

CHAPTER 6

TYPES OF CONSTRUCTION

General Comments

Chapter 6 contains the requirements to classify buildings into one of five types of construction. Tables 601 and 602 provide the minimum hourly fire-resistance ratings for the structural elements based on the type of construction of the building and fire separation distance. Section 602 describes each construction type in detail. Section 603 describes the use of combustible materials in buildings of noncombustible construction.

Correct classification of a building by its type of construction is essential. Many code requirements applicable to a building, such as allowable height and area (see Chapter 5), are dependent on its type of construction. The required construction type is determined from Table 503 based on occupancy class, height, and area. Once the construction type is determined, the requirements of Tables 601 and 602 are applicable. Table 601 requirements are minimums, and nothing prohibits the selection of elements that exceed the minimums. Once the minimum criteria have been met, materials that exceed the required minimums may be used without penalty. If a building is placed in an incorrect construction classification (for example, one that is overly restrictive), its owner may be penalized by increased construction costs. On the other hand, when a building is incorrectly classified in an overly lenient type of construction, it will not be constructed in a manner that takes into account the relative risks associated with its size or function. The provisions

of this chapter, coupled with Chapter 3 and Tables 601 and 602, establish the basis for the "equivalent risk theory" on which the entire code is based.

Purpose

The purpose of classifying buildings or structures by their type of construction is to account for the response or participation that a building's structure will have in a fire condition originating within the building as a result of its occupancy or fuel load.

The code requires every building to be classified as one of five possible types of construction: Types I, II, III, IV and V. Each type of construction denotes the kinds of materials that are to be used [i.e., noncombustible steel, concrete, masonry, combustible (wood, plastic) or heavy timber (HT)], and the minimum fire-resistance ratings that are associated with the structural elements in a building having that classification, i.e., 0, 1, 1¹/₂, 2 or 3 hours. Type I and II construction have building elements that are noncombustible. Type III construction has noncombustible exterior walls and combustible or noncombustible interior elements. Type IV construction has noncombustible exterior walls and HT interior elements. Type V construction has building elements that are combustible. Type I, II, III and V construction are further subdivided into two categories (IA and IB, IIA and IIB, IIIA and IIIB, VA and VB).

SECTION 601 GENERAL

601.1 Scope. The provisions of this chapter shall control the classification of buildings as to type of construction.

This section requires that all buildings be assigned a type of construction classification as indicated in the "General Comments" above. The table determining allowable percentage of openings in exterior walls is found in Section 704 Exterior Walls.

SECTION 602 CONSTRUCTION CLASSIFICATION

602.1 General. 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. The building elements shall have a fire-resistance rating not less than that specified in Table 601 and exterior walls shall have a fire-resistance rating not less than that specified in Table 602.

This section requires that each building or structure be put into one of five possible construction classifications: Type I, II, III, IV or V. All structural members are required to have a fire-resistance rating in accordance with Table 601. Additionally, the exterior walls of the structure must satisfy the requirements in Table 602, which bases the fire-resistance rating on the fire separation distance.

The use of multiple construction classifications in a single building is very limited and can only be done when specifically called out in the code. An example of combining types of construction is an office building of Type IIA construction located above an open parking structure of Type IIB construction, as described in Sections 509.7 and 509.7.1.

A more common example is where a single structure is divided into two compartments by using a fire wall, resulting in two separate buildings or structures—each of which may be of a different type of construction. While a structure may contain more than one building (for example, separation by a party wall), each building is to be individually assigned a type of

construction.

Also, a building may have elements that comply with the requirements of more than one type of construction, in which case the building as a whole must be assigned the less restrictive type of construction. The designer may have intended, however, to comply with a higher type of construction, in which case those elements not in compliance with the intended type of construction are to be brought into compliance. Contact with the designer may be appropriate to eliminate a plan reviewer guessing as to the designer's intention, since the selection of the type of construction remains the prerogative of the permit applicant.

