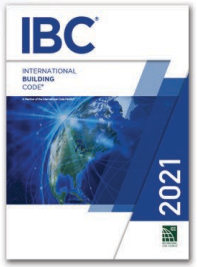
2021 IBC® Update

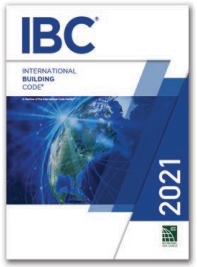
Based on the 2021 International Building Code® (IBC®)



ICC LEARNING center

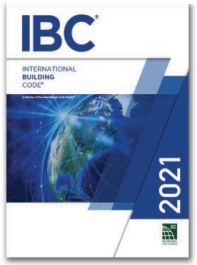
Identify changes between
the 2018 and 2021 IBC

Apply code requirements to design, plan submittals and/or inspection.



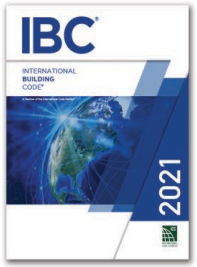
OBJECTIVES

- Identify the differences between 2021 IBC and the 2018 edition.
- Determine if the change is an addition, deletion, modification or clarification.
- Identify changes in format and technical requirements.
- Explain the intent and application of the changes.



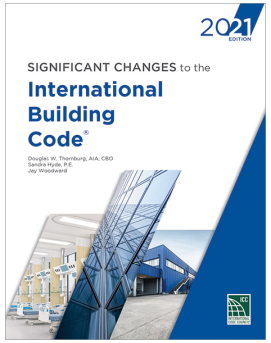
Topics

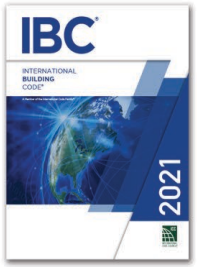
- Administration, Chapters 1 and 2
- Building Planning, Chapters 3 through 6
- Fire Protection, Chapters 7 through 9
- Means of Egress, Chapter 10
- Accessibility, Chapter 11
- Building Envelope, Structural Systems, and Construction Materials, Chapters 12 through 26
- Building Services, Special Devices, and Special Conditions, Chapters 27 through 34



Selection of Topics

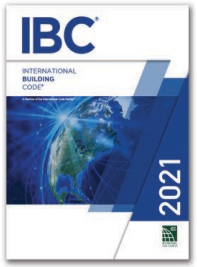
- Provisions addressed based primarily on:
  - Frequency of application
  - Special significance
  - Change in application
- Featured code changes have been selected from:
  - 2021 IBC Significant Nonstructural Changes seminar
  - 2021 IBC Significant Structural Changes seminar
- For additional code change commentary, see ICC publication *Significant Changes to the International Building Code, 2021 Edition*





Marginal Markings within the International Building Code

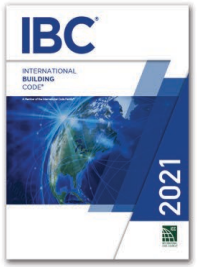
- **Solid vertical lines** in the margins within the body of the code indicate a technical change from the requirements of the 2018 edition.
- **Deletion indicators in the form of an arrow** are provided in the margin where an entire section, paragraph, exception or table has been deleted or an item in a list of items or a table has been deleted.
- **A single asterisk** [*] placed in the margin indicates that text or a table has been relocated within the code.
- **A double asterisk** [**] placed in the margin indicates that the text or table immediately following it has been relocated there from elsewhere in the code.



Letter Designations in Front of Section Numbers

- In each code development cycle, proposed changes to the code are considered at the Code Development Hearings.
- Proposed changes to a code section that has a number beginning with a letter in brackets are considered by a different code development committee.

[A]	Administrative
[E]	Energy
[EB]	Existing Building
[F]	Fire
[FG]	Fuel Gas
[M]	Mechanical
[P]	Plumbing



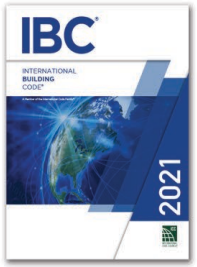
Course Icons

Addition

Deletion

Modification

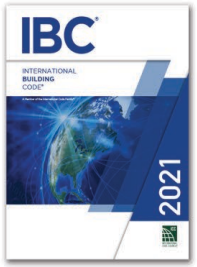
Clarification



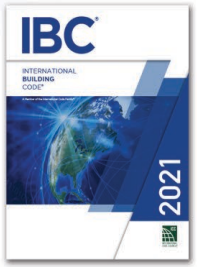
Tips

Guide to a successful class:

- Slides contain some text and iconic images to help you learn.
- Text and commentary is in the handout.
- Follow along in the course handout.
- Ask Questions, ask questions, ASK QUESTIONS!!!!



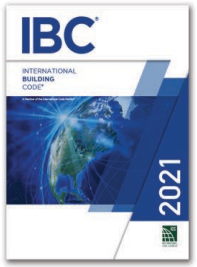
Part 1
Definitions
Chapter 2



ICC LEARNING center

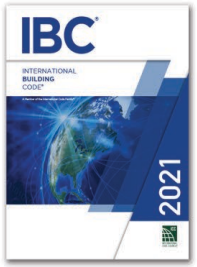
202 Definition of Atrium

- Atrium definition has been simplified to address only two conditions:
  - Vertical space enclosed at the top, and
  - Connects three or more stories in all occupancies other than Groups I-2 and I-3 (two stories).
- Other text has been deleted or relocated to Chapter 7.
- Primary significance is increase of threshold from two to three stories for most occupancies, however no change in application will typically occur.
- Intended result is to eliminate confusion with allowance in Section 712.9 permitting two-story opening conditions without regulation as an atrium.



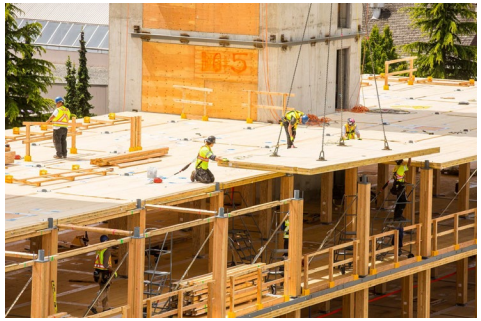
202 Definition of Change of Occupancy

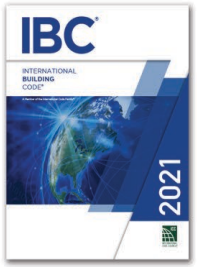
- Change of occupancy now occurs where code requires a greater degree of safety, accessibility, structural strength, fire protection, means of egress, ventilation or sanitation than exists in current building.
- Applies where there is a change in:
  - Occupancy classification, or
  - Purpose or level of activity.
- Previously, a change in occupancy occurred if there was a change in application of the code requirements.
  - Did not limit the areas of code addressed or that it only applied where a higher risk to life safety or occupant welfare occurred.



202 Definition of Mass Timber

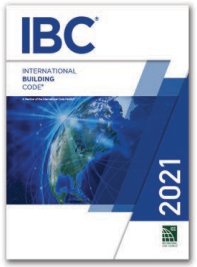
- Mass timber is considered as structural elements of Type IV construction primarily of solid, built-up, panelized or engineered wood products that meet minimum cross-section dimensions.
- Single term represents both:
  - Heavy-timber designated as Type IV-HT which includes various types of members where fire-resistance is based on minimum dimensions.
  - Mass timber used in new Types IV-A, IV-B and IV-C that must have a fire-resistance rating.





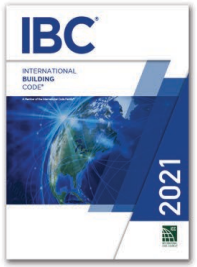
202 Definition of Mass Timber

- New definition of *noncombustible protection* addresses the passive fire protection required for mass timber.
- Depending on the building's type of construction, mass timber may have a fire-resistance rating obtained:
  - By its own fire-resistive rating, or
  - Through a combination of the inherent mass timber fire-resistance plus protection with noncombustible insulating materials, or
  - Entirely by the noncombustible protection
- The use of noncombustible protection recognizes its value in delaying the combustion of mass timber members.

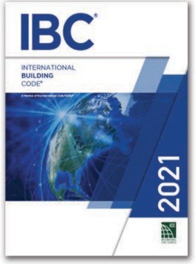


202 Definition of Puzzle Room

- Puzzle room is a new defined term that is mostly commonly recognized as an “escape room.”
- In a puzzle room, occupants are encouraged to solve a challenge to escape from a room or, more commonly, a series of rooms.
- Of particularly importance is the recognition by the definition that a puzzle room is considered as a “special amusement area” (formerly special amusement building).
  - Special amusement areas continue to be specifically regulated under provisions of Section 411.

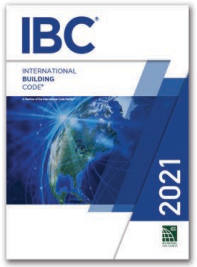


Part 2
Building Planning
Chapters 3 through 6



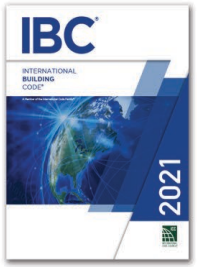
306.2 Group F-1 Occupancy Classification

- Two new items added to listing of Group F-1 occupancies.
- Energy storage systems (ESS) in dedicated-use buildings.
  - Administrative/support areas without ESS permitted where ≤ 10% of floor area of the story where located
  - In mixed-occupancy buildings, ESS to be classified the same as major occupancy
  - Previously would often be classified as Group H-2, however new IFC provisions address potential hazards to allow for a reduction in occupancy classification.
- Water/sewer treatment plants
  - Typically contain materials in use that would warrant a Group H classification should MAQs be exceeded.



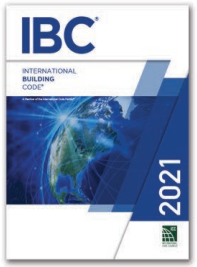
307.1.1 Uses Not Classified as Group H

- Two new items have been added to the list of uses that store, use and/or handle hazardous materials but are not to be classified as Group H.
  - Distilling or brewing of alcohol beverages
  - Storage of beer, distilled spirits and wines in barrels and casks
- Removal of Group H status applicable regardless of alcohol content and quantity of liquid.
- IFC has added additional requirements to address hazards, including automatic sprinkler systems in Group F-1 and S-1 fire areas where such liquids are located.



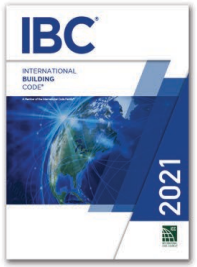
311.2, 311.3 Alcoholic Beverage Storage

- Storage of alcoholic beverages with over 16% alcohol content now classified as Group S-1 occupancy.
  - Previously not specifically addressed.
- Where alcohol content does not exceed 16%, classification continues to be Group S-2.
  - Limit that containers be only metal, glass or ceramic has been deleted to allow for wooden barrels and casks.
  - IFC safeguards no longer warrant restriction to only noncombustible containers.



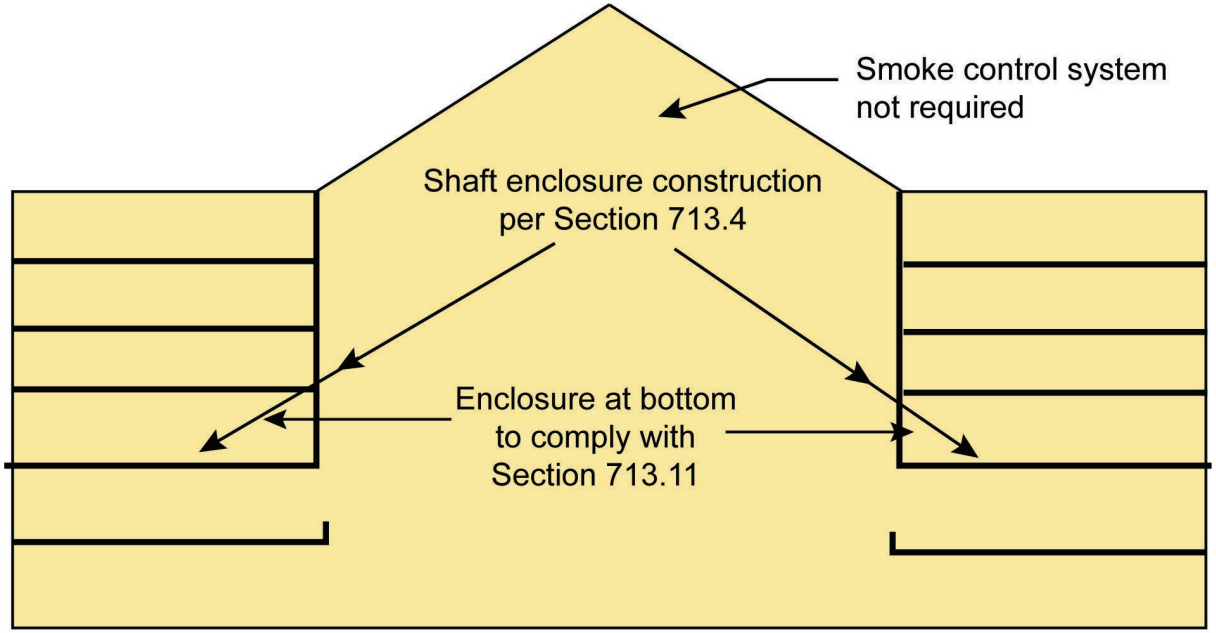
404.5 Smoke Control in Atriums

- New allowance permits a combination vertical opening condition consisting of both an atrium and a shaft enclosure without the requirement for a smoke control system.
- Smoke control system not required for atriums connecting more than two stories where:
  - Only the two lowest stories permitted to be open to the atrium, and
  - All stories above the lowest two stories to be separated from the atrium in accordance with shaft enclosure provisions.

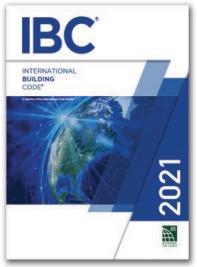


404.5 Smoke Control in Atriums

- Recognizes that the combination of shaft enclosure and atrium condition provides the necessary degree of separation expected between multiple stories.

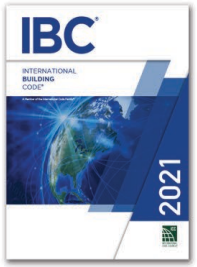


ATRIUM CONDITION



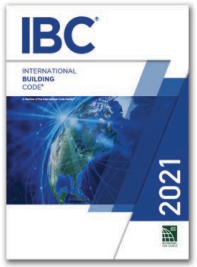
411.5 Puzzle Rooms

- Puzzle rooms now regulated as special amusement areas, requiring compliance with all fire- and life-safety provisions of Section 411.
- In addition, special exiting requirements have been added to solely address puzzle rooms:
    - Per Chapter 10, or
    - Alternate design approved by building official, or
    - Exit to be open and readily available upon activation by fire alarm system, sprinkler system, or manual control at constantly attended location.



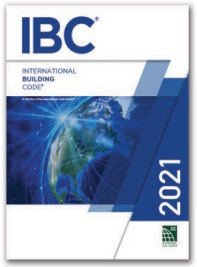
411.5 Puzzle Rooms

- Puzzle rooms, as well as all other special amusement areas, must meet the following previously-established criteria:
  - Classified as Group A or B occupancy, based upon occupant load.
  - Fire protection systems required, including:
    - Automatic sprinkler system (with exception)
    - Automatic smoke detection system
    - Emergency voice/alarm communication system
  - Special exit marking, including approved directional marking.
  - Class A interior finishes.



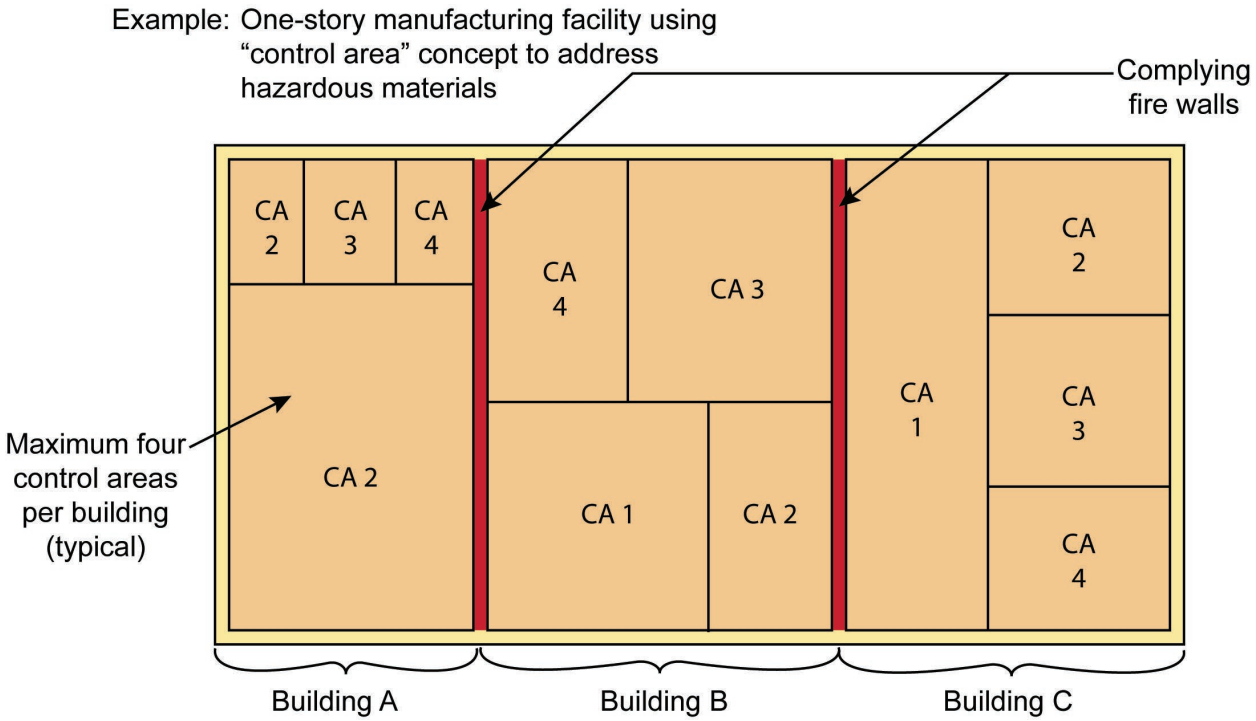
414.2.3 Fire Wall Use for Control Areas

- For purposes of determining the number of control areas in a building, each portion separated by one or more fire walls shall be considered a separate building.
  - Previously, the “separate building” allowance has been limited to allowable area, allowable height and type of construction



414.2.3 Fire Wall Use for Control Areas

- New allowance permits additional quantities of hazardous materials without classification as a Group H occupancy by increasing the number of control areas permitted in the structure.



424 Play Structures

- No longer limited to structures used solely by children, such as climbing walls.
- Additional requirements now applicable for structures more than 600 square feet in area or more than 10 feet in height:
  - Interior finishes per Table 803.13
  - Designed in accordance with Chapter 16
- Special investigation to demonstrate adequate fire safety now required where area of play structure exceeds 600 square feet.
  - Previously required when greater than 300 square feet in area.

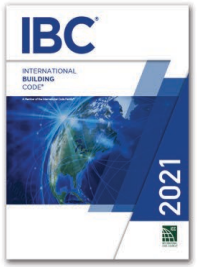


Table 504.3 Allowable Height in Feet

- Limits to building height (in feet) have been developed for Types IV-A, IV-B and IV-C construction
- Sprinklered and nonsprinklered options
- Establishment of allowable height started with setting IV-B allowances equivalent to Type IB.
- No unlimited heights for Type IV-A, but typically an increase of 1.5 over Type IV-B.
- Type IV-C generally equivalent to IV-HT limits.
- No additional heights over that permitted for Type IV-HT are permitted for nonsprinklered buildings.

