

Study Session

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2012 IBC Chapter 6 Types of Construction

OBJECTIVE: To gain an understanding of how a building is classified as a specific type of construction, based on the construction materials and the various building elements' resistance to fire.

REFERENCE: Chapter 6, 2012 *International Building Code*

- KEY POINTS:**
- What do the various types of construction indicate?
 - How are the required fire-resistance ratings of building elements determined?
 - Why are exterior walls regulated by additional criteria?
 - Why are exterior walls protected differently based on fire separation distance?
 - At what minimum distance is the protection of exterior walls unnecessary?
 - Which types of materials are required to be used as building elements of a Type I or II building?
 - How do the two different categories of Type I construction differ in fire protection? Type II construction?
 - Which types of materials are required for use in the exterior walls of a Type III structure? In the interior building elements?
 - What is another name for Type IV construction?
 - How shall exterior walls be constructed? Interior building elements?
 - What are the minimum construction details for columns used in a building of Type IV construction?
 - In Type IV buildings, what is the minimum size of heavy-timber members used in the floor and roof framing? Floors? Roofs? Partitions?
 - Where the minimum dimensions for Type IV solid sawn members are prescribed, how are the equivalent sizes established for glued laminated members?
 - Type V buildings may be constructed of which building materials?
 - How does a Type VA building differ from a Type VB building?
 - In noncombustible Type I and II buildings, where may fire-retardant-treated wood be used?
 - Which specific allowances are provided for combustible materials in Type I and Type II buildings?

- KEY POINTS:**
- (Cont'd)**
- What are the limitations for the use of fire-retardant-treated wood in the roof construction of noncombustible buildings? In nonbearing partitions? In nonbearing exterior walls?
 - Which building elements are considered structural frame elements for the determination of fire resistance? Secondary members?
 - When are bracing members considered part of the structural frame?
 - Under which conditions may the required fire resistance of roof supports be reduced?
 - At what height may the required fire resistance of roof construction be eliminated? In which occupancies is the elimination not applicable?
 - For which building elements are heavy-timber members and 1-hour fire-resistance-rated construction interchangeable?
 - How can a sprinkler system affect a building's type of construction classification?
 - How are interior nonbearing walls regulated for fire resistance based on construction type? Exterior nonbearing walls?

Topic: Construction Types
Reference: IBC 602.1

Category: Types of Construction
Subject: Construction Classification

Code Text: *Buildings and structures erected or to be erected, altered or extended in height or area shall be classified in one of the five construction types defined in Sections 602.2 through 602.5.*

Discussion and Commentary: There are two major groupings based on the construction materials: noncombustible construction (Types I and II) and noncombustible or combustible construction (Types III, IV and V). These groupings are divided into two more categories: protected, where the major structural elements are provided with some degree of fire resistance, and unprotected, where no fire protection of the building elements is typically mandated. Protected construction is further distinguished in Type I buildings where the required protection for many structural elements exceeds a 1-hour fire-resistance rating.

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

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

Topic: Fire Resistance Ratings
Reference: IBC 602.1, Table 601

Category: Types of Construction
Subject: Construction Classification

Code Text: *The building elements shall have a fire-resistance rating not less than that specified in Table 601. The protection of openings, ducts and air transfer openings in building elements shall not be required unless required by other provisions of the IBC.*

Discussion and Commentary: The building elements regulated by Table 601 for types of construction include structural frame members, such as columns, girders and trusses; bearing walls, both interior and exterior; floor construction, including supporting beams and joists; and roof construction, consisting of supporting beams, joists, rafters and other members. The required fire-resistance rating for each of these elements is based on the specific type of construction assigned to the building. The required fire-resistance rating can be as high as a 3-hour or as little as a 0-hour (no fire-resistance rating required).

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

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
	A	B	A ^d	B	A ^d	B	HT	A ^d	B
Primary structural frame ^e (see Section 202)	3 ^a	2 ^a	1	0	1	0	HT	1	0
Bearing walls									
Exterior ^{f, g}	3	2	1	0	2	2	2	1	0
Interior	3 ^a	2 ^a	1	0	1	0	1/HT	1	0
Nonbearing walls and partitions	See Table 602								
Exterior									
Nonbearing walls and partitions							See Section 602.4.6		
Interior ^e	0	0	0	0	0	0		0	0
Floor construction and associated secondary members (see Section 202)	2	2	1	0	1	0	HT	1	0
Roof construction and associated secondary members (see Section 202)	1 1/2 ^b	1 ^{b, c}	1 ^{b, c}	0 ^c	1 ^{b, c}	0	HT	1 ^{b, c}	0

For SI: 1 foot = 304.8 mm.

