.2 Stairway Width



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

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1011.3 Headroom

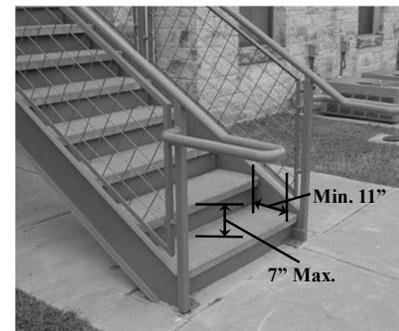


- Stairways shall have a minimum headroom clearance of 80 inches measured vertically from a line connecting the edge of the nosings.
- Continuous to point that intersects landing at one tread depth past bottom riser
- Maintained for full width

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1011.5.2 Stair Treads & Risers



- 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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1011.8 Vertical rise

- A flight of stairs shall not have a vertical rise greater than 12 feet between floor levels or landings.



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1012 Ramps

- The provisions of this section shall apply to ramps used as a component of a means of egress.
 - Exceptions:
 - 1. Ramped aisles within assembly rooms or spaces complying Section 1029.
 - 2. Curb ramps per ICC A117.1.
 - 3. Vehicle ramps in parking garages where they are not an accessible route serving accessible parking spaces, other required accessible elements or part of an accessible means of egress.



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1012 Ramps

- Means of Egress
 - 1:12 (8%)
- Other Ramps
 - 1:8 (12.5%)
- Cross Slope
 - 1:48 (2%)
- Maximum rise for any ramp run shall be 30 inches



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1014 Handrail Height

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



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1014.4 Continuity

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



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1014.6 Handrail Extensions

- 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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1014.7 Clearance

- 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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1015 Guards

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



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1015.3 Guard Height

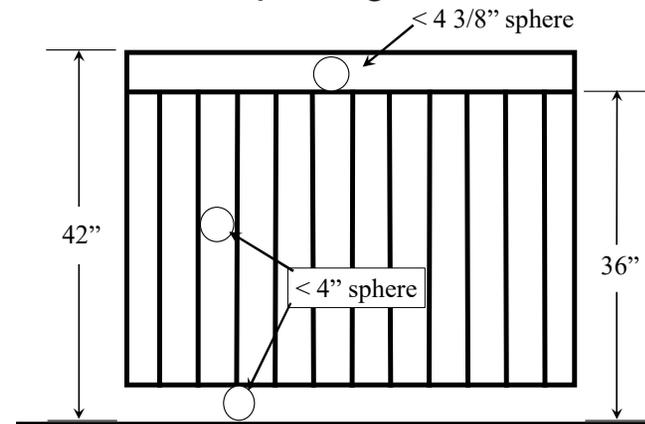


- Required guards shall be not less than 42 inches high, measured vertically
 - Above the adjacent walking surfaces or the
 - A line connecting the leading edges of the tread nosings.
 - Ramp surface
- Exceptions!

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1015.4 Guard Opening Limitations



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1015.6 Mechanical Equipment



- Guard required where appliances, equipment, fans, roof hatch openings or other components within 10 feet of roof edge
- Prevent 21-inch sphere
- Extend 30 inches beyond each end of such equipment

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1020.1 Corridor Construction

- 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 708 for fire partitions.

TABLE 1020.1
CORRIDOR FIRE-RESISTANCE RATING

OCCUPANCY	OCCUPANT LOAD SERVED BY CORRIDOR	REQUIRED FIRE-RESISTANCE RATING (hours)	
		Without sprinkler system	With sprinkler system ^c
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
R	Greater than 10	Not Permitted	0.5
I-2 ^a , I-4	All	Not Permitted	0
I-1, I-3	All	Not Permitted	1 ^b

192

192

1013 Exit Signs

- Exits and exit access doors shall be marked by an approved exit sign readily visible from any direction of egress travel.
- The path of egress travel to exits and within exits shall be marked by readily visible exit signs to clearly indicate the direction of egress travel in cases where the exit or the path of egress travel is not immediately visible to the occupants.