Section 602.1 applies to both new construction and additions. The provisions in Chapter 503 on general height and area limitations, Chapter 7 on fire-resistant materials and construction, and the applicable portions of the code depend on the requirements of this section.

602.1.1 Minimum requirements. A building or portion thereof shall not be required to conform to the details of a type of construction higher than that type, which meets the minimum requirements based on occupancy even though certain features of such a building actually conform to a higher type of construction.

These requirements permit design flexibility by allowing various building materials and components to be used. A building must, as a minimum, meet all of the requirements of a given type of construction to be classified as such, even though portions of that building meet the criteria of a higher construction type (i.e., greater fire-resistance ratings). This is consistent with the concept that the code is a minimum requirement. For example, a building classified as Type III construction is not prohibited from having construction that is superior, but it could not be reclassified into a higher type of construction unless it met all of the requirements for that construction type. In a normal situation, the design professional has identified the construction classification on the drawings. When this assignment has not been made, the building official is placed in a position of verifying the designer's intent and selecting the least-restrictive type that will meet all of the code requirements.

602.2 Types I and II. Type I and II construction are those types of construction in which the building elements listed in Table 601 are of noncombustible materials, except as permitted in Section 603 and elsewhere in this code.

Buildings of Type I and II construction are required to be constructed of noncombustible materials (see Section 703.4), and, therefore, are frequently referred to as "noncombustible construction." All Type I and II structural members have a fire-resistance rating as required by Tables 601 and 602. A typical example of a building of Type IA, IB or IIA construction would be a high-rise structure or a very large low-rise structure. These buildings are permitted to be relatively large in height and area due to the fire resistance afforded the structures components. The structural members of a

building of Type IIB construction do not have the same fire resistance as structural members in a building of Type IA, IB or IIA construction. As such, the height and area requirements are not as large (see Figure 602.2 for an example of Type I or II construction).

Type I and II construction are divided into four subclassifications: Types IA, IB, IIA and IIB. The difference among the four subclassifications is the degree of fire-resistance rating required for similar elements and assemblies. For example, the required rating for structural frame members in Type IA construction is 3 hours, for Type IB is 2 hours, for Type IIA is 1 hour and for Type IIB is 0 hours. The required fire-resistance ratings of structural elements range from zero for Type IIB construction to 4 hours for some of the elements of Type IA construction. Often, the fire-resistance ratings required by Tables 601 and 602 for structural elements are achieved by "fireproofing" structural members. Fireproofing is typically the process of creating a fire-resistance-rated assembly that incorporates the structural member by encapsulating it, either by boxing it in or by spraying on a coating to achieve the required fire-resistance ratings. It should be noted that when a protective covering is used to provide the fire-resistance rating, it must be a noncombustible material, except as indicated in Section 603.1, Item 18. FRTW, although combustible, is permitted in limited uses in buildings of Type I and II construction (see Section 603 and Table 601, Note c). While FRTW is permitted in certain applications in buildings of Type I and II construction, it is not assumed to be fire-resistance rated, and generally does not afford any higher fire-resistance rating than untreated wood material. Other combustible items (as specified in Section 603.1) are also permitted in buildings of Type I or II construction.

602.3 Type III. Type III construction is that type of construction in which the exterior walls are of noncombustible materials and the interior building elements are of any material permitted by this code. Fire-retardant-treated wood framing complying with Section 2303.2 shall be permitted within exterior wall assemblies of a 2-hour rating or less.

Buildings of Type III construction are made with both combustible and noncombustible materials. The exterior walls are required to be noncombustible with load-bearing exterior walls required to have a minimum 2-hour fire-resistance rating, but may have to have a higher rating depending on Table 602 and fire separation distances (see note g). Exterior non-bearing walls are not required by Table 601 to have a fire-resistance rating, but must comply with the provisions of Table 602 based on the fire separation distance. The interior elements (i.e., floors, roofs and walls) are permitted to be of combustible materials. One example of a typical building of Type III construction is a structure having its exterior walls constructed of concrete, masonry or other approved noncombustible materials, but with a wood-frame floor and roof construction (see Figure 602.3 for an example of Type