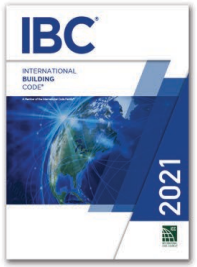


TABLE 504.3
ALLOWABLE BUILDING HEIGHT IN FEET ABOVE GRADE PLANE [a]

OCCUPANCY CLASSIFICATION	TYPE OF CONSTRUCTION												
	SEE FOOTNOTES	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[c,d]	UL	160	65	55	65	55	120	90	65	65	50	40
	S												
H-4	NS[c,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[d,e]	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[d,e,f]	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85									
I-4	NS[d,g]	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[h]	NS[d]	UL	160	65	55	65	55	65	65	65	65	50	40
	S13D	60	60	60	60	60	60	60	60	60	60	50	40
	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

No changes to footnotes.

Sprinklered: IV-B = I-B & IV-A = 1.5 x IV-B with exceptions

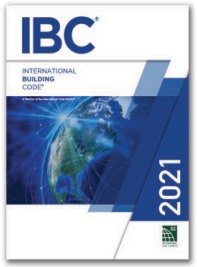


Table 504.4 Allowable Height in Stories

- Limits to number of stories above grade plane have been established for Types IV-A, IV-B and IV-C construction.
- Rationale for story limits similar to that for height in feet.
- Where building is not sprinklered:
  - Limits on stories same as that allowed for Type IV-HT.
- Consistent with allowable height in feet and allowable floor area, each occupancy reviewed individually to address specific hazards that would warrant a variance from the established process.

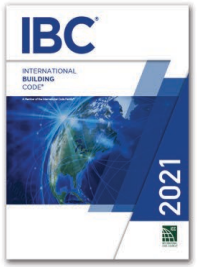
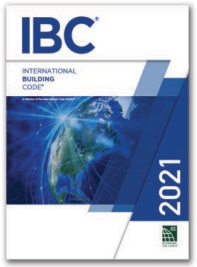


Table 504.4 Allowable Height in Stories

- Story limits have also been modified for specific Group S-1 and S-2 occupancies.
- Height limits for Group S-1 occupancies in fully-sprinklered buildings of Type IIB and IIIB construction have been increased from three to four stories.
  - Restores story limits of 2006 IBC that were part of numerous reductions due to inconsistencies in original thresholds.
- Group S-2 story limitations for buildings of Type IV-HT construction have been increased by one story, to five stories in nonsprinklered buildings and six stories in sprinklered buildings.
  - Corrects two tabular errors that went undetected in transition from Table 503 in 2012 IBC to Table 504.4 in 2015 edition.



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	2	1
	S	UL	6	4	3	4	3	9	6	4	4	3	2
A-2	NS	UL	11	3	2	3	2	3	3	3	3	2	1
	S	UL	12	4	3	4	3	18	12	6	4	3	2
A-3	NS	UL	11	3	2	3	2	3	3	3	3	2	1
	S	UL	12	4	3	4	3	18	12	6	4	3	2
A-4	NS	UL	11	3	2	3	2	3	3	3	3	2	1
	S	UL	12	4	3	4	3	18	12	6	4	3	2
A-5	NS	UL	UL	UL	UL	UL	UL	1	1	1	UL	UL	UL
	S	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
S-1	NS	UL	11	4	2	3	2	4	4	4	4	3	1
	S	UL	12	5	~~3~~4	4	~~3~~4	10	7	5	5	4	2
S-2	NS	UL	11	5	3	4	3	4	4	4	~~4~~5	4	2
	S	UL	12	6	4	5	4	12	8	5	~~5~~6	5	3

Sprinklered: IV-B = I-B & IV-A = 1.5 x IV-B with exceptions

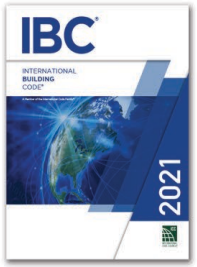


Table 506.2 Allowable Building Area

- Limits to building floor areas have been developed for Types IV-A, IV-B and IV-C.
- No unlimited area permitted for any of Type IV classifications.
- Initially, allowable area factors for Type IV-HT construction were increased by following multipliers:
  - Type IV-C: x 1.25
  - Type IV-B: x 2.00
  - Type IV-A: x 3.00
- Factors then re-examined on a case-by-case basis regarding their relative hazard and occupancy classification.

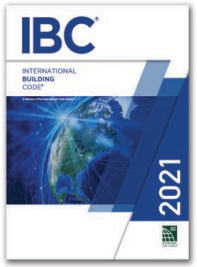
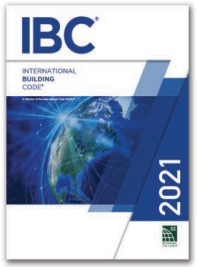


Table 506.2 Allowable Building Area

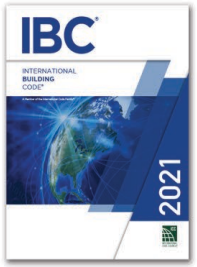
- Allowable area factor also modified for Group I-3 occupancies in one-story buildings of Type IIA construction.
  - Limit of 45,000 square feet has been increased to 60,000 square feet for single-story fully-sprinklered buildings.
  - Corrects tabular error that went undetected in transition from Table 503 in 2012 IBC to Table 504.4 in 2015 edition.



ALLOWABLE AREA FACTOR (A_t = NS, S1, S13R, S13D OR SM, as applicable) IN SQUARE FEET[a,b]

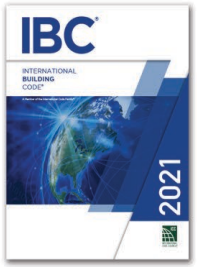
OCCUPANCY CLASSIFICATION	TYPE OF CONSTRUCTION													
	SEE FOOTNOTES	TYPE I		TYPE II		TYPE III		TYPE IV				TYPE V		
		A	B	A	B	A	B	A 3xHT	B 2xHT	C 1.25xHT	HT	A	B
I-1	NS[d,e]	UL	55,000	19,000	10,000	16,500	10,000	54,000	36,000	18,000	18,000	10,500	4,500
	S1	UL	220,000	76,000	40,000	66,000	40,000	216,000	144,000	72,000	72,000	42,000	18,000
	SM	UL	165,000	57,000	30,000	49,500	30,000	162,000	108,000	54,000	54,000	31,500	13,500
I-2	NS[d,f]	UL	UL	15,000	11,000	12,000	NP	36,000	24,000	12,000	12,000	9,500	NP
	S1	UL	UL	60,000	44,000	48,000	NP	144,000	96,000	48,000	48,000	38,000	NP
	SM	UL	UL	45,000	33,000	36,000	NP	108,000	72,000	36,000	36,000	28,500	NP
I-3	NS[d,e]	UL	UL	15,000	10,000	10,500	7,500	36,000	24,000	12,000	12,000	7,500	5,000
	S1	UL	UL	60,000	40,000	42,000	30,000	144,000	96,000	48,000	48,000	30,000	20,000
	SM	UL	UL	45,000	30,000	31,500	22,500	108,000	72,000	36,000	36,000	22,500	15,000
I-4	NS[d,g]	UL	60,500	26,500	13,000	23,500	13,000	76,500	51,000	25,500	25,500	18,500	9,000
	S1	UL	121,000	106,000	52,000	94,000	52,000	306,000	204,000	102,000	102,000	74,000	36,000
	SM	UL	181,500	79,500	39,000	70,500	39,000	229,500	153,000	76,500	76,500	55,500	27,000
M	NS	UL	UL	21,500	12,500	18,500	12,500	61,500	41,000	25,625	20,500	14,000	9,000
	S1	UL	UL	86,000	50,000	74,000	50,000	246,000	164,000	102,500	82,000	56,000	36,000
	SM	UL	UL	64,500	37,500	55,500	37,500	184,500	123,000	76,875	61,500	42,000	27,000

General approach with exceptions.



506.3.2 Allowable Area Frontage Increase

- Methodology for determining allowable area increase for open frontage has been simplified through use of a tabular format.
- Table 506.3.3 based on two criteria:
  - Smallest public way or open space that ≥ 20 feet, and
  - Percentage of building perimeter having ≥ 20 feet of public way and/or open space
- Allowance for weighting the open space area increase has been eliminated
  - Interpolation within Table 506.3.3 is permitted



506.3.2 Allowable Area Frontage Increase

- Resulting frontage increase intended to be consistent with increase determined by previous method
  - In some cases, greater frontage increases are provided as compared to past methodology
- Under certain circumstance, a greater frontage increase may be available to the designer if one or more open spaces not recognized when applying Table 506.3.3 or 506.3.3.1

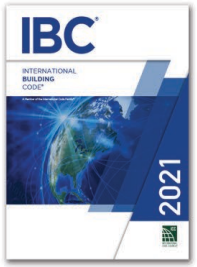


TABLE 506.3.3 Frontage Increase Factor[a]

Percentage of Building Perimeter	Open Space			
	0 to less than 20 Feet	20 to less than 25 Feet	25 to less than 30 Feet	30 Feet or greater
0 to less than 25	0	0	0	0
25 to less than 50	0	0.17	0.21	0.25
50 to less than 75	0	0.33	0.42	0.50
75 to 100	0	0.50	0.63	0.75

a. Interpolation is permitted.

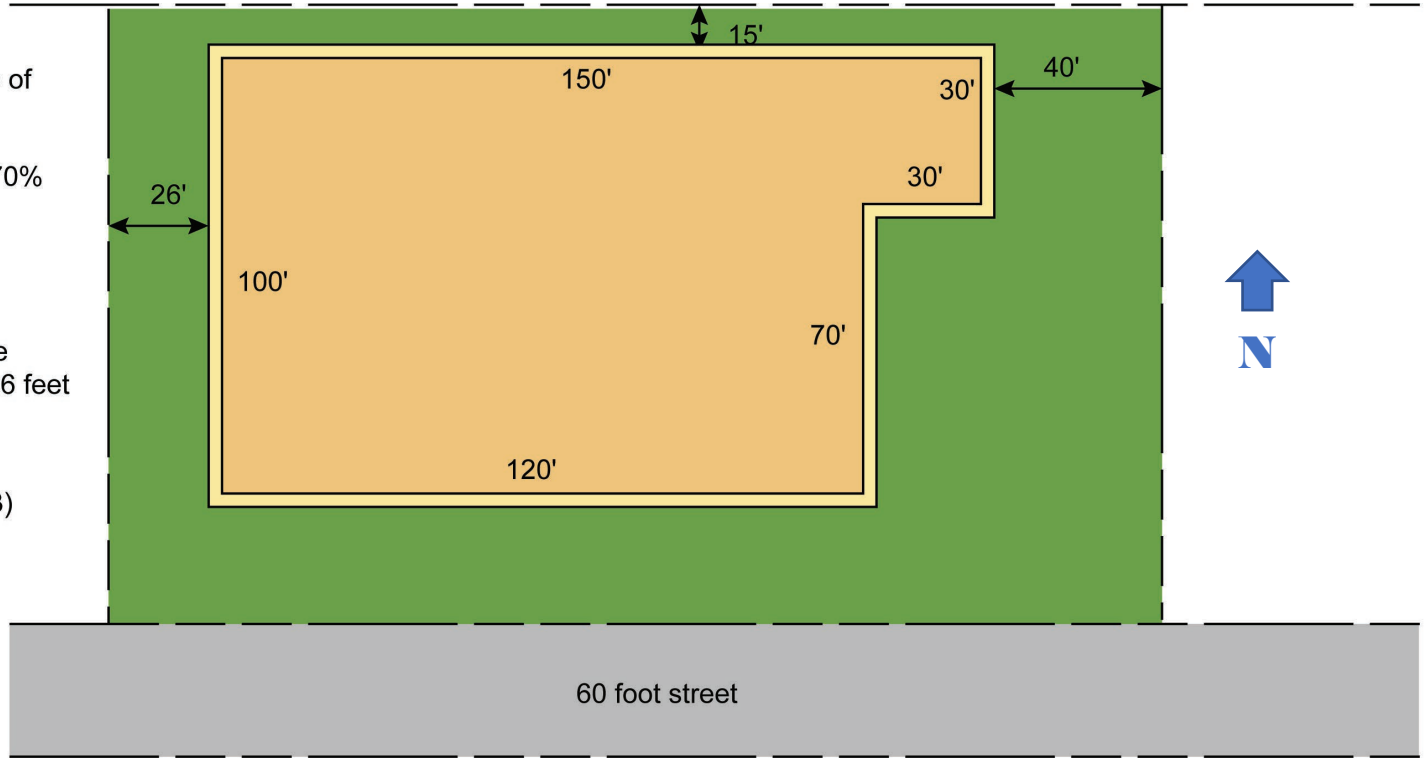
TABLE 506.3.3.1 Section 507 Buildings[a]

Percentage of Building Perimeter	Open Space					
	30 to less than 35 feet	35 to less than 40 feet	40 to less than 45 feet	45 to less than 50 feet	50 to less than 55 feet	55 to less than 60 feet
0 to less than 25	0	0	0	0	0	0
25 to less than 50	0.29	0.33	0.38	0.42	0.46	0.50
50 to less than 75	0.58	0.67	0.75	0.83	0.92	1.00
75 to 100	0.88	1.00	1.13	1.25	1.38	1.50

a. Interpolation is permitted.

506.3.2 Allowable Area Frontage Increase

- EXAMPLE:



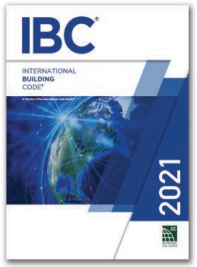
Percentage of perimeter =

$\frac{350'}{500'} = 70\%$

Smallest open space of 20 feet or more: 26 feet

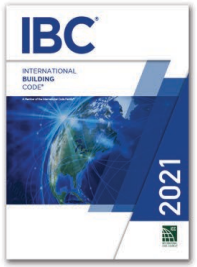
Frontage increase factor (Table 506.3.3)
I_f: 0.42

Note: If west open space is ignored, I_f would be 0.50 based on 50% of perimeter open with smallest open space of $\geq$ 30 feet



508.4.4.1, 509.4.1.1 Fire Separations of Mass Timber

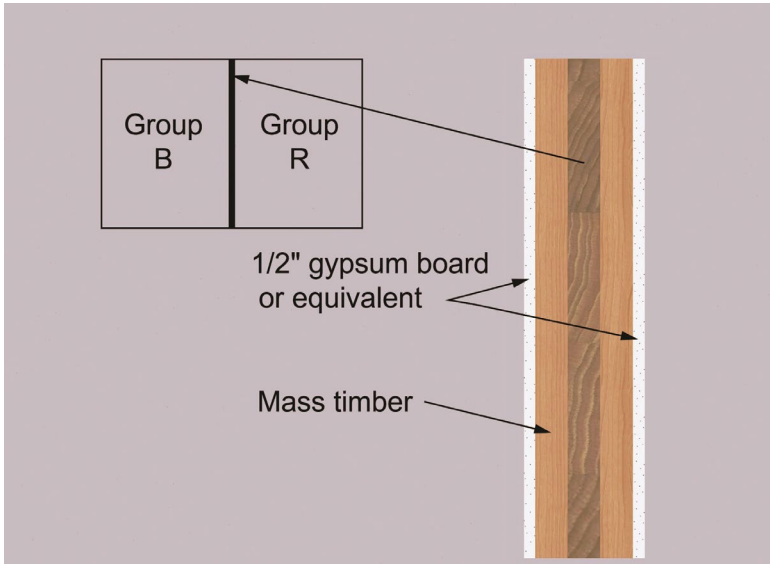
- Mass timber elements used as fire barriers and horizontal assemblies for separating occupancies or incidental use areas to be protected with approved thermal barrier of:
  - Minimum ½-inch gypsum board, or
  - Material tested to NFPA 275 (Temperature and Integrity Fire Tests of thermal barriers)
- Applicable only to Type IV-B and IV-C construction
- Thermal barrier only needs to cover exposed wood surfaces and does not add to fire-resistance rating of mass timber.



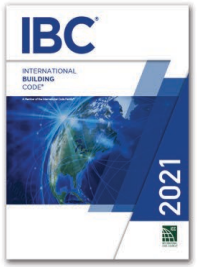
508.4.4.1, 509.4.1.1 Fire Separations of Mass Timber

- Only required on incidental use side of separation, on both sides for occupancy separation.

Example of fire separation as required by Table 508.4 for “separated occupancies”

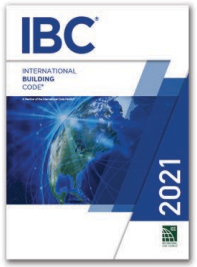


Applicable to Type IV-B and IV-C construction



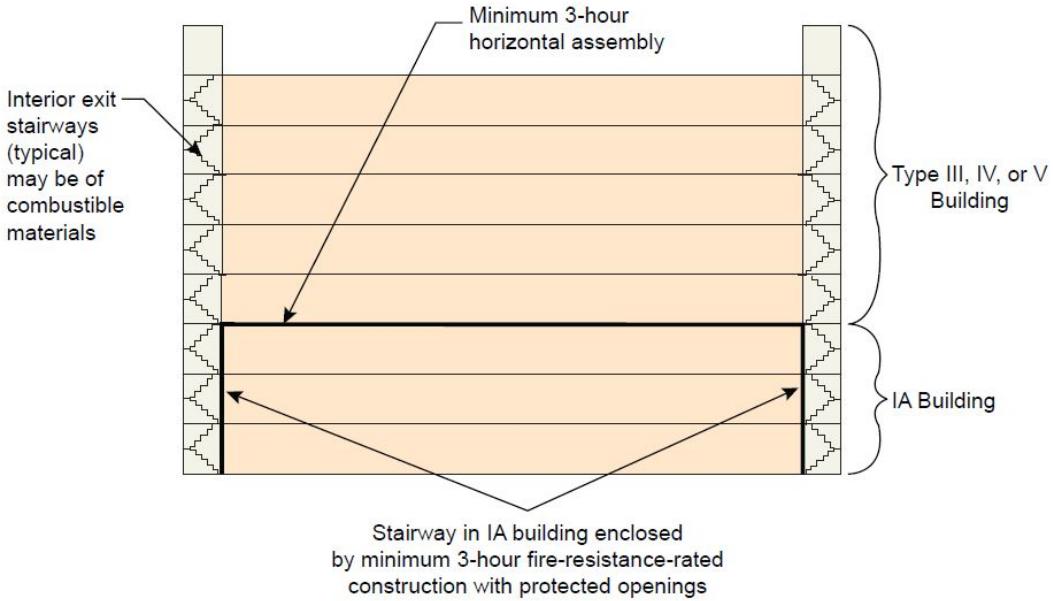
510.2 Stairway Construction in Podium Buildings

- Stairway construction in Type IA (lower) portion of podium buildings now permitted to be of combustible materials where two conditions exist:
  - Upper building is of Type III, IV or V construction, and
  - Stairway in lower building enclosed by minimum 3-hour fire-resistance-rated construction (shaft enclosure) with protected openings.
- Addresses confusion on how to address stairway construction that connects combustible and noncombustible portions of a podium building.
  - Section 1011.7 indicates stairways to be built of materials permitted based on building's type of construction.



510.2 Stairway Construction in Podium Buildings

- Stairway is conceptually located totally within upper Type III, IV or V building, thus allowing for combustible stairway construction.
  - Minimum 3-hour fire-resistance-rated separation fully separates “combustible” construction from “noncombustible” construction.