193

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1013 Exit Signs

- Exceptions:
 1. Exit signs are not required in rooms or areas that require only one exit or exit access.
 2. Main exterior exit doors or gates that are obviously and clearly identifiable as exits need not have exit signs where approved by the building official.
 3. Exit signs are not required in occupancies in Group U and individual sleeping units or dwelling units in Group R-1, R-2 or R-3.
 4. Exit signs are not required in dayrooms, sleeping rooms or dormitories in occupancies in Group I-3.
 5. In occupancies in Groups A-4 and A-5, exit signs are not required on the seating side of vomitories or openings into seating areas where exit signs are provided in the concourse that are readily apparent from the vomitories. Egress lighting is provided to identify each vomitory or opening within the seating area in an emergency.



194

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1008.1 Means of egress illumination

- Illumination shall be provided in the means of egress in accordance with Section 1008.2.
- Under emergency power, means of egress illumination shall comply with Section 1008.3.



195

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1008.2 Illumination required

- The means of egress serving a room or space shall be illuminated at all times that the room or space is occupied.



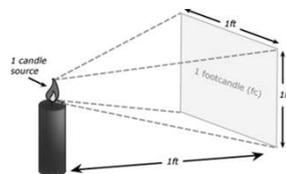
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1008.2.1

Illumination level under normal power

- The means of egress illumination level shall be not less than 1 footcandle at the walking surface.
- Along exit access stairways and at their required landings, the illumination level shall not be less than 10 footcandles at the walking surface when the stairway is in use.



197

197

1008.3.1

Emergency power for illumination

- In the event of power supply failure in rooms and spaces that require two or more exits or access to exits, an emergency electrical system shall automatically illuminate all of the following areas:
 - 1. Aisles.
 - 2. Corridors.
 - 3. Exit access stairways and ramps.



198

198

1008.3.2
Buildings

- In the event of power supply failure in buildings that require two or more means of egress, an emergency electrical system shall automatically illuminate all of the following areas:
 1. Interior exit access stairways and ramps.
 2. Interior and exterior exit stairways and ramps.
 3. Exit passageways.
 4. Vestibules and areas on the level of discharge used for exit discharge in accordance with Section 1028.1.
 5. Exterior landings as required by Section 1010.1.6 for exit doorways that lead directly to the exit discharge.



199

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1008.3.3
Rooms and spaces

- In the event of power supply failure, an emergency electrical system shall automatically illuminate all of the following areas:
 1. Electrical equipment rooms.
 2. Fire command centers.
 3. Fire pump rooms.
 4. Generator rooms.
 5. Public restrooms with an area greater than 300 square feet.



200

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1022 Exits

- 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



201

201

1023 Interior Exit Stairways

- Interior exit stairways and ramps shall be enclosed
 - 4+ stories - 2 hr. fire rated
 - < 4 stories - 1 hr. fire rated
 - all floor levels used to compute stories, including basements
 - excluding mezzanines
- Means of Egress and circulation only

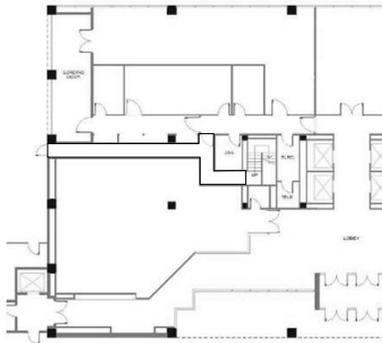


202

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1024 Exit Passageway

- Width per Section 1005.1, minimum 44 inches
 - Occupant load <50 – 36"
- Walls, floors & ceilings 1-hour fire-resistance rated, and not less than exit enclosure rating
- Openings & penetrations restricted

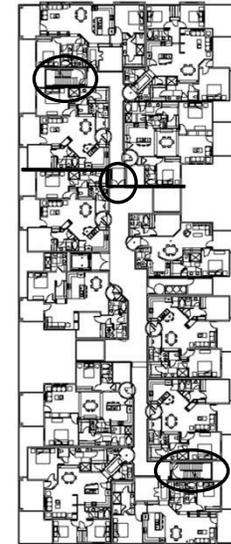


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1026 Horizontal Exit

- Shall not serve as only exit
- not more than 1/2 of exits or width shall be horizontal exits
- Separated by fire wall or 2 hr. fire barrier
 - Fire barrier shall extend through all levels or 2 hr. floors



204

204

1027

Exterior Exit Ramps & Stairways

- Not permitted to be used in I-2
- Limited to 6 stories above grade plane or buildings not classified as a high rise.