- a. Roof supports: Fire-resistance ratings of primary structural frame and bearing walls are permitted to be reduced by 1 hour where supporting a roof only.
- b. Except in Group F-1, H, M and S-1 occupancies, fire protection of structural members shall not be required, including protection of roof framing and decking where every part of the roof construction is 20 feet or more above any floor immediately below. Fire-retardant-treated wood members shall be allowed to be used for such unprotected members.
- c. In all occupancies, heavy timber shall be allowed where a 1-hour or less fire-resistance rating is required.
- d. An approved automatic sprinkler system in accordance with Section 903.3.1.1 shall be allowed to be substituted for 1-hour fire-resistance-rated construction, provided such system is not otherwise required by other provisions of the code or used for an allowable area increase in accordance with Section 506.3 or an allowable height increase in accordance with Section 504.2. The 1-hour substitution for the fire resistance of exterior walls shall not be permitted.
- e. Not less than the fire-resistance rating required by other sections of this code.
- f. Not less than the fire-resistance rating based on fire separation distance (see Table 602).
- g. Not less than the fire-resistance rating as referenced in Section 704.10

Where a structure is separated by one or more fire walls, the code treats those individual compartments created by the fire walls as separate buildings. Thus, each separate compartment would be considered a distinct building for the purpose of classification by type of construction.

Code Text: *Exterior walls shall have a fire-resistance rating not less than that specified in Table 602.*

Discussion and Commentary: The rationale behind exterior wall protection is that an owner has no control over what occurs on an adjacent lot. The lot line concept provides a convenient means of protecting one building from another insofar as radiant heat could potentially be transmitted from one building to another during a fire. The requirements are based on “fire separation distance,” which must be considered for all exterior walls. Where such walls are also bearing walls, the provisions of Table 601 also apply, governed by the more restrictive of the hourly ratings. Additional provisions for exterior walls are found in Section 705.

Table 602 Regulates Exterior Walls Only

- Table 602 used in conjunction with Table 601 for fire resistance of exterior bearing walls
- Only Table 602 used for nonbearing exterior walls
- Based primarily on occupancy type
- Highest required rating for exterior wall is 3 hours
- Final threshold at $\geq 30'$
- Additional provisions for exterior walls and openings in Section 705

TABLE 602
FIRE-RESISTANCE RATING REQUIREMENTS FOR EXTERIOR WALLS BASED ON FIRE SEPARATION DISTANCE^{a, b}

FIRE SEPARATION DISTANCE = X (feet)	TYPE OF CONSTRUCTION	OCCUPANCY GROUP H ^f	OCCUPANCY GROUP F-1, M, S-1 ^g	OCCUPANCY GROUP A, B, E, F-2, I, R, S-2 ^h , U ^g
$X < 5'$	All	3	2	1
$5 \leq X < 10$	IA Others	3 2	2 1	1 1
$10 \leq X < 30$	IA, IB IIB, VB Others	2 1 1	1 0 1	1 ^d 0 1 ^d
$X \geq 30$	All	0	0	0

For SI: 1 foot = 304.8 mm.

a. Load-bearing exterior walls shall also comply with the fire-resistance rating requirements of Table 601.

b. For special requirements for Group U occupancies, see Section 406.3.

c. See Section 706.1.1 for party walls.

d. Open parking garages complying with Section 406 shall not be required to have a fire-resistance rating.

e. The fire-resistance rating of an exterior wall is determined based upon the fire separation distance of the exterior wall and the story in which the wall is located.

f. For special requirements for Group H occupancies, see Section 415.5.

g. For special requirements for Group S aircraft hangars, see Section 412.4.1.

h. Where Table 705.8 permits nonbearing exterior walls with unlimited area of unprotected openings, the required fire-resistance rating for the exterior walls is 0 hours.

The “fire separation distance” is defined in Section 202 as the distance measured from the building face to the closest interior lot line, to the centerline of a street, alley or public way, or to an assumed imaginary line between two buildings on the same lot.