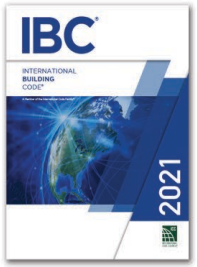
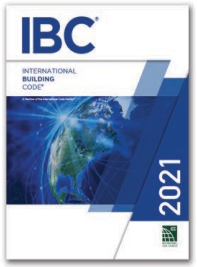


Table 601 Type IV Fire-Resistance

- Table 601 identifying minimum fire-resistance rating for building elements based on type of construction has been expanded to include new Type IV-A, IV-B and IV-C buildings.
- General comparison with Type IA (IV-A) and Type IB (IV-B and IV-C).
- Also clarifies that heavy timber roof construction, including primary structural frame members, permitted in: Type IB, IIA, IIB, IIIA and VA buildings.
  - Allows for nonrated combustible roof construction
- In Type IV-HT construction, interior bearing walls supporting > 2 floors or > 1 floor and a roof to have minimum 1-hour fire-resistance rating



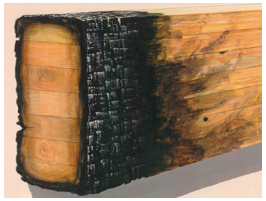
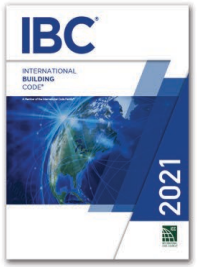


TABLE 601 Fire-Resistance Rating Requirements for Building Elements (Hours)

	Type I		Type II		Type III		Type IV				Type V	
Building Element	A	B	A	B	A	B	A	B	C	HT	A	B
Primary structural frame[f]	3[a,b]	2[a,b,c]	1[b,c]	0[c]	1[b,c]	0	3[a]	2[a]	2[a]	HT	1[b,c]	0
Bearing walls												
Exterior[e,f]	3	2	1	0	2	2	3	2	2	2	1	0
Interior	3[a]	2[a]	1	0	1	0	3	2	2	1/HT[g]	1	0
Nonbearing walls and partitions Exterior	See Table ~~602~~ 705.5											
Nonbearing walls and partitions Interior[d]	0	0	0	0	0	0	0	0	0	See Section 2304.11.2	0	0
Floor construction and associated secondary structural members (see Section 202)	2	2	1	0	1	0	2	2	2	HT	1	0
Roof construction and associated secondary structural members (see Section 202)	1½[b]	1[b,c]	1[b,c]	0[c]	1[b,c]	0	1½	1	1	HT	1[b,c]	0

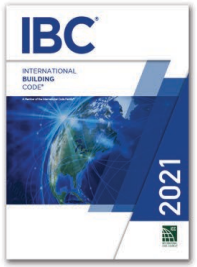
c. In all occupancies, heavy timber complying with Section 2304.11 shall be allowed for roof construction, including primary structural frame members, where a 1-hour or less fire-resistance rating is required.

g. Heavy timber bearing walls supporting more than two floors or more than a floor and a roof shall have a fire-resistance rating of not less than 1 hour.



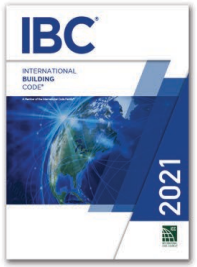
602.4 Mass Timber Type IV Buildings

- Type IV-A, IV-B and IV-C buildings may be constructed of mass timber and noncombustible materials.
- Required fire-resistance ratings may come from mass timber, noncombustible protection, or both.
  - Protective material to be applied directly to the timber members
  - Assigned time determined per Sections 703.2 and 722.7
- For Type IV-HT construction, minimum timber member dimensions of Section 2304.11 continue to be applicable.

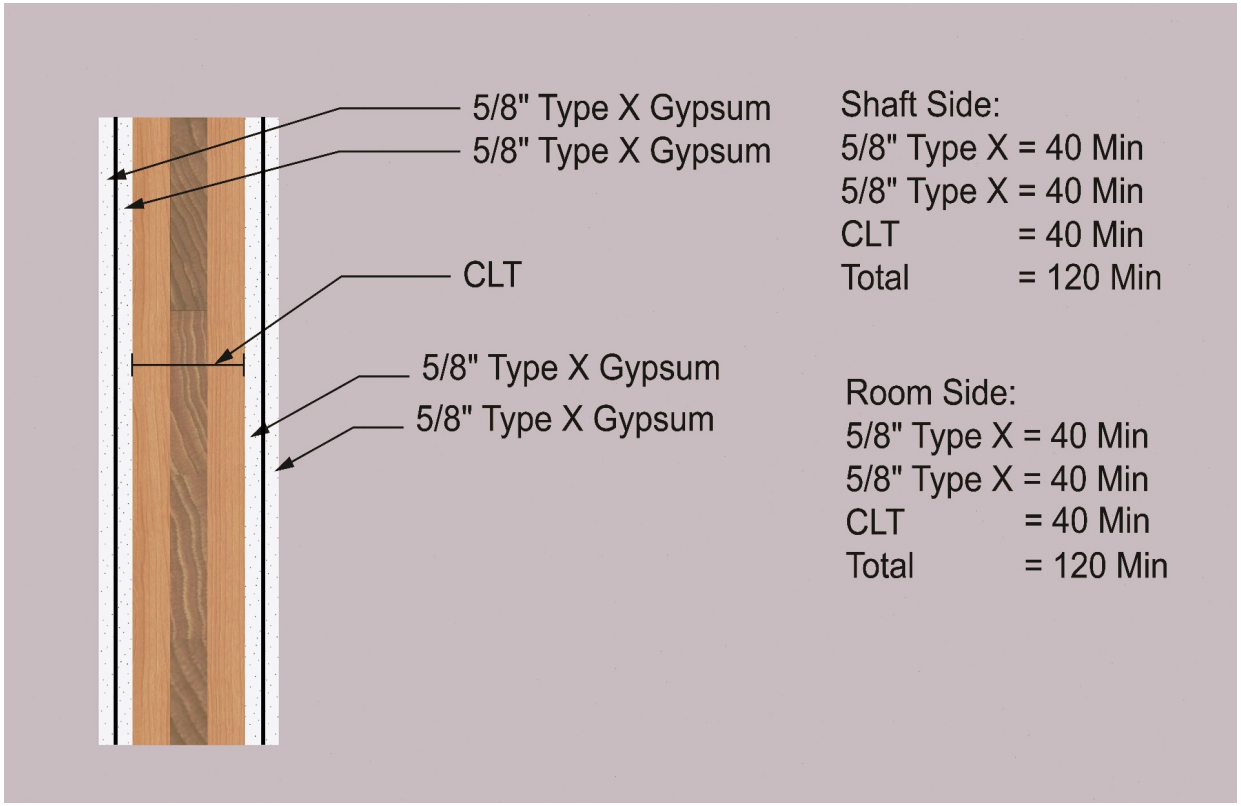


602.4 Mass Timber Type IV Buildings

- In buildings of Type IV-A, IV-B and IV-C construction with an occupied floor > 75 feet above lowest level of fire department vehicle access, mass timber interior exit stairways and elevator enclosures to be additionally protected where:
  - ≤ 12 stories or 180 feet: Interior faces of mass timber to be covered with noncombustible protection
  - > 12 stories or 180 feet: Only noncombustible materials

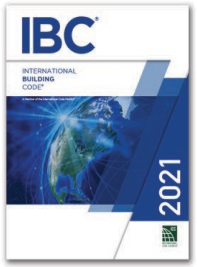


602.4 Type IV Shaft Walls



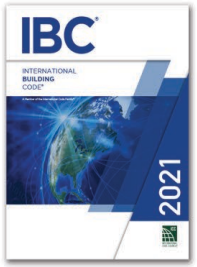
Example of interior exit stairways and elevator enclosures in Types IV-A and IV-B

- Limited to a maximum height of 12 stories or 180 ft
  Where height is exceeded in Type IV-A buildings, all noncombustible materials required



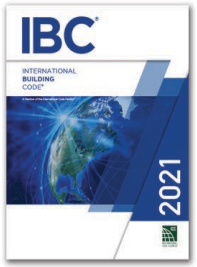
602.4 Mass Timber Type IV Buildings

- Limited changes to existing heavy timber provisions now designated as Type IV-HT.
- Combustible concealed spaces permitted in all Type IV categories where in conformance with Sections 602.4.1 through 602.4.4.
- Publication "*Mass Timber Buildings and the IBC*" by ICC and AWC addresses Type IV construction in detail.



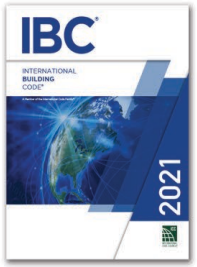
602.4.1- 602.4.3 Type IV-A, IV-B and IV-C Buildings

- Type IV-A construction mandates that faces of all timber members be protected with noncombustible materials.
  - Noncombustible wall and ceiling protection to contribute a time per Table 722.7.1(1), but not less than 80 minutes.
  - Floor assembly to be protected with noncombustible material at least 1 inch thick on top.
- Type IV-B construction mandates similar protection, but only required on an established percentage of members.
  - Some degree of exposed timber permitted
- Type IV-C construction permits all timber members to be unprotected.



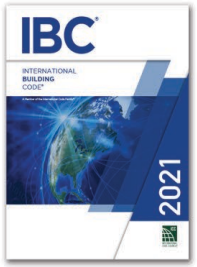
602.4.1 Type IV-A Buildings

- Type IV-A construction mandates:
  - Outside face of exterior walls of mass timber construction to have noncombustible protection with minimum assigned time of 40 minutes.
  - Interior faces of all mass timber elements, including inside faces of exterior mass timber walls and mass timber roofs, to have noncombustible protection with minimum assigned time of 80 minutes.
  - Floor assemblies to contain a noncombustible material at least 1 inch thick above mass timber with underside protected to same criteria as for other interior faces (80 minutes).
  - Interior surfaces of roof assemblies to meet same criteria as for other interior faces (80 minutes).



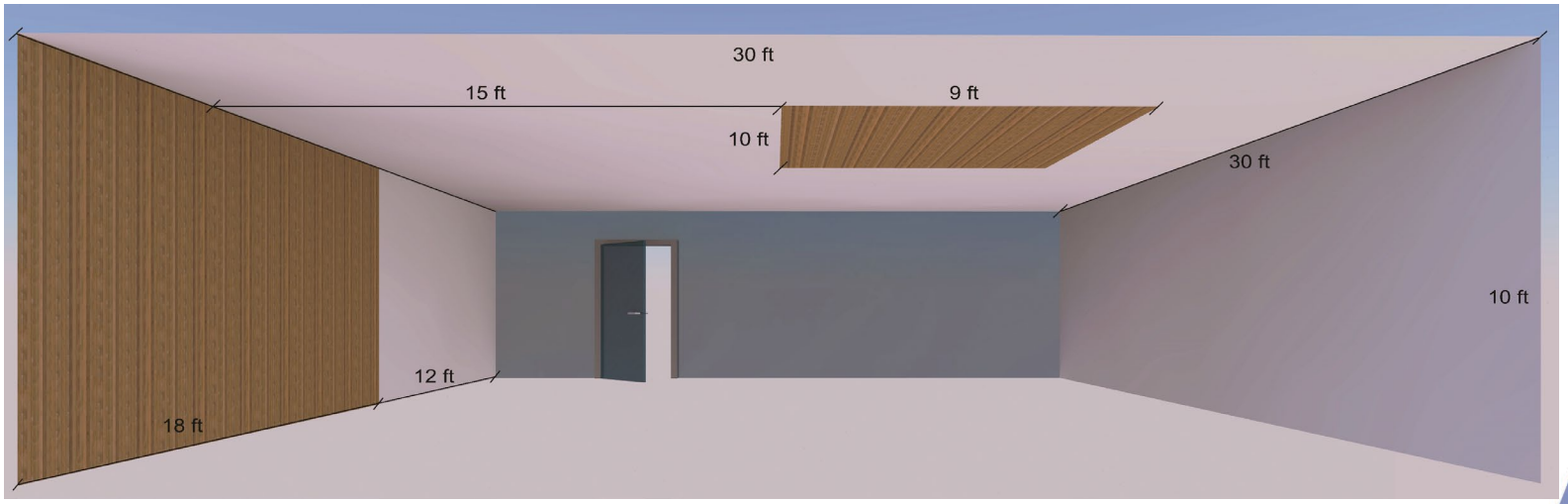
602.4.2 Type IV-B Buildings

- Type IV-B construction requires same degree of noncombustible protection as mandated for Type IV-B buildings.
- Unprotected portions of mass timber ceilings and walls permitted in Type IV-B buildings where:
  - Limited to a wall area equal to 40% of the floor area in any dwelling unit or fire area, or
  - Limited to a ceiling area equal to 20% of the floor area in any dwelling unit or fire area, or
  - A combination of unprotected wall and ceiling areas determined by applying the unity formula.



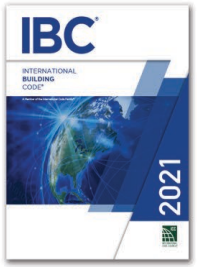
602.4.2 Type IV-B Buildings

- In each dwelling unit or fire area, unprotected portions of mass timber walls and ceilings to be ≥ 15 feet from other unprotected portions of other walls and ceilings.



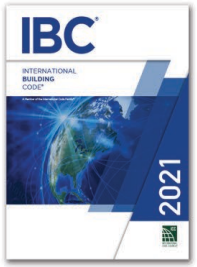
602.4.3 Type IV-C Buildings

- Type IV-C construction differs significantly from Types IV-A and IV-B as mass timber located on building's interior can be fully exposed, except for:
  - Concealed spaces
  - Shaft enclosures and interior exit stairways
- In addition, Type IV-C differs from Type IV-HT regarding fire-resistance-rated protection of building elements.
  - Minimum 2-hour rating required for bearing walls, floors and primary structural frame elements, however such rated elements need not be covered with noncombustible protection.



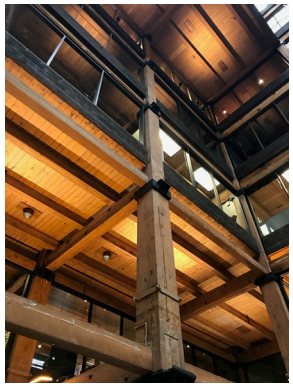
602.4.1- 602.4.3 Type IV-A, IV-B and IV-C Buildings

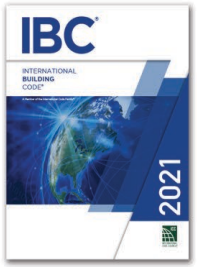
- Concealed spaces in Type IV-A, IV-B and IV-C buildings shall not contain combustibles other than electrical, mechanical, fire protection and plumbing materials and equipment permitted in plenums per IMC Section 602.
  - Combustible construction forming concealed spaces to be protected with noncombustible materials with minimum assigned time of:
    - 80 minutes in Types IV-A and IV-B
    - 40 minutes in Type IV-C
- In shaft construction, both shaft and room sides of mass timber elements to be protected with noncombustible materials with minimum assigned time of:
  - 80 minutes in Types IV-A and IV-B
  - 40 minutes in Type IV-C



602.4.4 Type IV-HT Buildings

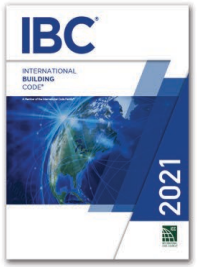
- Type IV-HT represents the traditional heavy timber construction type where fire-resistance relies almost solely on minimum cross-sectional dimensions.
- All fire-resistance based on dimensions of timber members, prescriptive rather than performance.
- Modifications made where FRT wood is used within exterior wall assemblies:
  - Minimum 6-inch thickness deleted
  - CLT minimum thickness (4”) regulated rather than wall thickness (6”)



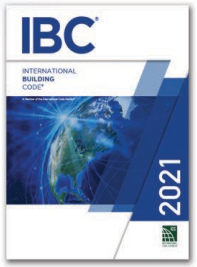


602.4.4 Type IV-HT Buildings

- Concealed spaces now permitted provided no combustibles other than building elements and electrical, mechanical, fire protection and plumbing materials permitted in plenums per IMC Section 602, and protected by one of following:
  - Building is sprinklered throughout, including within concealed space, or
  - Concealed space is completely filled with noncombustible insulation, or
  - Surfaces within concealed space to be fully covered with minimum 5/8” Type X gypsum board
- Exception allows concealed spaces within interior walls and partitions having minimum 1-hour rating with no additional protection.



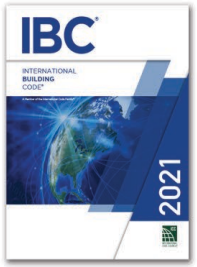
Part 3
Fire Protection
Chapters 7 through 9



LEARNING center

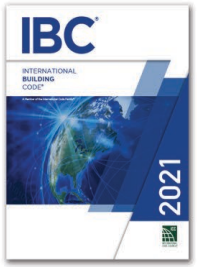
703.6, 703.7 Noncombustible Protection for Mass Timber

- The time contributed to the fire-resistance rating for mass timber elements, components and assemblies by the noncombustible protection to be established through a comparison of assemblies tested per ASTM E119 or UL 263.
- Two assemblies to be tested to same criteria of structural failure with the following conditions, with noncombustible protection time contribution assigned based on time difference between the two assemblies:
  - Test Assembly 1:without protection
  - Test Assembly 2:includes representative noncombustible protection

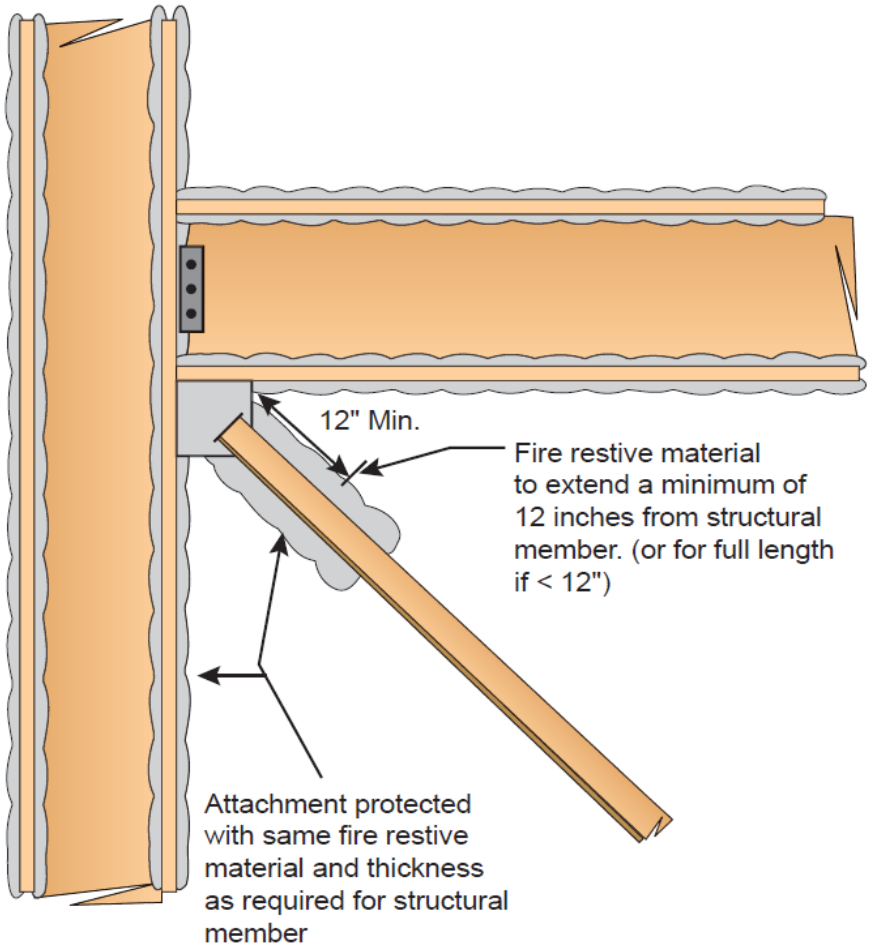


704.6.1 Secondary Attachments and Fireproofing

- Where primary and secondary structural steel members require fire protection, secondary steel attachments to have same protective material and thickness as required for primary member to address heat transfer.
- Protection to extend away from primary member:
  - At least 12 inches, or
  - Applied to entire length where attachment < 12 inches in length.
- Where attachment is hollow and ends are open, fire-resistive material and thickness to be applied to both the interior and exterior of the hollow steel attachment.