205

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1027

Exterior Exit Stairs

- Open on at least one side
 - Minimum 35 sq. ft., 42" above floor level
 - open areas yards, courts, public ways
- Separated from the building per 1023.2 & 1023.7
 - exceptions



206

206

1028

Exit Discharge

- 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 re-enter a building.



207

207

Assembly

1030

- Foyers & lobbies
- Smoke protected seating
- Travel distance
- Aisles required
- Assembly guards



208

208

International Building Code Accessibility

- Chapter 11
 - Accessibility
- Chapter 10
 - Means of Egress
- International Existing Building Code
 - Existing Buildings



209

209

1101.1 Scope

- The provisions of this chapter shall control the design and construction of facilities for accessibility for individuals with disabilities.



210

210

2021 WBC - Design



- 1101.2 Design:
- THIS CODE and
- ICC/ANSI A117.1-2017.

211

211

IBC – Where is accessibility required?????

- Everywhere!!!
- Temporary or permanent buildings and structures and associated sites and facilities.

There are always Exceptions to the rule!

212

212

1104.1 Site arrival points

- At least one accessible route within the site shall be provided from public transportation stops, accessible parking, accessible passenger loading zones, and public streets or sidewalks to the accessible building entrance served.



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1104.2 Within a site

- At least one accessible route shall connect accessible buildings, accessible facilities, accessible elements and accessible spaces that are on the same site.

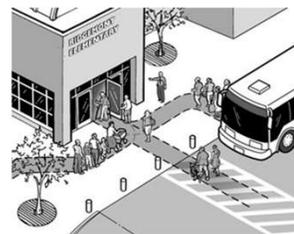


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1104.3 Connected spaces

- Where a building or portion of a building is required to be accessible, at least one accessible route shall be provided to each portion of the building, to accessible building entrances connecting accessible pedestrian walkways and to the public way.



215

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1104.4 Multistory buildings and facilities

- At least one accessible route shall connect each accessible story, mezzanine and occupied roofs in multilevel buildings and facilities.



– Exceptions

216

216

1104.5 Location

- Accessible routes shall coincide with or be located in the same area as a general circulation path.
- Where the circulation path is interior, the accessible route shall be interior.
- Where only one accessible route is provided, the accessible route shall not pass through kitchens, storage rooms, restrooms, closets or similar spaces.



217

217

1105.1 Public entrances

- In addition to accessible entrances required by Sections 1105.1.2 through 1105.1.8, at least 60 percent of all public entrances shall be accessible.



218

218

Parking & Passenger Loading Facilities – 1106.1

- Where parking is provided, accessible parking spaces shall be provided in compliance with Table 1106.2, except as required by Sections 1106.3 through 1106.5.
- Where more than one parking facility is provided on a site, the number of parking spaces required to be accessible shall be calculated separately for each parking facility.

**TABLE 1106.2
ACCESSIBLE PARKING SPACES**

TOTAL PARKING SPACES PROVIDED IN PARKING FACILITIES	REQUIRED MINIMUM NUMBER OF ACCESSIBLE SPACES
1 to 25	1
26 to 50	2
51 to 75	3
76 to 100	4
101 to 150	5
151 to 200	6
201 to 300	7
301 to 400	8
401 to 500	9
501 to 1,000	2% of total
1,001 and over	20, plus one for each 100, or fraction thereof, over 1,000

219

219

1108.6.2 Residential R-2 Apartments

- ≥Four dwelling units in single structure
 - Every unit – Type B
- R-2 > 20 units
 - 2% - Type A



220

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1110.2 Toilet and bathing facilities

- Each toilet room and bathing room shall be accessible. Where a floor level is not required to be connected by an accessible route, the only toilet rooms or bathing rooms provided within the facility shall not be located on the inaccessible floor.
- Except as provided for in Sections 1110.2.4 and 1110.2.5, at least one of each type of fixture, element, control or dispenser in each accessible toilet room and bathing room shall be accessible.



221

221

Ventilation 1202

- Buildings shall be provided with natural ventilation in accordance with Section 1202.5 or shall be provided with mechanical ventilation in accordance with the *International Mechanical Code*.



222

222

Lighting 1204.1

- Every space intended for human occupancy shall be provided with natural light by means of exterior glazed openings in accordance with Section 1205.2 or shall be provided with artificial light in accordance with Section 1205.3.
- Exterior glazed openings shall open directly onto a public way or onto a yard or court in accordance with Section 1206.