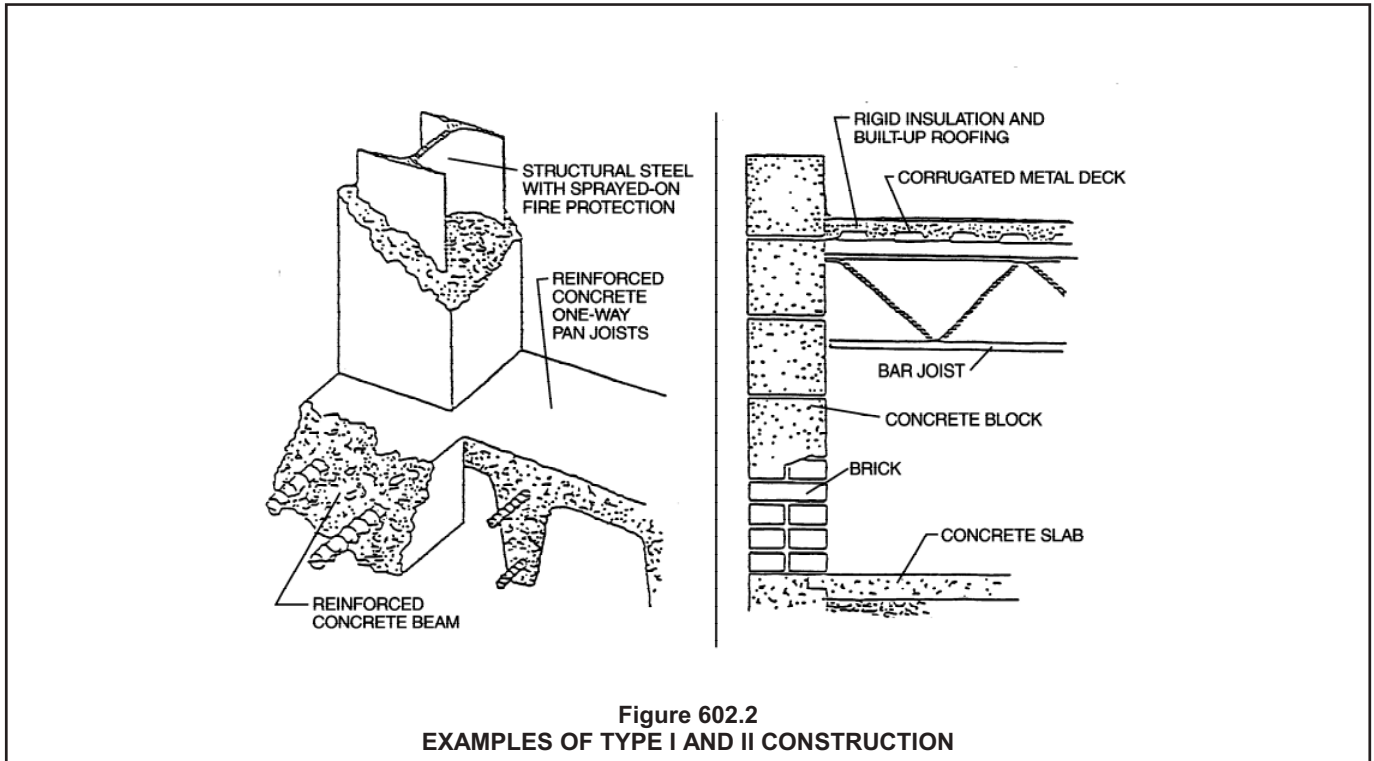


Figure 602.2
EXAMPLES OF TYPE I AND II CONSTRUCTION

III construction). Type III construction is further divided into two subclassifications: Types IIIA and IIIB (see Commentary to Table 601 for a discussion of the differences between A and B). An example of a building of Type IIIA construction is one in which the interior load-bearing walls, floors, roofs and all structural members are protected to provide a minimum 1-hour fire-resistance rating (See note c for exceptions to the fire resistance rating for roofs). The structural members of a building of Type IIIB construction are not required to have a fire-resistance rating with the exception of the exterior load-bearing walls and floors over basements in Group B and M occupancies 5 or more stories (See note d).