704.6.1 Secondary Attachments and Fireproofing



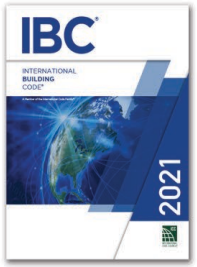
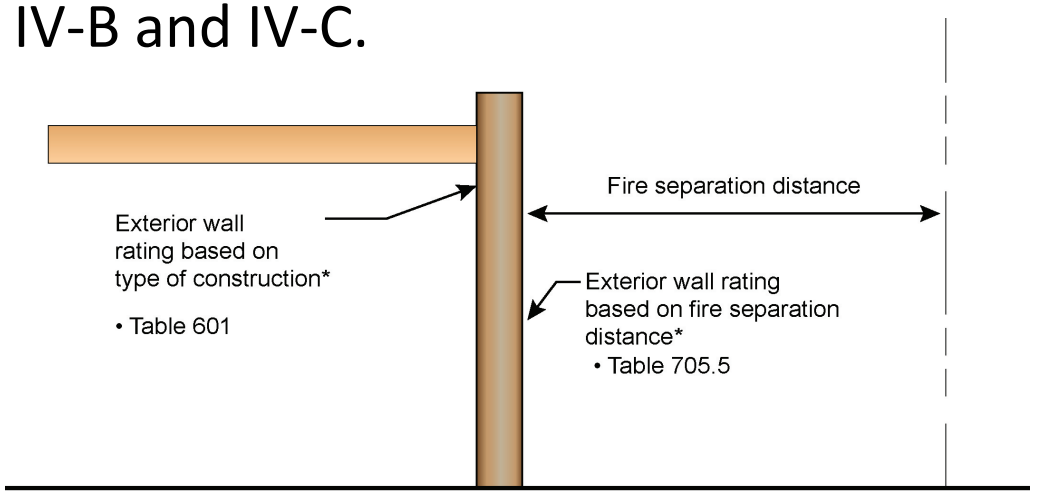


Table 705.5 Exterior Wall Ratings

- Previous Table 602 addressing “Fire-resistance Rating Requirements for Exterior Walls Based on Fire Separation Distance” has been relocated.
- Relocation is deemed appropriate as Chapter 7 is the primary location for establishing exterior wall requirements related to fire-resistance.
- In addition, entries have been made for new construction types IV-A, IV-B and IV-C.



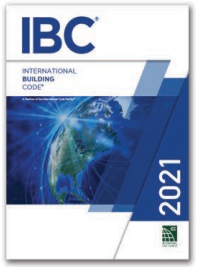


TABLE ~~602~~ 705.5 Fire-Resistance Rating Requirements for Exterior Walls Based on Fire Separation Distance[a,d,g]

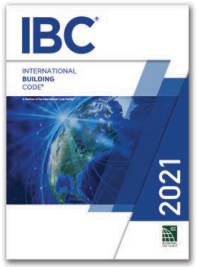
Fire Separation Distance = X (feet)	Type Of Construction	Occupancy Group H[e]	Occupancy Group F-1, M, S-1[f]	Occupancy Group A, B, E, F-2, I, R[i], S-2, U[h]
X < 5[b]	All	3	2	1
5 ≤ X < 10	IA, IV-A	3	2	1
	Others	2	1	1
10 ≤ X < 30	IA, IB, IV-A, IV-B	2	1	1[c]
	IIB, VB	1	0	0
	Others	1	1	1[c]
X ≥ 30	All	0	0	0

For SI: 1 foot = 304.8 mm.

(footnotes not shown)

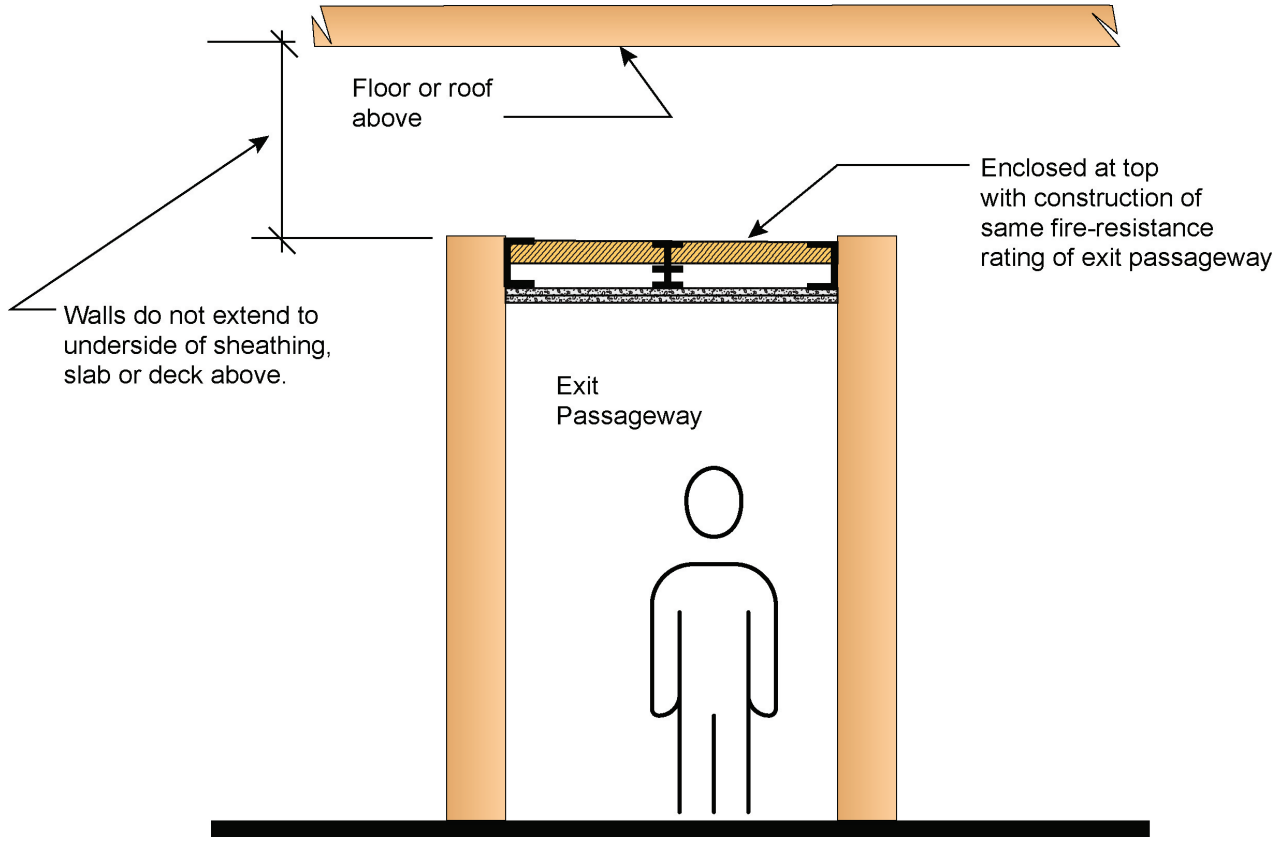
707.5 Enclosure of Exit Passageways

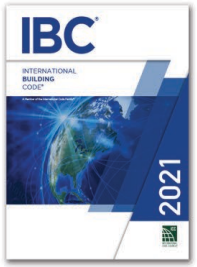
- Allowance now provided for fire barriers creating an exit passageway to terminate at a fire-resistance-rated lid.
  - Enclosure at top to have same fire-resistance rating as required for the exit passageway.
- This new option can be applied where fire barrier does not extend to the underside of the roof sheathing, slab or deck above.
- Permits passage of ducts, piping and conduit from one side of the exit passageway to the other without need for a horizontal shaft enclosure.



707.5 Enclosure of Exit Passageways

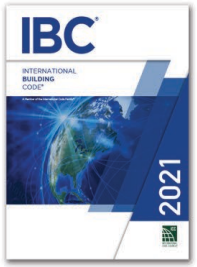
- Provision is applicable where either a floor or roof occurs above the exit passageway enclosure.



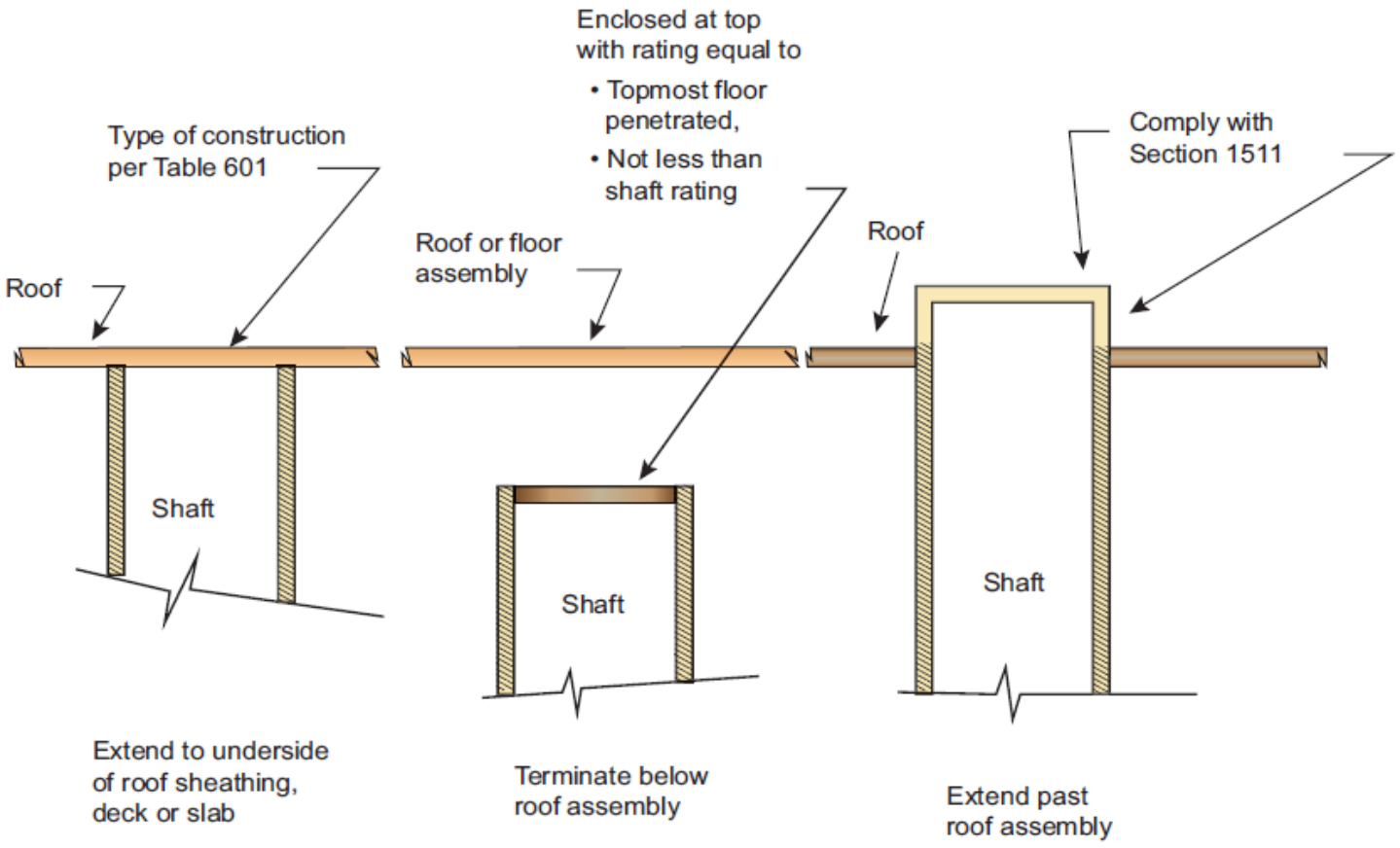


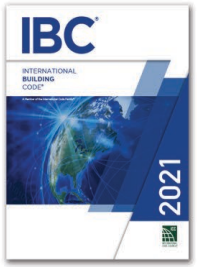
713.12 Top of Shaft Enclosure

- Three specific methods for terminating a shaft enclosure at the top have been established to clarify the options that are available:
  - Extend the shaft walls to the underside of the roof sheathing, deck or slab, or
  - Terminate below the roof assembly with a top enclosure having the same fire-resistance rating as the topmost floor penetrated by the shaft but not less that the required rating of the shaft enclosure, or
  - Extend past the roof assembly and comply with the provisions for rooftop structures (penthouses) in Section 1511.



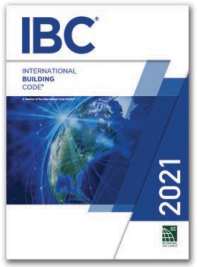
713.12 Top of Shaft Enclosure





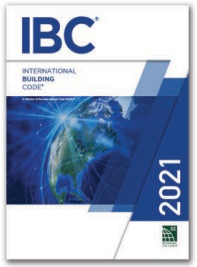
716.4 Fire-Protective Curtain Assemblies

- New definition in Section 202 defining fire-protective curtain assembly as: *an assembly consisting of a fabric curtain, bottom bar, guides, coil, and an operating and closing system*
- New provisions establish guidance on how such assemblies are to be tested, labeled and installed.



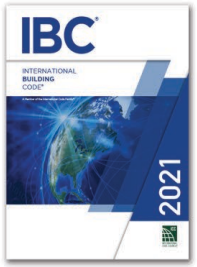
716.4 Fire-Protective Curtain Assemblies

- Assemblies to be evaluated using UL 10D, but without hose stream test.
- IBC does not address how or where these systems are to be used or where they would be accepted.
  - It is assumed that the assemblies would typically be installed as a means of smoke and draft control.
- Their use, either vertical or horizontal, will need to be reviewed and approved by the building official under alternate methods provisions of Section 104.11.



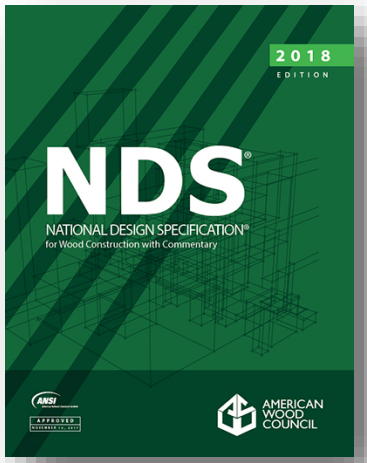
717.5.2 Flex Connectors

- Under Exception 3, fire dampers may be omitted at penetrations of fire barriers in fully-ducted HVAC systems where specified conditions are met.
- New allowances permit the installation of nonmetal flexible air connectors at two locations:
  - At the duct connection to the air handling unit or equipment located within the mechanical room per IMC Section 603.9.
  - From an overhead metal duct to a ceiling diffuser within the same room per IMC Section 603.6.2.

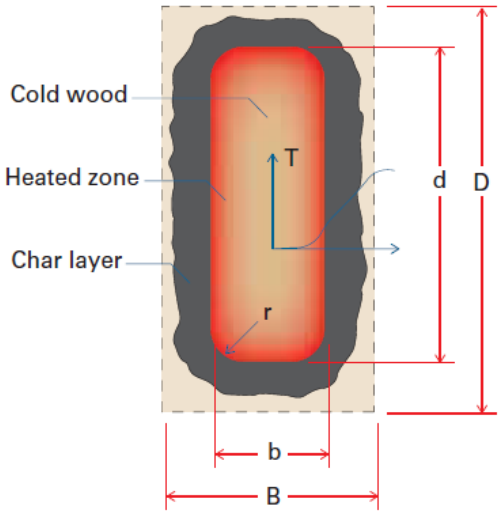


722.1 Fire-Resistance Rating of Exposed Mass Timber Members

- The fire-resistance rating of mass timber members is to be in conformance with Chapter 16 of the *National Design Specification for Wood Construction* (NDS).
- NDS 16.2 addresses fire design up to 2 hours
- Applicable to beams, columns, walls, floors/roofs
- Applicable products include:
  - Sawn lumber
  - Glulam (softwood)
  - LVL
  - PSL
  - LSL
  - CLT



722.1 Fire-Resistance Rating of Exposed Mass Timber Members



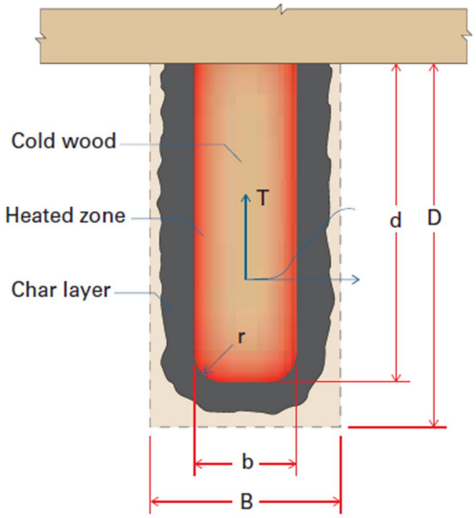
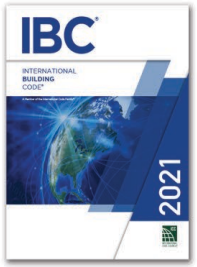


Table 16.2.1A Char Depth and Effective Char Depth (for β_n = 1.5 in./hr.)

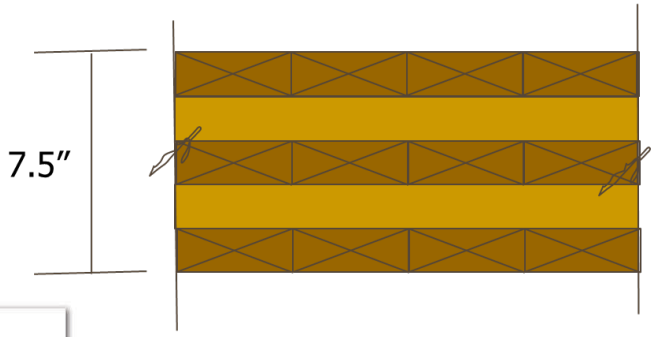
Required Fire Resistance (hr.)	Char Depth, a_{char} (in.)	Effective Char Depth, a_{eff} (in.)
1-Hour	1.5	1.8
1½-Hour	2.1	2.5
2-Hour	2.6	3.2

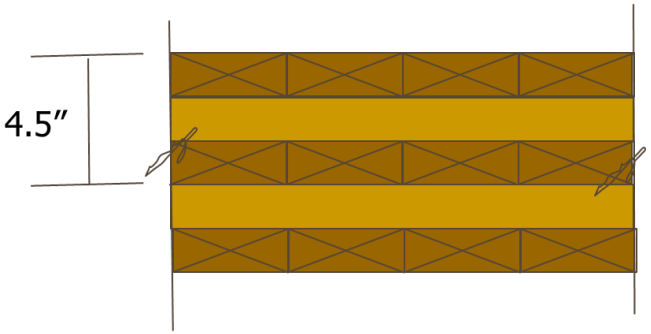


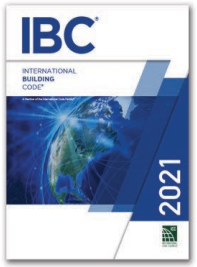
722.1 Fire-Resistance Rating of Exposed Mass Timber Members

Example of determination of effective CLT roof cross-section:

- Assume 5-layers @ 1.5” (total = 7.5”)
- Determine thickness for 1-hr FRR
- a_{char} = 1.8” (NDS Table 16.2.1B)
- d = 7.5” – 1.8” = 5.7”
- Could conservatively assume 3-layer panel for design

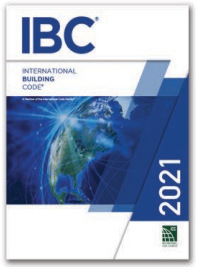






722.7 Fire-Resistance Rating of Mass Timber Assemblies

- A prescriptive approach has been provided to achieve the required fire-resistance ratings for mass timber members and assemblies.
- The fire-resistant rating to consist of the rating of the unprotected mass timber element added to the protection time of the noncombustible protection.
  - At least 2/3 of the required fire-resistance rating must come from the noncombustible protection.
- Provisions address protection on both exterior and interior surfaces.
- The fire-resistance rating of exposed mass timber members is to be in conformance with Chapter 16 of the *National Design Specification for Wood Construction* (NDS).