223

223

1202.7 - Radon resistive construction standards

- The criteria of this section establishes minimum radon resistive construction requirements for Group R Occupancies.
- The requirements of Section 1202.7 shall be adopted and enforced by all jurisdictions of the state according to the following subsections.
- All jurisdictions of the state shall comply with Section 1202.7.2.
- Clark, Ferry, Okanogan, Pend Oreille, Skamania, Spokane and Stevens counties shall also comply with Section 1202.7.3.

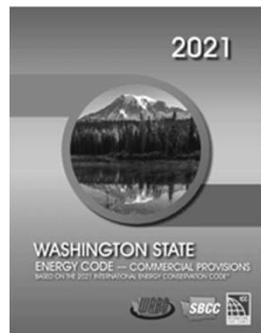


224

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Energy Efficiency Chapter 13

- Buildings shall be designed and constructed in accordance with the International Energy Conservation Code.



225

225

Exterior Walls 1404

- Exterior walls shall provide weather protection for the building.
- The materials of the minimum nominal thickness specified in Table 1404.2 shall be acceptable as approved weather coverings.

TABLE 1404.2
MINIMUM THICKNESS OF WEATHER COVERINGS

COVERING TYPE	MINIMUM THICKNESS (inches)
Adhered masonry veneer	0.25
Aluminum siding	0.019
Anchored masonry veneer	
Stone (natural)	2.0
Architectural cast stone	2.5
Other	2.0
Asbestos-cement boards	0.125
Asbestos shingles	0.156
Cold-rolled copper ^a	0.0216 nominal
Copper shingles ^a	0.0162 nominal
Exterior plywood (with sheathing)	0.313
Exterior plywood (without sheathing)	See Section 2304.6
Fiber cement lap siding	0.25 ^b
Fiber cement panel siding	0.25 ^b
Fiberboard siding	0.5
Glass-fiber reinforced concrete panels	0.375
Hardboard siding ^c	0.25
High-yield copper ^a	0.0162 nominal
Lead-coated copper ^a	0.0216 nominal
Lead-coated high-yield copper	0.0162 nominal
Marble slabs	1

226

226

1404.3 Vapor retarders

- Vapor retarder materials shall be classified in accordance with Table 1404.3(1).
- A vapor retarder shall be provided on the interior side of frame walls in accordance with Tables 1404.3(2) and 1404.3(3), or an approved design using accepted engineering practice for hygrothermal analysis.
- The appropriate climate zone shall be selected in accordance with Chapter 3 of the International Energy Conservation Code.

TABLE 1404.3(1)
VAPOR RETARDER MATERIALS AND CLASSES

VAPOR RETARDER CLASS	ACCEPTABLE MATERIALS
I	Sheet polyethylene, nonperforated aluminum foil, or other approved materials with a perm rating of less than or equal to 0.1
II	Kraft-faced fiberglass bats or vapor retarder paint or other approved materials, applied in accordance with the manufacturer's instructions for a perm rating greater than 0.1 and less than or equal to 1.0
III	Latex paint, enamel paint, or other approved materials, applied in accordance with the manufacturer's instructions for a perm rating of greater than 1.0 and less than or equal to 10

TABLE 1404.3(2)
VAPOR RETARDER OPTIONS

CLIMATE ZONE	VAPOR RETARDER CLASS		
	I	II	III ^a
1, 2	Not permitted	Not Permitted	Permitted
3, 4 (except Marine 4)	Not permitted	Permitted	Permitted
Marine 4, 5, 6, 7, 8	Permitted	Permitted	See Table 1404.3(3)

227

227

1404.4 Flashing

- Flashing shall be installed in such a manner so as to prevent moisture from entering the wall or to redirect it to the exterior.
 - Perimeters of exterior door and window assemblies
 - Penetrations and terminations of exterior wall assemblies
 - Exterior wall intersections with roofs, chimneys, porches, decks, balconies and similar projections
 - Built-in gutters and similar locations where moisture could enter the wall.

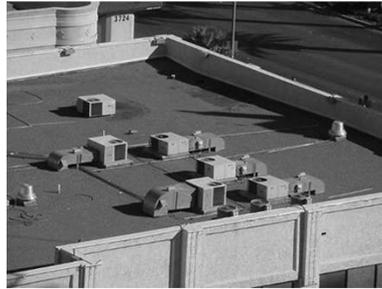


228

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1503.1 Roofing

- Roof decks shall be covered with approved roof coverings secured to the building or structure in accordance with the provisions of this chapter.
- Roof coverings shall be designed in accordance with this code, and installed in accordance with this code and the manufacturer's approved instructions.