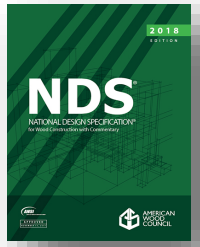
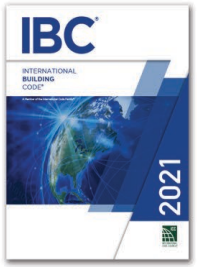


TABLE 722.7.1(1) Protection Required from Noncombustible Covering Material

Required Fire-Resistance Rating of Building Element per Tables 601 and 705.5 (hours)	Minimum Protection Required from Noncombustible Protection (minutes)
1	40
2	80
3 or more	120

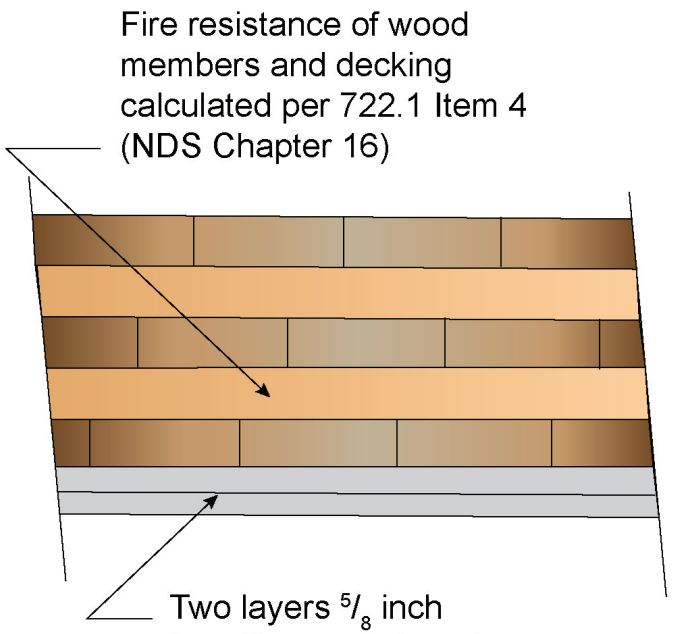
TABLE 722.7.1(2) Protection Provided by Noncombustible Covering MateriaL

Noncombustible Protection	Protection Contribution (minutes)
1/2-inch Type X gypsum board	25
5/8-inch Type X gypsum board	40



722.7 Fire-Resistance Rating of Mass Timber Assemblies

- Example:



CLT time = 50 min.

5/8" typex = 40 min.

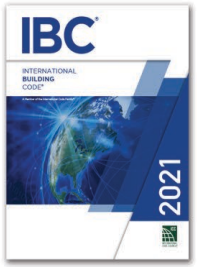
5/8" typex = 40 min.

Total = 130 min.

(Ok for 2-hour rating)

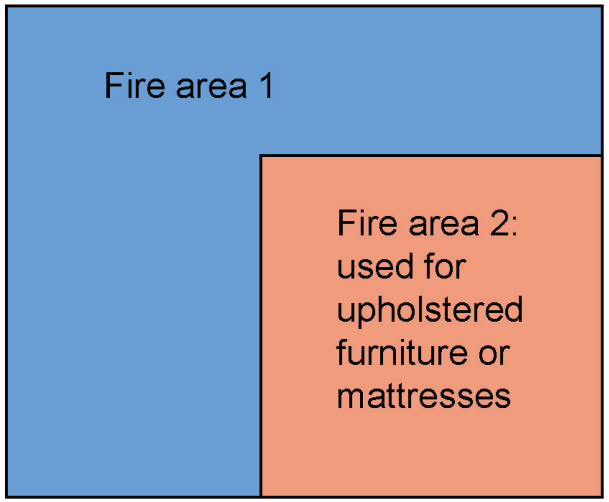
903.2.4, 903.2.7, 903.2.9 Upholstered Furniture and Mattresses

- Sprinkler requirements for Groups F-1, M and S-1 where upholstered furniture or mattresses are manufactured, sold or stored have been revised.
  - Group F-1: Area threshold (2,500 sf) now based on size of fire area where upholstered furniture or mattresses are manufactured
  - Groups M: Area threshold (5,000 sf) now based on size of floor area within fire area used for display and sales of upholstered furniture or mattresses
  - Group S-1: Area threshold (2,500 sf) now based on size of floor area within fire area used for storage of upholstered furniture or mattresses



903.2.4, 903.2.7, 903.2.9 Upholstered Furniture and Mattresses

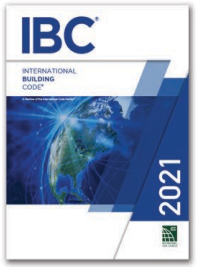
- In addition, where floor area threshold exceeded, sprinkler need only be provided in fire area and not throughout building.



Separation per Table 707.3.10

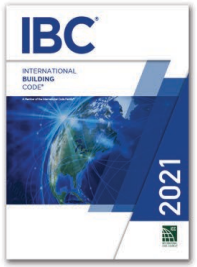
Sprinkler system required throughout fire area, if:

- F-1: > 2,500 sq. ft. **fire area** for manufacture
- M: > 5,000 sq. ft. **floor area** within fire area for display and sale
- S-1: > 2,500 sq. ft **floor area** within fire area for storage



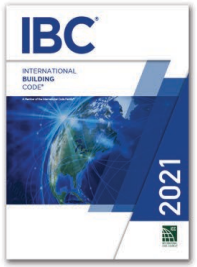
903.2.4, 903.2.7, 903.2.9 Upholstered Furniture and Mattresses

- In addition, new exception indicates that one-story Group S-1 self-storage facilities are exempt from 2,500 square foot sprinkler threshold where all storage spaces can be accessed directly from exterior.
  - General Group S-1 sprinkler threshold of 12,000 square feet continues to be applicable.
- Based on assumption that such facilities contain significant amount of upholstered furniture and/or mattresses.



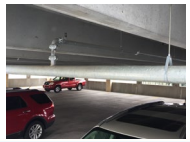
903.2.4.2, 903.2.9.3 Distilled Spirits

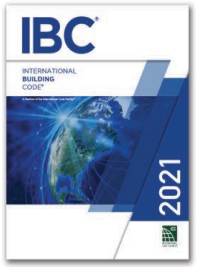
- Automatic sprinkler protection now required in all:
  - Group F-1 fire areas used for the manufacture of distilled spirits
  - Group S-1 fire areas used for the bulk storage of distilled spirits or wine.
- Part of a series of changes in IBC and IFC to eliminate confusion in regulation of such buildings.
  - Includes allowance that Group H classification not warranted regardless of quantities of hazardous materials.



903.2.10 Sprinklers in Open Parking Garages

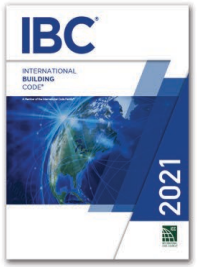
- Sprinklers now required in Group S-2 open parking garages where:
  - Any fire area exceeds 48,000 square feet, or
  - In a building having one or more stories with an occupant load ≥ 30 located ≥ 55 feet above lowest level of fire department vehicle access
- Sprinkler protection to extend throughout entire garage
- Concern based on:
  - Increased fuel load due to expanded use of plastics and lightweight materials in vehicles, as well as types of fuels being utilized
  - Recognition of a fire that occurred in a parking garage in Liverpool, England in late 2017





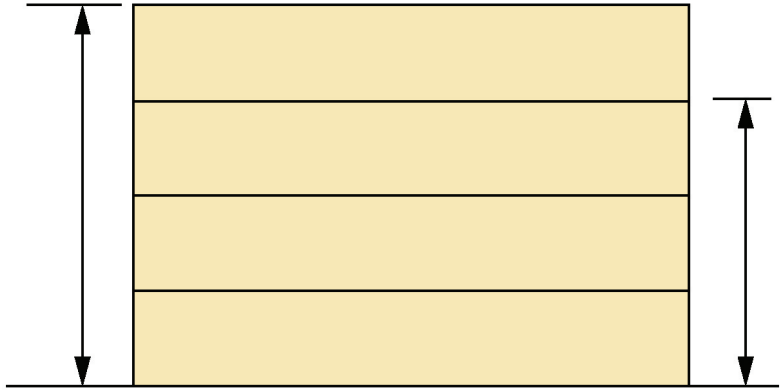
903.3.1.2 NFPA 13R Sprinkler Protection

- Scoping for the permitted use of an NFPA 13R sprinkler system in Group R occupancies has been modified such that the following conditions must all be met by the Group R to allow for use of 13R system:
  - Located no more than 4 stories above grade plane, and
  - Floor level of highest story no more than 30 feet above lowest level (or lowest story below highest level) of fire department vehicle access. (previously 60 feet above grade plane)
- In addition, the story limit of four is now to be measured from grade plane in podium buildings (Sec. 510.2 and 510.4) rather than from the horizontal assembly separating the two buildings.



903.3.1.2 NFPA 13R Sprinkler Protection

Group R occupancy permitted to use NFPA 13R sprinkler system

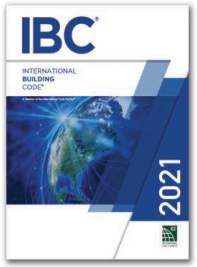


2018

- ≤ 4 stories in height
- ≤ 60-foot building height

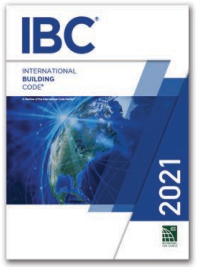
2021

- 4 stories above grade plane
- Highest story ≤ 30 feet above lowest level of fire dept. vehicle access
- Limit on stories also measured from grade plane when constructed using Sec. 510.2 or 510.4 (podium provisions



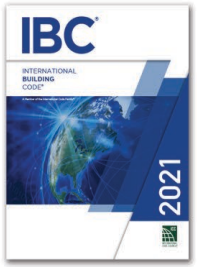
907.2.10 Manual Fire Alarms in Group S Buildings

- Manual fire alarm system now required in Group S public- and self-storage occupancies where both of following conditions occur:
  - Three stories or greater in height, and
  - Interior corridors and/or interior common areas
- Visible notification appliances not required within storage units.
- Manual fire alarms boxes not required where building is fully sprinklered and occupant notification appliances activate throughout notification zones upon sprinkler water flow.



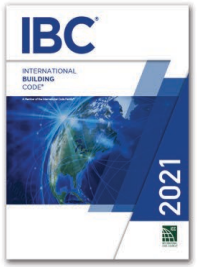
907.5.2.1.3 Fire Alarm Occupant Notification

- In sleeping rooms of Group R-1 and R-2 occupancies, the audible fire alarm activated by the fire alarm system to now be a 520-Hz low-frequency signal.
  - Where smoke alarm unable to produce a 520-Hz signal, the signal to be provided by a listed notification appliance or smoke detector with an integral 520-HZ sounder.
- Low-frequency signal for smoke alarms only required if Group R-1 or R-2 occupancy is required to have a fire alarm system.



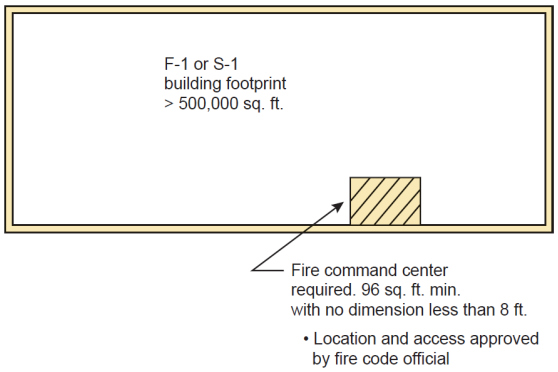
907.5.2.1.3 Fire Alarm Occupant Notification

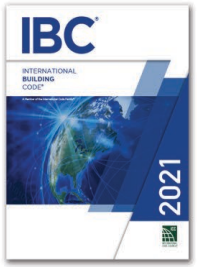
- Low frequency signals have been shown to improve the waking effectiveness for several high-risk groups, including:
  - Individuals who are over 65 who are hard of hearing
  - School-age children
  - People who are alcohol impaired
- As there are currently very few smoke alarms capable of providing the low-frequency signal, particularly in back-up mode, other methods include:
  - Fire alarm system horns and horn/strobes
  - Smoke detectors w/integral sounder bases
  - Speakers connected to an EVAC system



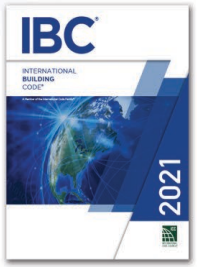
911 Fire Command Centers in Groups F-1 and S-1

- Fire command center now required in Group F-1 and S-1 occupancies with building footprint > 500,000 square feet.
  - Fire command centers continue to be required for high-rise buildings.
- Fire command center to be ≥ 96 square feet with a minimum dimension of 8 feet where approved by the fire code official.
  - Reduction from general requirement of ≥ 200 square feet and ≥ 10 feet minimum dimension.





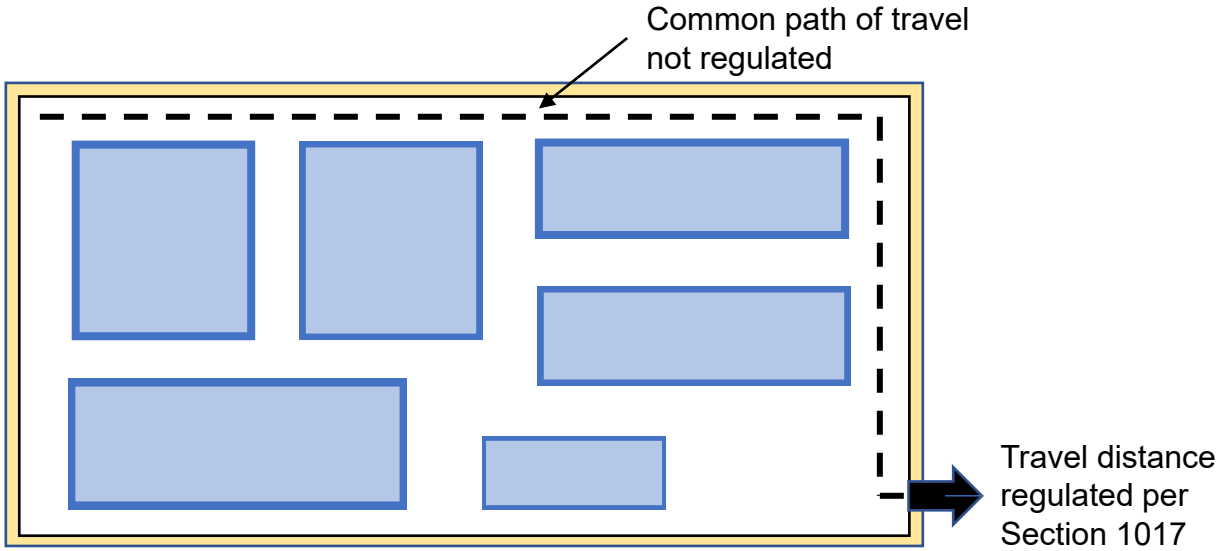
Part 4
Means of Egress
Chapter 10

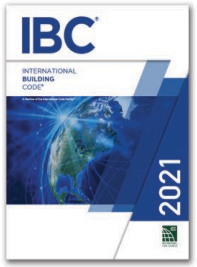


ICC LEARNING center

1006.2.1 Egress from Mechanical Rooms and Penthouses

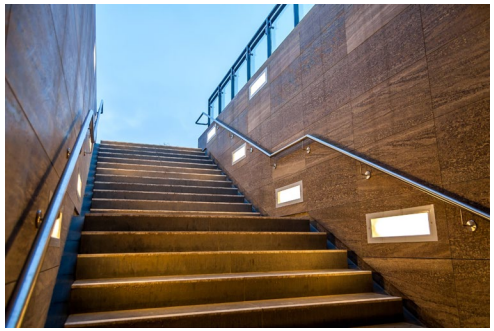
- Common path of travel distance limitations are no longer applicable to unoccupied mechanical rooms and penthouses.
- These limited use spaces continue to be regulated based on:
  - Occupant load (Table 1006.2.1)
  - Exit access travel distance (Table 1017.2)

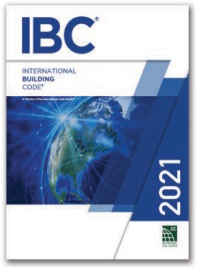




1008.2.1 Stairway Illumination

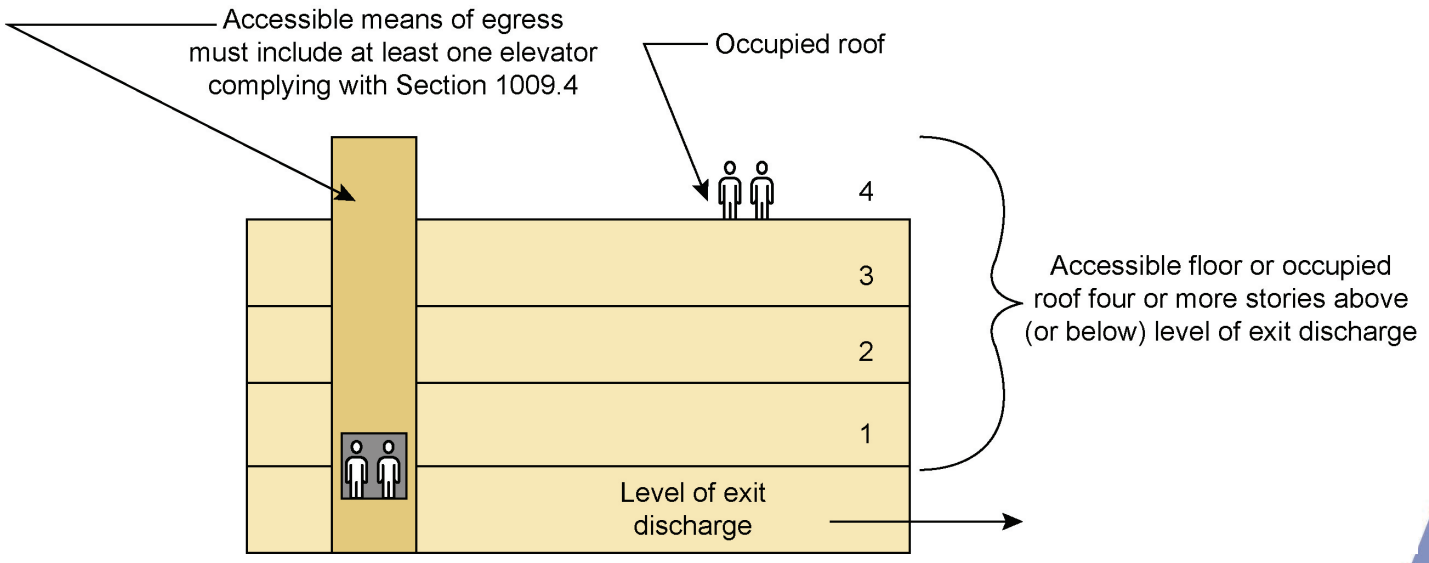
- Exit stairways, exit access stairways and their associated landings must now have an illumination level under normal power of at least 10 footcandles.
  - Measured at the walking surface
  - Not applicable to stairs in exit discharge
  - Required only when stairway is in use, allowing for occupant-sensor or daylight-responsive controls
  - Exceptions for auditoriums, theaters and similar assembly occupancies still applicable
- Considered as an easily accomplished means for improving stairway safety

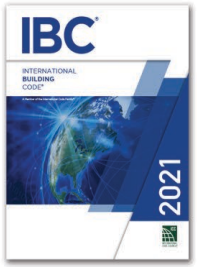




1009.2.1 Accessible Elevators to Occupied Roofs

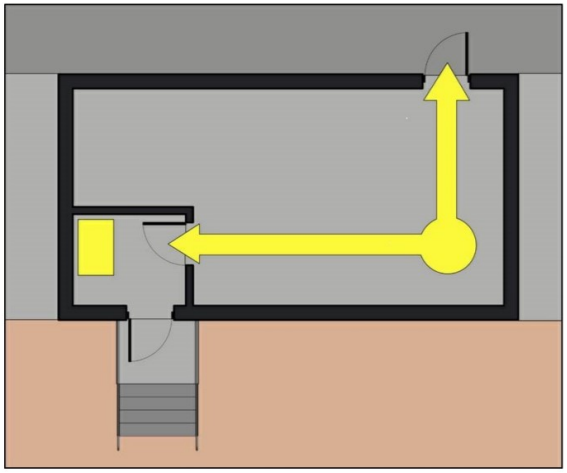
- An elevator serving a required accessible occupied roof must now be considered as one of the required accessible means of egress where the roof is located directly above the 3rd story above the level of exit discharge.

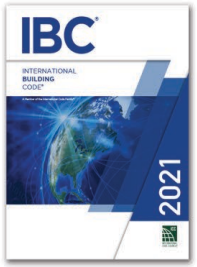




1009.6.2 Areas of Refuge

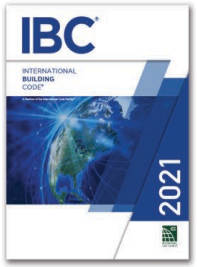
- An interior area of refuge no longer needs to have direct access to a complying stairway or elevator where the area of refuge:
  - Is located at the level of exit discharge, and
  - Provides direct access an exterior exit door.
- Allows for an alternative to an exterior area for assisted rescue which is typically utilized where the exit discharge is not accessible.