229

229

Chapter 16 Structural Design

- The provisions of this chapter shall govern the structural design of buildings, structures and portions thereof regulated by this code.



230

230

1705 Special Inspections

- | | |
|----------------------------------|------------------------------------|
| ■ Steel construction | ■ Fabricated items |
| – Table 1704.3 | ■ Wind resistance |
| ■ Concrete construction | ■ Seismic resistance |
| – Table 1704.4 | ■ Sprayed fire-resistant materials |
| ■ Masonry construction | ■ Mastic and intumescent coatings |
| ■ Wood construction | ■ EIFS |
| – Fabricated materials | ■ Penetrations joints |
| ■ Soils | ■ Smoke control systems |
| ■ Driven deep foundations | ■ Sealing of mass timber |
| ■ Cast-in-place deep foundations | |
| ■ Helical pile foundations | |

231

231

2406 Safety Glazing

- Individual glazed areas, including glass mirrors, in hazardous locations as defined in Section 2406.3 shall comply with Sections 2406.1.1 through 2406.1.4.



232

232

2406.4.2 Hazardous Locations

- Glazing in an individual fixed or operable panel adjacent to a door where the nearest vertical edge of the glazing is within a 24-inch arc of either vertical edge of the door in a closed position and where the bottom exposed edge of the glazing is less than 60 inches above the walking surface shall be considered to be a hazardous location.



– Exceptions

233

233

2902.1 Minimum number of fixtures

- Plumbing fixtures shall be provided in the minimum number shown in Table 2902.1.
- Uses not shown in Table 2902.1 shall be determined individually by the building official based on the occupancy which most nearly resembles the proposed occupancy.
- The number of occupants shall be determined by this code.
- Plumbing fixtures need not be provided for unoccupied buildings or facilities.



234

234

2902.1.1 Fixture calculations

- To determine the occupant load of each sex, the total occupant load shall be divided in half.
- To determine the required number of fixtures, the fixture ratio or ratios for each fixture type shall be applied to the occupant load of each sex in accordance with Table 2902.1.
- Fractional numbers resulting from applying the fixture ratios of Table 2902.1 shall be rounded up to the next whole number.
- For calculations involving multiple occupancies, such fractional numbers for each occupancy shall first be summed and then rounded up to the next whole number.



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[P] TABLE 2902.1 MINIMUM NUMBER OF REQUIRED PLUMBING FIXTURES^a (See Sections 2902.2 and 2902.3)

NO.	CLASSIFICATION	OCCUPANCY	DESCRIPTION	WATER CLOSET		LAVATORIES		BATHTUBS/ SHOWERS
				Male	Female	Male	Female	
1	Assembly	A-1 ^d	Theaters and other buildings for the performing arts and motion pictures	1 per 125	1 per 65	1 per 200	—	—
		A-2 ^d	Nightclubs, bars, taverns, dance halls and buildings for similar purposes	1 per 40	1 per 40	1 per 75	—	—
		A-3 ^d	Restaurants, banquet halls and food courts	1 per 75	1 per 75	1 per 200	—	—
			Auditoriums without permanent seating, art galleries, exhibition halls, museums, lecture halls, libraries, arcades and gymnasiums	1 per 125	1 per 65	1 per 200	—	—
			Passenger terminals and transportation facilities	1 per 500	1 per 500	1 per 750	—	—
			Places of worship and other religious services	1 per 150	1 per 75	1 per 200	—	—
A-4	Coliseums, arenas, skating rinks, pools, and tennis courts for indoor sporting events and activities	1 per 75 for first 1,500 and 1 per 120 for remainder exceeding 1,500	1 per 40 for first 1,520 and 1 per 60 for remainder exceeding 1,520	1 per 200	1 per 150	—		
A-5	Stadiums, amusement parks, bleachers and grandstands for outdoor sporting events and activities	1 per 75 for first 1,500 and 1 per 120 for remainder exceeding 1,500	1 per 40 for first 1,520 and 1 per 60 for remainder exceeding 1,520	1 per 200	1 per 150	—		

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2902.2 Separate facilities

- Where plumbing fixtures are required, separate facilities shall be provided for each sex.

Exceptions!



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