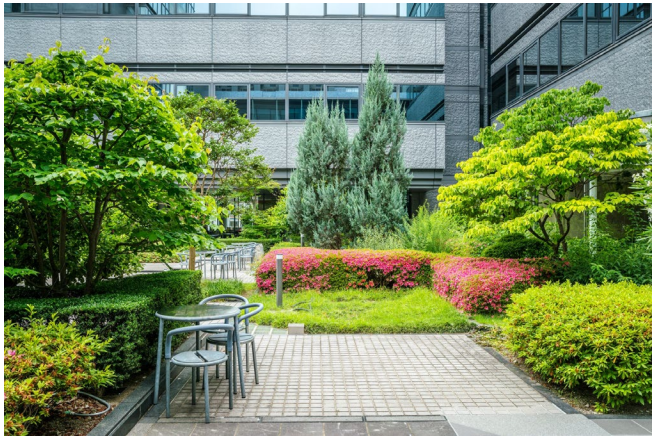
1010.2.4 Locks and Latches

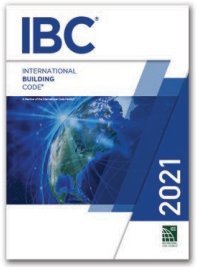
- In Group I-1, Condition 2 and Group I-2 occupancies where clinical needs of care recipients require containment, or where such persons pose a security threat, locks and latches are permitted to prevent door operation where:
  - All clinical staff can readily unlock doors at all times, and
  - All such locks are keyed to keys carried by clinical staff at all times, or clinical staff have codes or other means necessary to operate the locks at all times.
- Consistent with federal healthcare regulations
- Locking devices now also permitted on doors to balconies, decks and other exterior spaces serving:
  - Private office spaces where exterior space $\geq$ 250 sf
  - Individual dwelling or sleeping units



1010.2.4 Locks and Latches

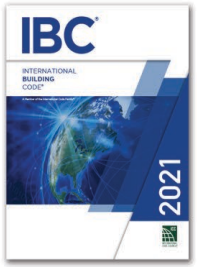
- Where occupants must egress from an exterior space through the building, exit access doors permitted to equipped with an approved locking device.
  - Applicable to enclosed courtyards, occupied roofs, decks and other exterior areas
  - Not applicable to egress courts
- Six conditions must be met in order for the locking devices to be permitted:





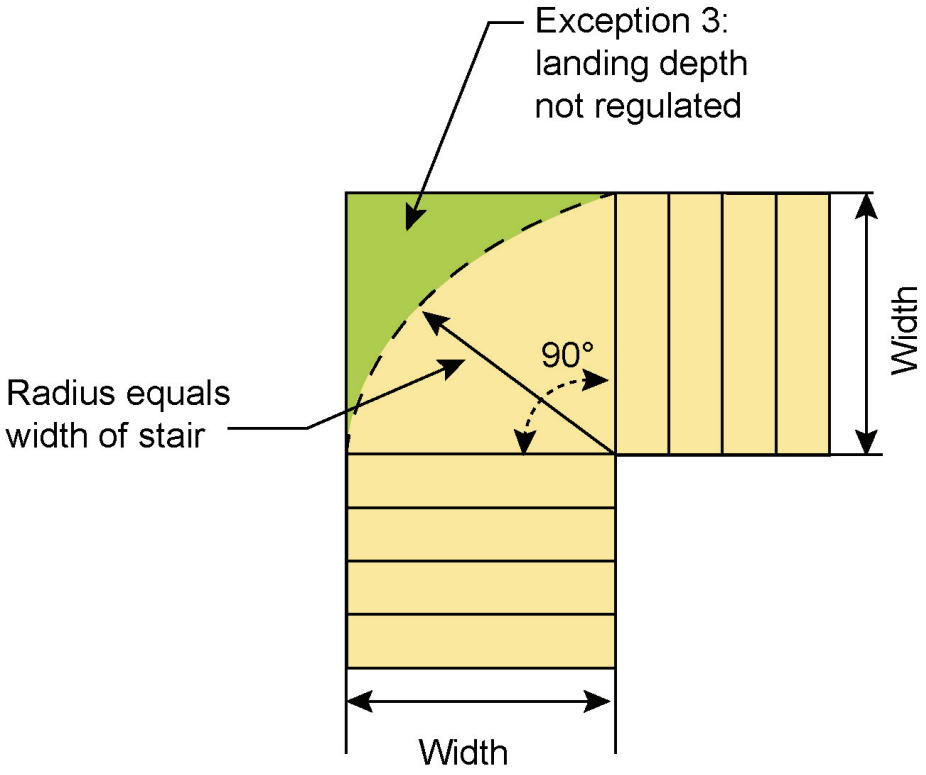
1010.2.4 Locks and Latches

- Conditions include:
  - Maximum occupant load posted per Section 1004.9 inside building adjacent to all exit access doorways
  - Weatherproof telephone or two-way communication system installed on exterior side adjacent to at least one required exit access door
  - Locking device to be key-operated and readily distinguishable as locked
  - Minimum 5 square-foot clear window or glazed door opening provided at each exit access door
  - Signage posted on interior side at each locked door stating “THIS DOOR TO REMAIN UNLOCKED WHEN THE OUTDOOR AREA IS OCCUPIED”
  - Occupant load of exterior area limited to 300



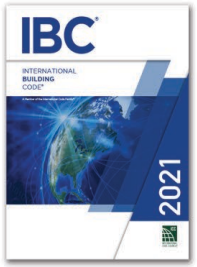
1011.6 Stairway Landings

- Where landing turns 90° or more, minimum landing depth not regulated where landing provided is not less than that described by an arc with a radius equal to width of the flight served.

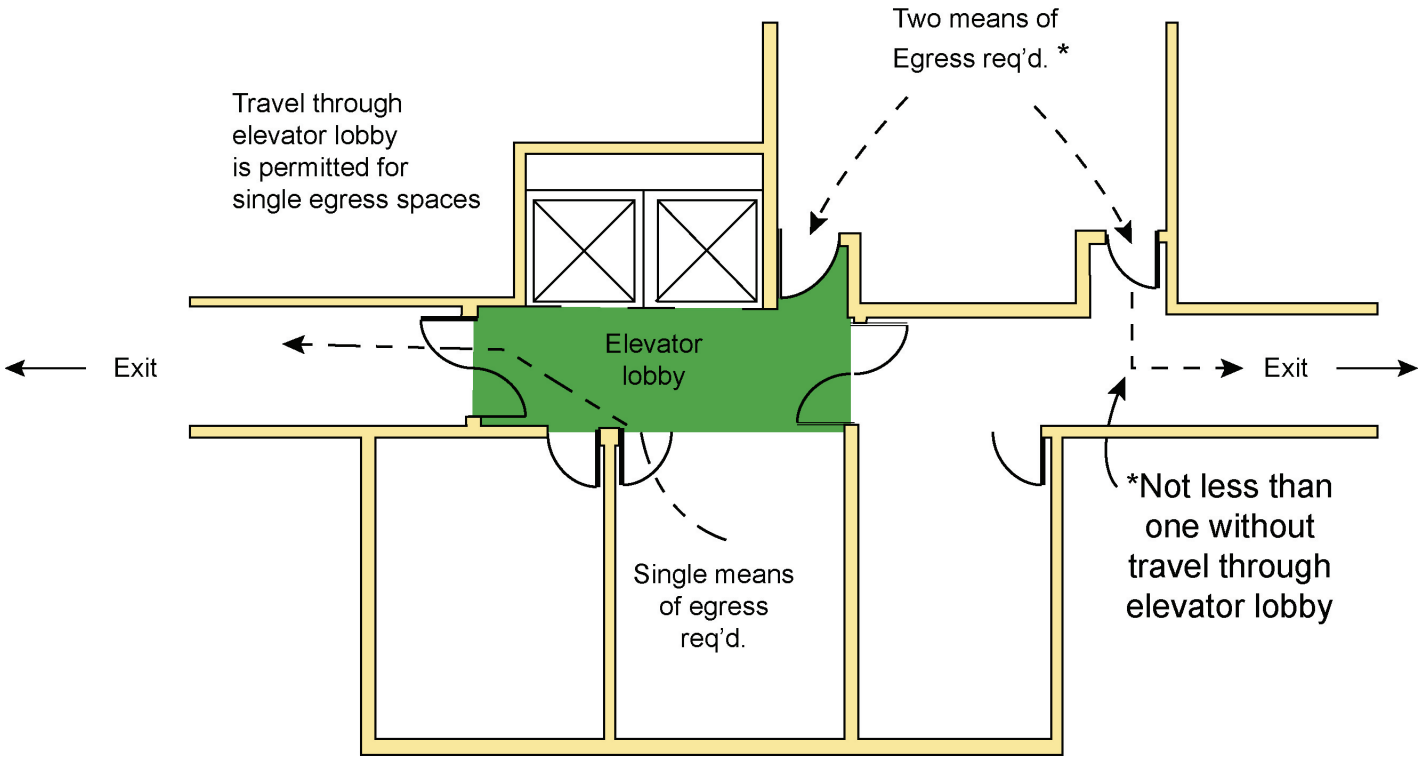


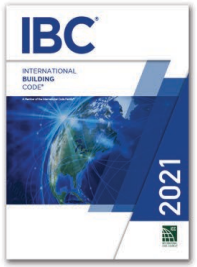
1016.2 Egress Through Intervening Spaces

- Egress through an enclosed elevator lobby now permitted for spaces having a single means of egress.
- Previous language mandated that access to not less than one of required exits to be provided without travel through an enclosed elevator lobby.
  - Such requirement still applicable to spaces where two or more means of egress are required
- Applicable for both nonrated and rated corridors



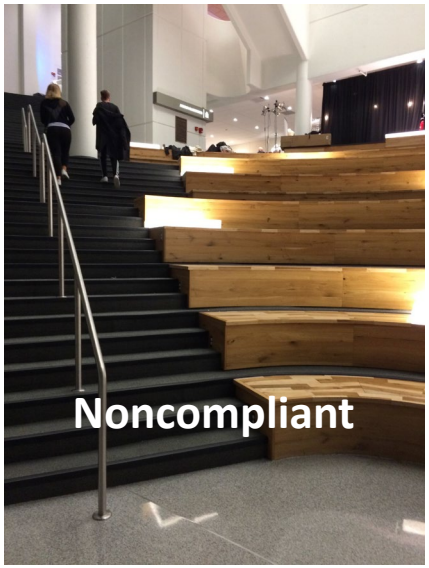
1016.2 Egress Through Intervening Spaces

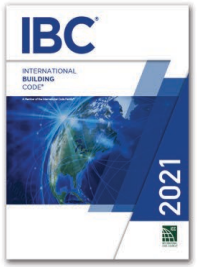




1030.16 Handrails at Social Stairs

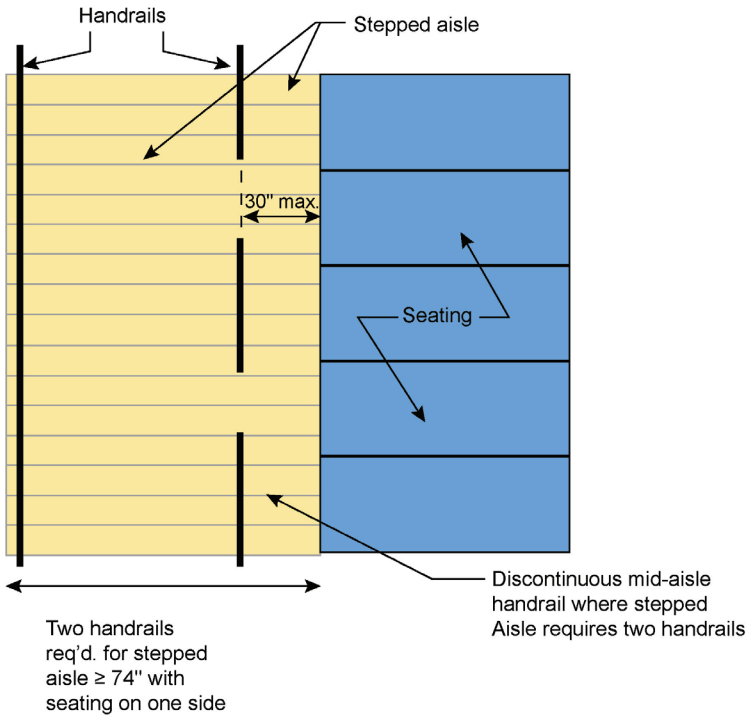
- Guidance has been provided to address handrails on those stairs, primarily in assembly and educational occupancies, that are a combination of stairway travel and assembly seating.
- Based on the assembly stepped aisle provisions, the condition is viewed as an assembly seating area with the seating platforms (without seats) located to the side of the stepped aisle.

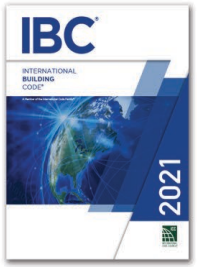




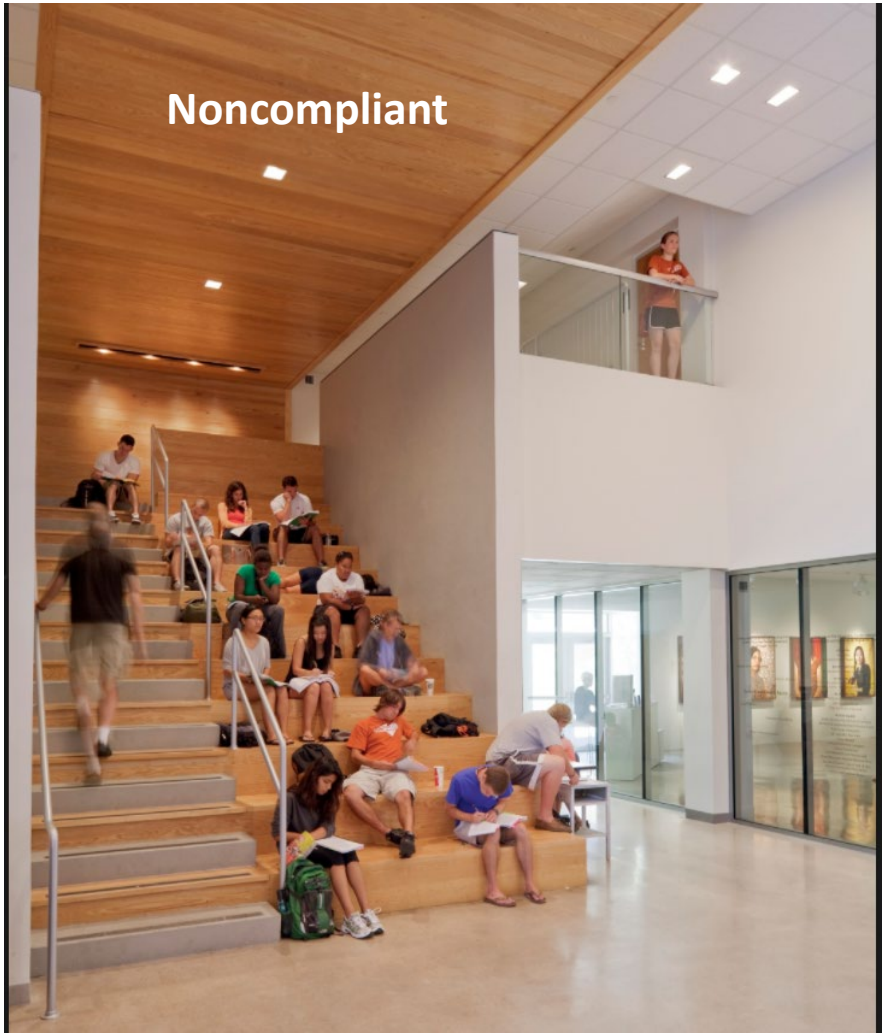
1030.16 Handrails at Social Stairs

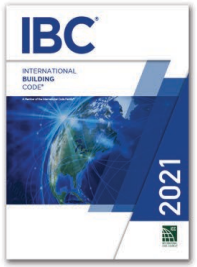
- Where the stepped aisle has seating on one side and the aisle width is at least 74 inches, two handrails are required (with at least one within 30 inches of the stepped aisle).
  - Where the stepped aisle is required to have two handrails, mid-aisle handrails to be discontinuous.





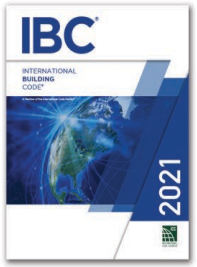
1030.16 Handrails at Social Stairs – Example



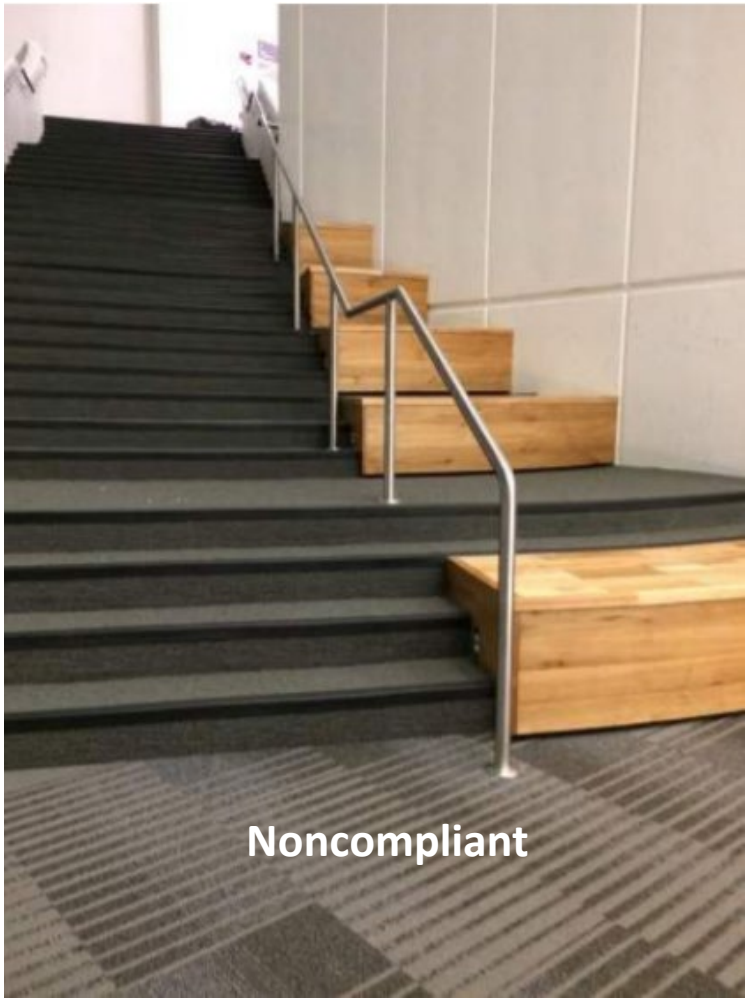


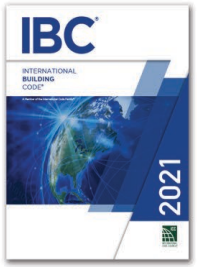
1030.16 Handrails at Social Stairs – Example

Possibly compliant

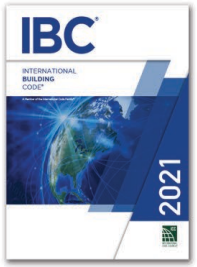


1030.16 Handrails at Social Stairs – Example

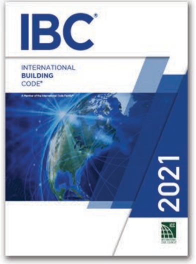




1030.16 Handrails at Social Stairs – Example



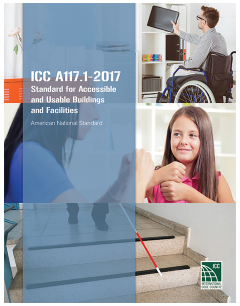
Part 5
Accessibility
Chapter 11

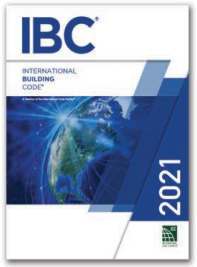


ICC LEARNING center

1102 Accessible Design Compliance

- The ICC A117.1 standard as referenced by the IBC for the design and construction of accessible buildings and facilities has been updated from the 2009 edition to the 2017 edition.
- Many of the major revisions are addressed in the ICC publication *Significant Changes to the ICC A117.1 Accessibility Standard*, 2017 Edition, including:
  - Enhanced dimensions for clear floor spaces and turning spaces.
  - Modifications to exterior routes, curb cuts, blended transitions, detectable warnings, passenger drop-offs and parking facilities.





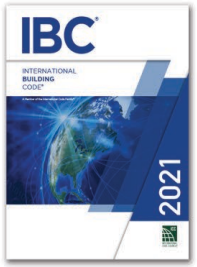
1105.1.1 Automatic Doors at Public Entrances

- In specified occupancies with sizable occupant loads, the accessible public entrances must now be provided with an automatic door.
  - Where an automatic door is required by Table 1105.1.1, it shall be either a full power-operated door or a low-energy power-operated door.

TABLE 1105.1.1 Public Entrance with Power-Operated Door[a]

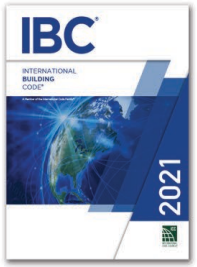
Occupancy	Building Occupant Load Greater Than
A-1, A-2, A-3, A-4	300
B, M, R-1	500

a. In mixed-use facilities where the total sum of the building occupant load is greater than those listed, the most restrictive building occupant load shall apply.



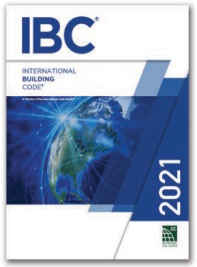
1105.1.1 Automatic Doors at Public Entrances

- In mixed-occupancy buildings where total building occupant load exceeds that listed, the most restrictive building occupant load shall apply, for example:
  - Where Group B has OL of 300 and Group A-3 has OL of 100, total OL of 400, automatic door required based on Group A-3 tabular threshold.
  - Where Group B has OL of 450 and Group E has OL of 60, total OL of 510, automatic door required based on Group B tabular threshold.
- Where the public entrance includes a vestibule, at least one door into and one door out of the vestibule must comply with the requirements.



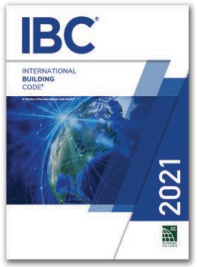
1107.2 Vehicle Charging Stations

- New scoping provisions now require electrical vehicle charging stations to meet limited accessibility criteria.
  - Charging stations provided to serve Group R-2, R-3 and R-4 occupancies are not required to comply.
- To be viewed as a “service” rather than a parking space
- Neither the IBC nor ICC A117.1 mandate the installation of such stations, but if they are provided they must comply with limited accessibility requirements:
  - Minimum of 5% of vehicle spaces on site, but not less than one of each type of system, shall be accessible.
  - Where charging stations are located at multiple locations on sites, accessible charging stations are not necessarily required at each location.



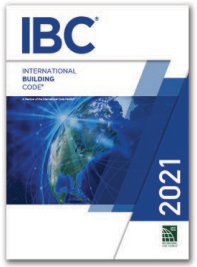
1107.2 Vehicle Charging Stations

- Accessible vehicle spaces to comply as for a van accessible parking space, with:
  - 132 inches minimum width, and
  - Minimum 60-inch-wide access aisle.
- In addition, applicable provisions of ICC A117.1 Section 502 must be met, including:
  - Access aisle
  - Floor surface
  - Vertical clearance
- A117.1 Section 502.11 specific to vehicle charging stations addresses:
  - Operable parts
  - Accessible route
  - Obstructions



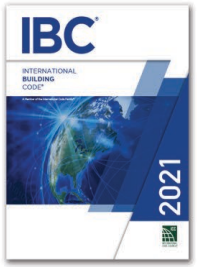
1108.5, 1110.2 Assisted Toileting and Bathing

- Changes have been made to the provisions for nursing homes and assisted living facilities to allow some units to have toilet and bathing facilities designed for assisted use.
  - These allowances are permitted instead of the independent use facilities generally intended by the ICC A117.1 Accessible unit provisions.
- Both scoping and technical provisions are provided in IBC.
- The assisted use provisions are optional and can be applied when desired by the designer.
  - Units may be modified for toileting, bathing or both

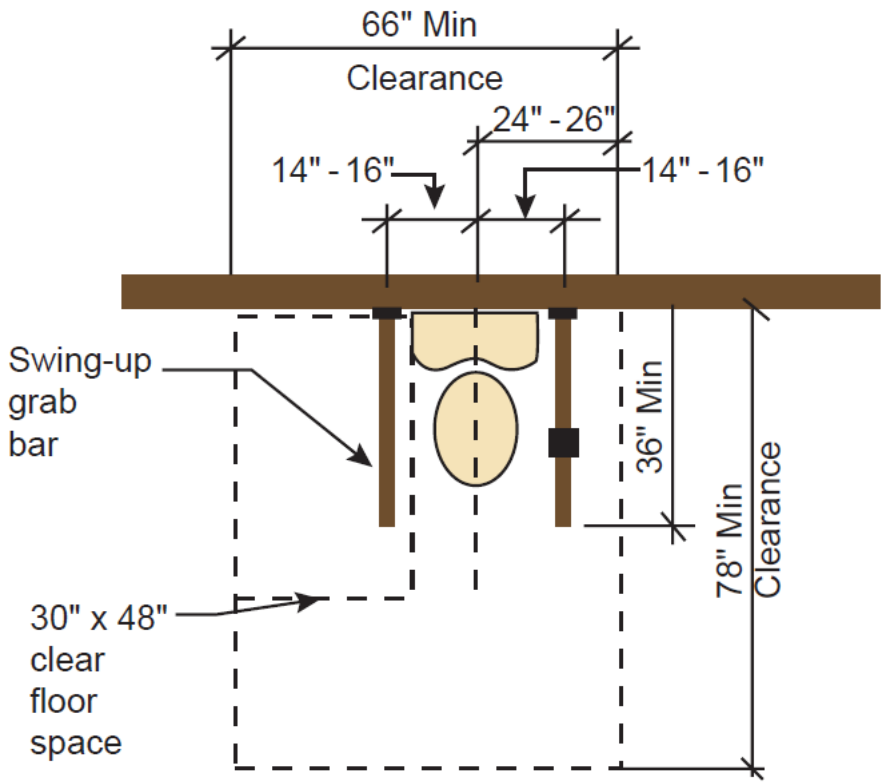


1108.5, 1110.2 Assisted Toileting and Bathing

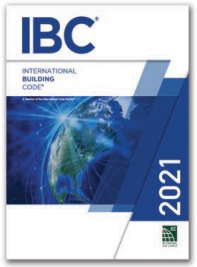
- Assisted water closets and roll-in-type showers may replace like fixtures in up to **50**% of Accessible units in the following occupancies:
  - Group I-1, Conditions 1 and 2
  - Group I-2 rehabilitation facilities
- Assisted water closets and roll-in-type showers may replace like fixtures in up to **90%** of Accessible units in the following occupancies:
  - Group I-2 nursing homes



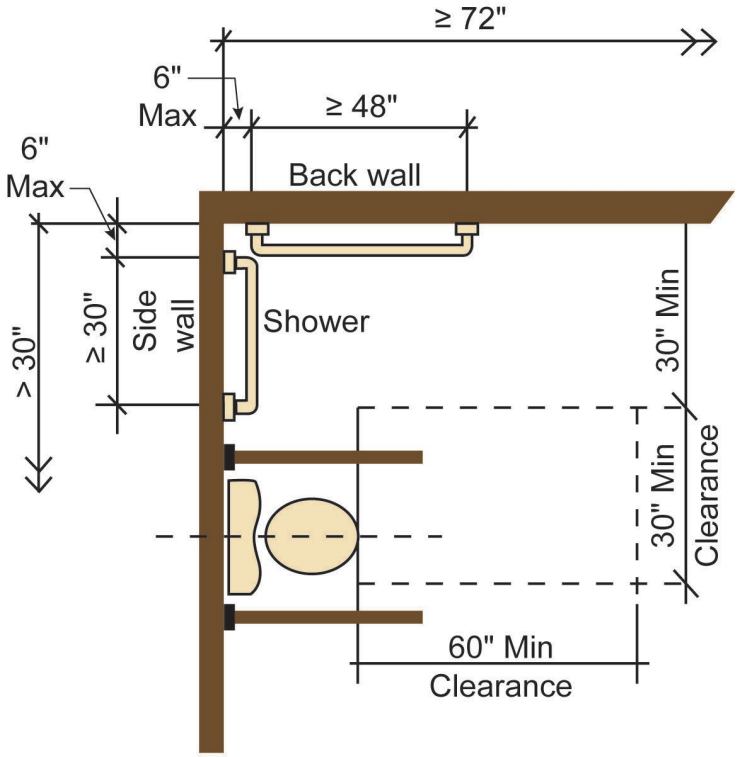
1108.5, 1110.2 Assisted Toileting



- Primary technical changes include:
  - Increased clearance around water closet of 66” with clearance of 24” to 26” from centerline of fixture
  - Increased clearance depth of 78” to allow for additional approach options
  - Allowance for swing-up grab bars that are typically only permitted in Type B units
  - Toilet paper dispenser to be installed on at least one of the swing-up grab bars

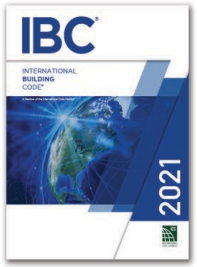


1108.5, 1110.2 Assisted Bathing

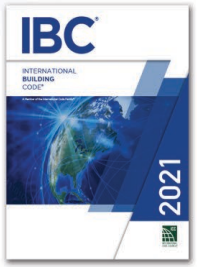


Assisted bathing
roll-in shower-using
exceptions

- Primary technical change is elimination of required folding seat
- Allows for use of rolling chair when necessary
- Sidewall and backwall grab bars now differ, with side-wall bar required on 'seat wall' and both grab bars starting in corners



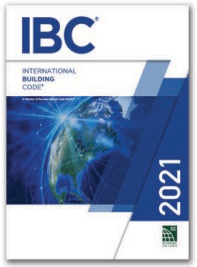
Part 6
Building Envelope, Special Inspections and Tests, and Construction Materials
Chapters 12-15, 17 and 25



ICC LEARNING center

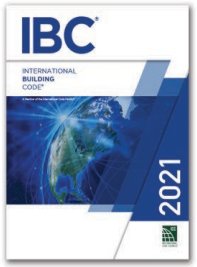
1207 Enhanced Classroom Acoustics

- In Group E occupancies, enhanced classroom acoustics shall be provided in all classrooms having a volume of 20,000 cubic feet or less.
- Intended to apply to standard-sized self-contained classrooms, but not larger spaces for activities such as band or choir.
  - Also not intended to apply to ancillary spaces, such as individual tutoring rooms, corridors, or a cafeteria.
- Good acoustics are essential to support language acquisitions and learning for all children.
- Assistive technologies typically only amplify the teacher and do not amplify discussions between students or between teacher and individual student.



1207 Enhanced Classroom Acoustics

- Such acoustics to be in compliance with Section 808 of ICC A117.1, including regulation of:
  - Reverberation times based on either the performance method or prescriptive method
  - Ambient sound levels from sources both inside and outside of the classroom
- In addressing reverberation times, both performance and prescriptive methods are available.
- Ambient sound levels not to exceed 35 dBA and 55 dBC



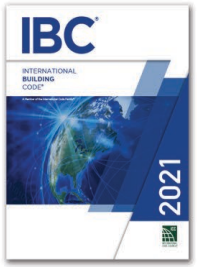
1406.10 Metal Composite Material (MCM) Cladding

- Metal composite materials (MCM) and systems installed on buildings of Type I, II, III and IV construction are now regulated based upon one of two conditions:
  - Such installations that are over 40 feet above grade plane must comply with:
    - Surface-burning characteristics
      - Flame spread index $\leq$ 25
      - Smoke developed index $\leq$ 450
    - Thermal barrier separation
      - Minimum ½" gypsum board or test per NFPA 275
    - Acceptance criteria of NFPA 285
      - Addresses exterior nonload-bearing wall assemblies containing combustible components

  - Such installations that do not exceed 40 feet above grade plane need only comply with surface-burning characteristics and thermal barrier separation.

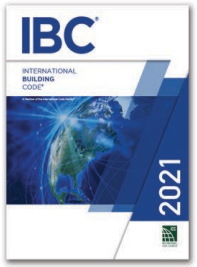
1406.10 Metal Composite Material (MCM) Cladding

- Previously, all MCM cladding on buildings of other than Type V to meet all three conditions, or meet alternative conditions of Section 1406.11
- Allowance for use of alternative conditions has been deleted, thus removing issues addressing:
  - Fire separation distance
  - MCM surface area limitation and separation
  - Sprinkler protection throughout building
- Modification addresses any confusion in the various requirements, as well as eliminating allowances previously provided where building is sprinklered.



1504.9 Aggregate-surfaced Roof

- Minimum parapet heights have been established for aggregate-surfaced roofs to prevent blow-off.
- New Table 1504.9 now mandates minimum heights based on:
  - Aggregate size
  - Mean roof height
  - Wind exposure
  - Basic design wind speed
- Provides engineering and scientific basis for roof design to prevent blow-off based on wind tunnel tests and subsequent field studies of hurricane damage.



1504.9 Aggregate-surfaced Roof

- Past provisions were not based on a quantitative analysis of observed roofing system performances on real wind events, but rather variations in surface pressure with building height
- Table 1504.8 previously either permitted or prohibited aggregate used as surfacing for roof coverings or ballast solely based on:
  - Maximum mean roof height
  - Design wind load
  - Exposure category
- Conditions where no parapets are provided are no longer allowed

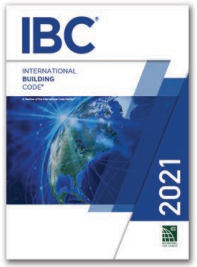


TABLE 1504.9 Minimum Required Parapet Height (inches) for Aggregate Surfaced Roofs[a,b,c]

Aggregate Size	Mean Roof Height (ft)	Wind Exposure and Basic Design Wind Speed (mph)																	
		Exposure B									Exposure C[d]								
		≤95	100	105	110	115	120	130	140	150	≤95	100	105	110	115	120	130	140	150
ASTM D1863 (No.7 or No.67)	15	2	2	2	2	12	12	16	20	24	2	13	15	18	20	23	27	32	37
	20	2	2	2	2	12	14	18	22	26	12	15	17	19	22	24	29	34	39
	30	2	2	2	13	15	17	21	25	30	14	17	19	22	24	27	32	37	42
	50	12	12	14	16	18	21	25	30	35	17	19	22	25	28	30	36	41	47
	100	14	16	19	21	24	27	32	37	42	21	24	26	29	32	35	41	47	53
	150	17	19	22	25	27	30	36	41	46	23	26	29	32	35	38	44	50	56
ASTM D1863 (No.6)	15	2	2	2	2	12	12	12	15	18	2	2	2	13	15	17	22	26	30
	20	2	2	2	2	12	12	13	17	21	2	2	12	15	17	19	23	28	32
	30	2	2	2	2	12	12	16	20	24	2	12	14	17	19	21	26	31	35
	50	12	12	12	12	14	16	20	24	28	12	15	17	19	22	24	29	34	39
	100	12	12	14	16	19	21	26	30	35	16	18	21	24	26	29	34	39	45
	150	12	14	17	19	22	24	29	34	39	18	21	23	26	29	32	37	43	48

For SI: 1 inch = 25.4 mm; 1 foot = 304.8 mm; 1 mile per hour = 0.447 m/s.

a. Interpolation shall be permitted for mean roof height and parapet height.

b. Basic design wind speed, *V*, and wind exposure shall be determined in accordance with Section 1609.

c. Where the minimum required parapet height is indicated to be 2 inches (51 mm), a gravel stop shall be permitted and shall extend not less than 2 inches (51 mm) from the roof surface and not less than the height of the aggregate.

d. For Exposure D, add 8 inches (203 mm) to the parapet height required for Exposure C and the parapet height shall not be less than 12 inches (305 mm).

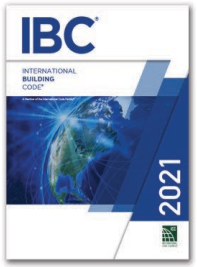


Table 1604.5 Public Assembly Spaces in Risk Category III

- Risk Category III has been assigned to those buildings whose primary occupancy is not public assembly, but have one or more public assembly spaces with an occupant load exceeding 300 and a cumulative occupant load of such assembly spaces that exceeds 2,500.
  - Eliminates inconsistency in risks associated with large assembly spaces.
- Risk Category III also now applies to Group I-4 occupancies where occupant load > 250, or where combined occupant load of Groups I-4 and E > 250.

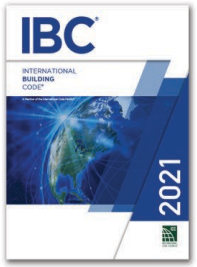


Table 1604.5 Public Assembly Spaces in Risk Category III

TABLE 1604.5 Risk Category of Buildings and Other Structures

Risk Category	Nature of Occupancy
III	Buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not limited to: • Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300. • Buildings and other structures containing one or more public assembly spaces, each having an occupant load greater than 300 and a cumulative occupant load of the public assembly spaces of greater than 2,500. • Buildings and other structures containing Group E or Group I-4 occupancies or combination thereof, with an occupant load greater than 250. *(Other Risk Category III criteria remain unchanged)*

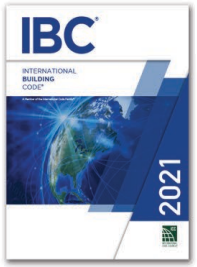
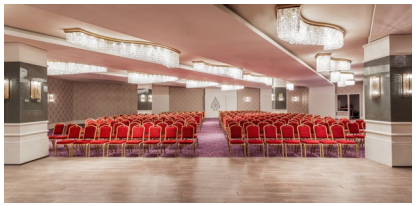
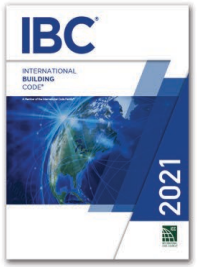


Table 1604.5 Public Assembly Spaces in Risk Category III

- Risk Category III previously only applied to public assembly condition where the assembly activity is the primary occupancy and the occupant load > 300, such as a theater.
- Example of new RC III designation:
  - 5-story hotel with conference center where hotel is building's primary occupancy
  - 2 ballrooms with 1,200 occupants each
  - 3 meeting rooms with 90 occupants each
  - Total assembly occupant load: 2,670
  - At least one assembly room with > 300 occupants, and total assembly occupant load > 2,500, thus Risk Category III



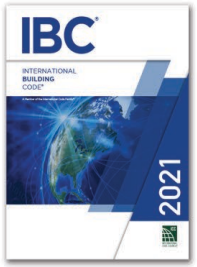


1606.5 Vegetative/Landscaped Roof Dead Loads

- The weight of all landscaping and hardscaping materials on roof to be considered as dead load.
- In determination of most severe load effects on structure, computed weight to consider both:
  - Fully saturated soil and drainage layer materials
  - Fully dry soil and drainage layer materials.

1704.6 Structural Observations

- Two new classes of structures are now required to be provided with structural observation:
  - Structures classified as Risk Category III (previously limited only to RC IV structures), and
  - Structures in SDC E that are more than two stories above grade plane (no previous requirement based upon SDC)
- Recognizes substantial hazards that may be present in facilities considered as RC III structures, as well as those structural hazards involving multi-story structures in SDC E.



1705.5.3 Mass Timber Special Inspection – Construction

- Applicable only to Type IV-A, IV-B and IV-C construction, special inspection requirements have been added to address the anchorage and connection of mass timber structural elements.
- Inspections are similar to requirements for other prefabricated systems, such as precast concrete and structural steel.
- Additional special inspections may be required by the building official for any work unusual in its nature.

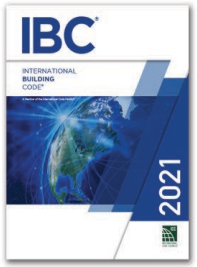
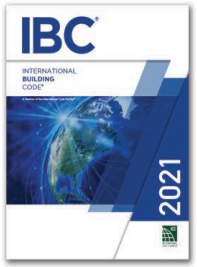


TABLE 1705.5.3 Required Special Inspections of Mass Timber Construction

Type	Continuous Special Inspection	Periodic Special Inspection
1. Inspection of anchorage and connections of mass timber construction to timber deep foundation systems.		×
2. Inspect erection of mass timber construction.		×
3. Inspection of connections where installation methods are required to meet design loads.		
Threaded fasteners.		
Verify use of proper installation equipment.		×
Verify use of pre-drilled holes where required.		×
Inspect screws, including diameter, length, head type, spacing, installation angle, and depth.		×
Adhesive anchors installed in horizontal or upwardly inclined orientation to resist sustained tension loads.	×	
Adhesive anchors not defined in the preceding cell.		×
Bolted connections.		×
Concealed connections.		×

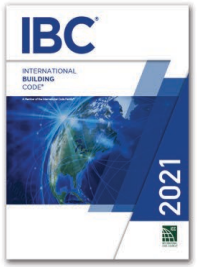
1705.20 Mass Timber Special Inspection -- Sealants

- Special inspection is also required where sealants and/or adhesives are provided in mass timber construction to resist the passage of air at abutting edges and intersections of mass timber elements required to be fire-resistant.
  - Not required where tested proprietary process to ensure there are no voids at intersections is used
- Only abutting edges and intersections in the plane and between different planes to be sealed.
- Special inspection not applicable to joints designed to accommodate building tolerances or to allow independent movement.
  - Regulated by Section 715
  - Special inspection addressed in Section 1705.18



1705.20 Mass Timber Special Inspection -- Sealants

- Applicable to Types IV-A, IV-B and IV-C construction
- Sealants regulated by ASTM C920
- Adhesives regulated by ASTM D3498

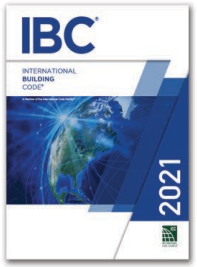


1705.13.7 Special Inspection of Steel Storage Racks

- Steel storage rack special inspection duties have been clarified with the addition of specific special inspection tasks.
  - Requirement continues to be applicable only to racks that are at least 8 feet in height and assigned to SDC D, E or F.

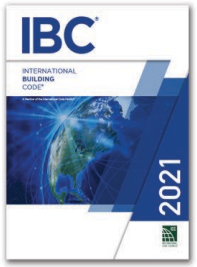
TABLE 1705.13.7 Required Inspections of Storage Rack Systems

Type	Periodic Inspection	Referenced Standard	IBC Reference
1. Materials used, to verify compliance with one or more of the material test reports in accordance with the approved construction documents.	×		
2. Fabricated storage rack elements.	×		1704.2.5
3. Storage rack anchorage installation.	×	ANSI/MH16.1 Section 7.3.2	
4. Completed storage rack system, to indicate compliance with the approved construction documents.	×		



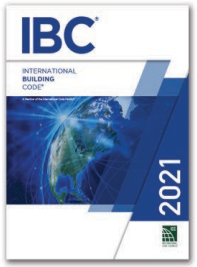
1705.18 Firestop Inspection in Group R

- In Group R fire areas with an occupant load > 250, special inspection is now required for the installation of:
  - Firestops
  - Fire-resistant joint systems
  - Perimeter fire containment systems
- Provides greater assurance that such fire protective features are properly installed where large residential occupant loads are anticipated.



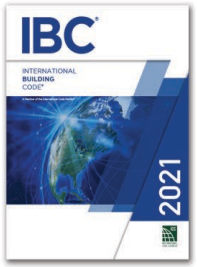
1709.5 Window and Door Assemblies

- Testing standards and analysis procedures are clarified for door and window assemblies, including garage doors.
- Garage doors now required to have a permanent label indicating:
  - Manufacturer
  - Model/serial number
  - Performance characteristics, including design wind pressure rating
- Provisions applicable regardless of whether building is in a hurricane-prone region.
- Provides for additional information regarding building's resilience.



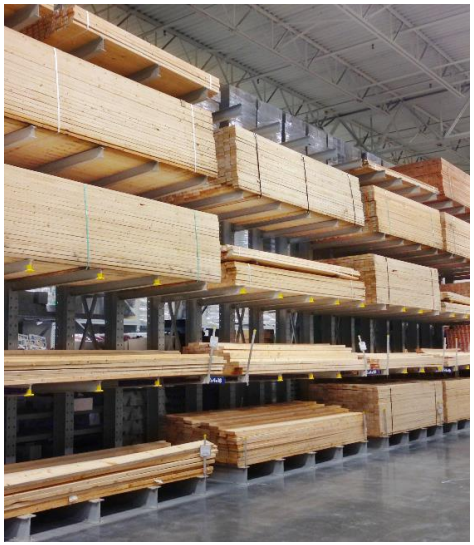
1809.5.1 Frost Protection at Required Exits

- Frost protection to be provided at exterior landings of all required exits utilizing outward swinging doors.
  - Extent of protection need only extend enough to ensure the unobstructed opening of the required exit doors.
- Foundations to be protected by:
  - Extending foundation below frost line, or
  - Frost-protected shallow foundations, or
  - Erecting foundation on solid rock
- Protection helps prevent concrete landings from heaving and interfering with swing of exit door.



2209 Storage Racks

- Definition of “cantilevered steel storage rack” added to Section 202, acknowledges that such racks have different load and design requirements as a standard steel storage rack.
- In addition, a certificate of compliance is required under specified circumstances.



202 Definition of Storage Racks – Steel Cantilevered

- A framework or assemblage composed of cold-formed or hot-rolled steel structural members, primarily in the form of vertical columns, extended bases, horizontal arms projecting from the faces of the columns, and longitudinal bracing between columns.
  - There may be shelf beams between the arms, depending on the products being stored; this definition does not include other types of racks such as pallet storage racks, drive-in racks, drive-through racks, or racks made of materials other than steel.

2209.3 Storage Rack Certification

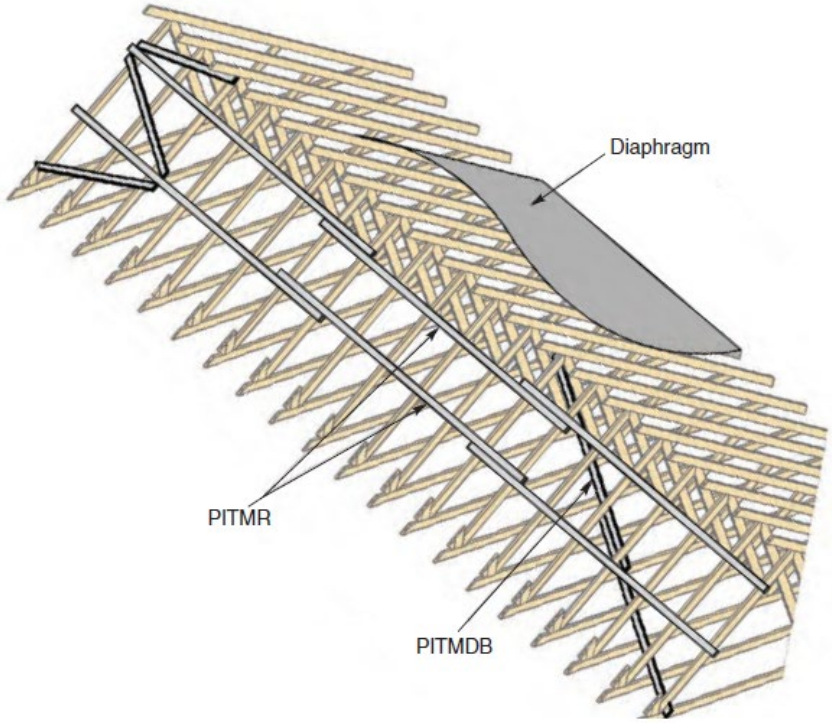
- Steel rack storage structures, including cantilevered storage racks, required to have a certificate of compliance where both:
  - ≥ 8 feet to top load level, and
  - Assigned to Design Category D, E, or F.
- After rack installation, the certificate of compliance is:
  - To be submitted to the owner or owner's authorized agent, and
  - Indicate that work was performed per approved construction documents.

2303.4.1 Wood Truss Bracing

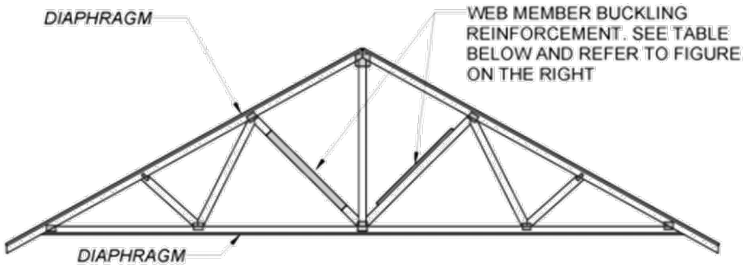
- Requirements have been added for permanent diagonal bracing and restraint purposes.
- In addition, new definitions are provided in Section 202 for:
  - Permanent Individual Truss Member Restraint (PITMR)
  - Permanent Individual Truss Member Diagonal Bracing (PITMDB)

Truss Web Member Bracing

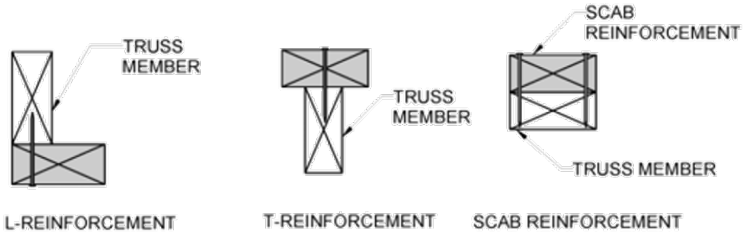
- Permanent Individual Truss Member Restraint (PITMR)
- Permanent Individual Truss Member Diagonal Bracing (PITMDB)



Alternative Bracing Installation



ELEVATION VIEW OF L, T OR SCAB REINFORCEMENT



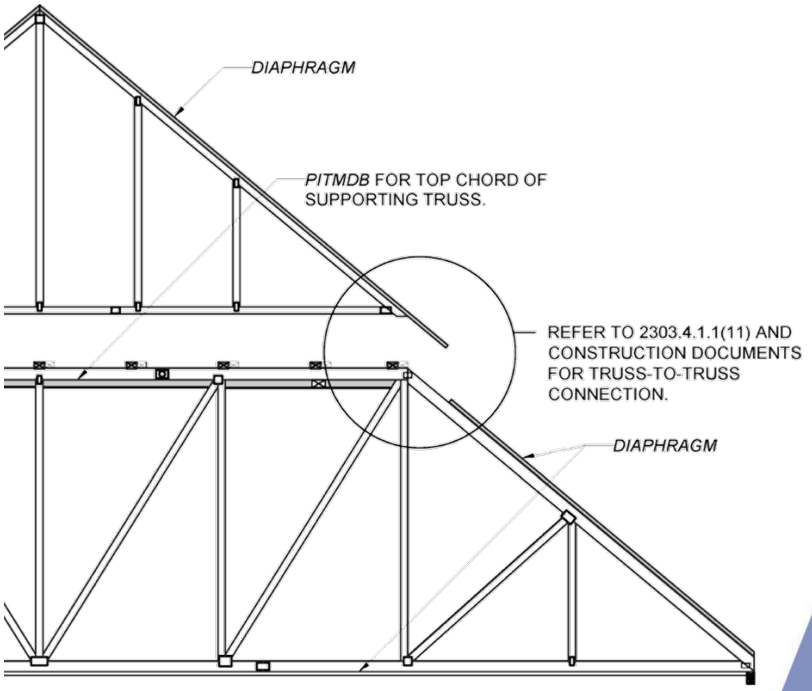
TYPES OF WEB MEMBER BUCKLING REINFORCEMENT

NUMBER OF ROWS OF PITMR SPECIFIED ON WEB MEMBER	SIZE OF TRUSS WEB	TYPE AND SIZE OF WEB REINFORCEMENT[1] FOR T, L OR SCAB[2]	GRADE OF WEB REINFORCEMENT	MINIMUM LENGTH OF WEB REINFORCEMENT	MINIMUM CONNECTION OF WEB REINFORCEMENT TO WEB
ONE	2x4	2x4	Same species and grade or better than web member	90% of web or extend to within 6" of end of web member, whichever is greater	(0.131" x 3") nails at 6" on-center[2]
	2x6	2x6			
	2x8	2x8			

[1]Maximum allowable web length is 14'
[2]Attach Scab reinforcement to web with two rows of minimum 0.131" x 3" nails at 6" on-center

Bracing Assumptions

- Compression web lateral force ~ 1-2% axial force
- 4-0.131”x3” nails = 375 lbs with SPF framing
- Top and bottom chords braced by diaphragms
- Design required if no diaphragms present



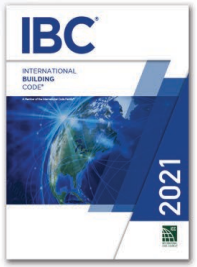
2304.11.3, 2304.11.4 Concealed Spaces in Type IV-HT

- Concealed spaces are now permitted in floors and roofs of Type IV-HT construction.
  - Details of limitations and protection methods set forth in Section 602.4.4.3

2308.5.6, 2308.6.6.2 Cripple Walls

- For buildings in Seismic Design Categories A, B and C, cripple walls that are part of an interior wall line no longer require bracing by blocking or sheathing.
- Cripple wall bracing in Seismic Design Categories D and E now limited to 14 inches in height, and must be blocked on both interior and exterior walls.

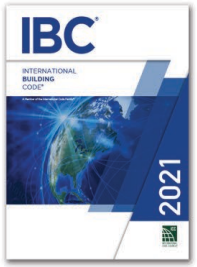
Part 7
Building Services, Special Devices and Special Conditions
Chapters 29 through 31, 33



ICC LEARNING center

2902 Minimum Plumbing Facilities

- When performing required number of fixtures calculations, new exceptions address both multiple-user and single-user facilities.
- In multiple-user facilities designed to serve all genders, minimum fixture count to be calculated at 100% based on total occupant load.
  - Each fixture type to meet ICC A117.1
  - Each urinal to be in a stall
  - Where single-user toilet and bathing facilities are provided, distribution and designation of facilities based on sexes is not required.
    - Single-user and family/assisted-use facilities must continue to be identified as being available for use by all persons regardless of sex



2902 Minimum Plumbing Facilities

MINIMUM REQUIRED NUMBER OF PLUMBING FIXTURES

Multiple-User Facility for Serving All Genders

Given: Business Classification having an Occupant Load of 60. Toilet facility design chosen to be one multiple-user facility to serve all genders.

Per Table 2902.1:

Water Closet Ratio:	1 per 25 for the first 50 and 1 per 50 for the remainder > 50
Lavatory Ratio:	1 per 40 for the first 80 and 1 per 80 for the remainder > 80

Calculations:

WCs: 50/25 + (60-50)/50 = 2.2	Round up to **3 water closets minimum.**
LAVs: 60/40 = 1.5	Round up to **2 lavatories minimum.**

Single-User Facilities

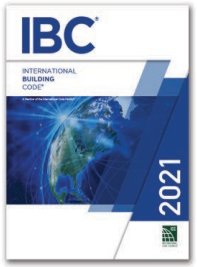
Given: Business Classification having an Occupant Load of 60. Toilet facility design chosen to be all single-user facilities.

Per Table 2902.1:

Water Closet Ratio:	1 per 25 for the first 50 and 1 per 50 for the remainder > 50
Lavatory Ratio:	1 per 40 for the first 80 and 1 per 80 for the remainder > 80

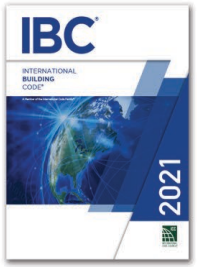
Calculations:

WCs: 50/25 + (60-50)/50 = 2.2	Round up to **3 water closets minimum.**
LAVs: 60/40 = 1.5	Round up to 2. However, because each single-user facility requires a LAV, **3 lavatories minimum.**



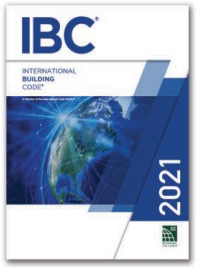
2902 Minimum Plumbing Facilities

- Separate facilities are not required where rooms having both water closets and lavatory fixtures are designed for use by both sexes, and
  - Water closet privacy provided per IPC, and
  - Urinals, where provided, to be in an area visually separated from the remainder of the facility
- Where accessible urinal is required, criteria for accessible stall not provided in A117.1 or IBC
  - Should be configured to allow for presence of a wheelchair, as well as user transfer to a standing position in front of urinal



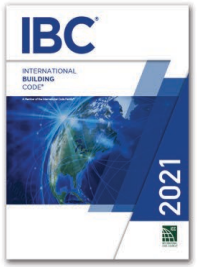
2902.3.3 Toilet Fixtures in Storage Facilities

- Location (within one story vertically) and distance (500 feet) limits imposed for travel limits to required toilet facilities may be exceeded in Group S occupancies.
  - Travel limits to be specifically approved by building official.
- Applicable to both public and employee facilities.
- Generally consistent with allowance for employee facilities in Group F occupancies.
- New allowance applicable to large warehouses, parking garages with attendants, self-storage facilities, etc.



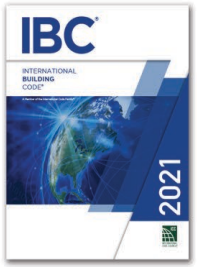
3103.1 Special Event Structures

- Special event structures are now regulated as one of the types of temporary structures addressed in Section 3103.
- Such structures, defined in the 2018 IFC, are now similarly defined in the IBC.
  - **SPECIAL EVENT STRUCTURE.** Any ground-supported structure, platform, stage, stage scaffolding or rigging, canopy, tower or similar structure supporting entertainment-related equipment or signage.



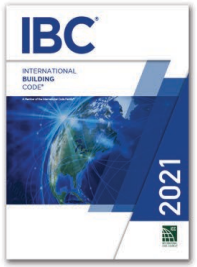
3103.1 Special Event Structures

- In addition to significant IFC requirements, key criteria for all temporary structures are established in IBC, including:
  - Code conformance for structural strength, fire safety, means of egress, accessibility, light, ventilation, sanitation
  - Permits
  - Construction documents
  - Location on lot
  - Means of egress



3115 Intermodal Shipping Containers

- Use of intermodal shipping containers as buildings and structures now address in code.
  - **INTERMODAL SHIPPING CONTAINERS.** A six-sided steel unit originally constructed as a general cargo container used for the transport of goods and materials.
- Previously, approval based on Section 104.11 addressing alternate methods and materials.
  - ICC G5-2019 *Guideline for the Safe Use of ISO Intermodal Shipping Containers Repurposed as Buildings and Building Components*
  - Evaluation Reports

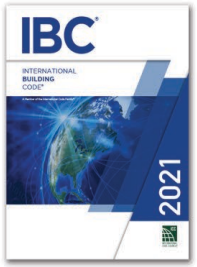


3115 Intermodal Shipping Containers

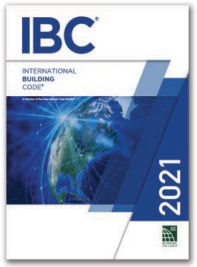
- New requirements designed to provide a consist set of code provisions that cover minimum safety requirements without duplicating existing code provisions.
- Mandates verification of a container's construction, condition and structural integrity to assist structural engineer in the evaluation for building construction.
- Provides for specific pointers to IBC provisions addressing protection against decay and termites, under-floor ventilation, roof assemblies and joints/voids.
- Introduces structural provisions unique to such containers.

3115 Intermodal Shipping Containers

- Provisions intended to supplement existing applicable IBC requirements, as well as :
  - Inspection by approved agency
  - Verification of data plate
  - Method of structural design (detailed design procedure or simplified method for single-units)
- Three ISO reference standards relevant to construction of intermodal shipping containers have been added to Chapter 35.
- New provisions intended to eliminate need for patchwork of potentially conflicting or duplicative requirements.



Questions?



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