Although FRTW does not meet the specifications of the code as a noncombustible material, it is permitted as a substitute for noncombustible materials in exterior wall assemblies of Type III construction provided the required fire-resistance rating is 2 hours or less. FRTW is required to comply with the provisions in Section 2303.2.

602.4 Type IV. Type IV construction (Heavy Timber, HT) is that type of construction in which the exterior walls are of noncombustible materials and the interior building elements are of solid or laminated wood without concealed spaces. The details of Type IV construction shall comply with the provisions of this section. Fire-retardant-treated wood framing complying with Section 2303.2 shall be permitted within exterior wall assemblies with a 2-hour rating or less. Minimum solid sawn nominal dimensions are required for structures built using Type IV construction (HT). For glued-laminated members the equivalent net finished width and depths correspond-

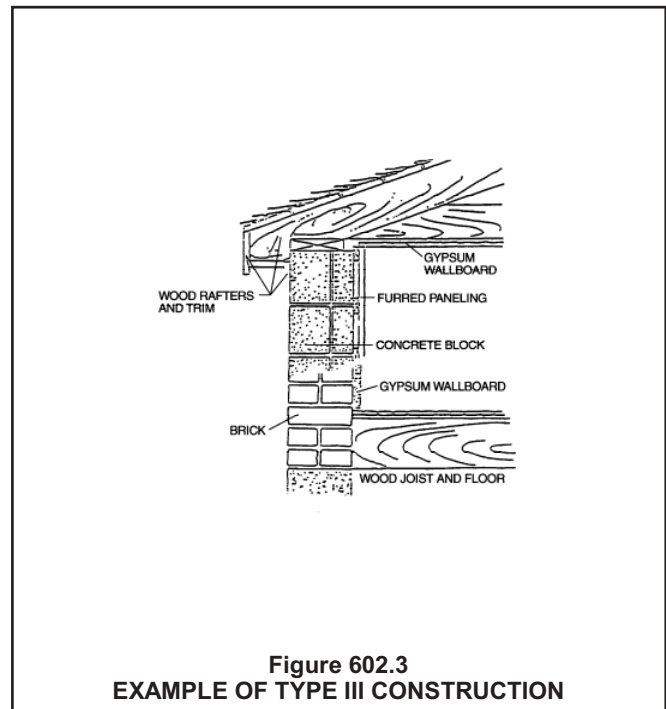


Figure 602.3
EXAMPLE OF TYPE III CONSTRUCTION

ing to the minimum nominal width and depths of solid sawn lumber are required as specified in Table 602.4.

This section provides the general regulations for Type IV (Heavy Timber, HT) construction. HT construction requires the exterior walls to be constructed of noncombustible materials. The interior elements are required to be constructed of solid or laminated wood without any concealed spaces. All of the combustible

structural elements are permitted to be unprotected because of the massive element sizes and the requirement that there not be any concealed spaces, such as soffits, plenums or suspended ceilings. Sections 602.4.1 through 602.4.7 provide specific requirements for the connection of structural members and minimum dimensions. An examination of Table 503 indicates that the allowable height and area for Type IV construction is greater than that permitted for buildings of Type IIB construction. This distinction is based on testing that demonstrated that HT structural members perform better structurally under fire conditions than comparable unprotected steel structural members because of charring, which insulates the wood mass.

As with Type III construction, FRTW is permitted as a substitute for noncombustible materials in exterior wall assemblies of Type IV construction. While the exterior walls are permitted to be either nonload bearing or load bearing, they must have a fire-resistance rating of no greater than 2 hours where FRTW is used in the exterior wall. FRTW is required to comply with the provisions of Section 2303.2.

Solid sawn wood members and glue-laminated timbers are manufactured using different methods and procedures and therefore, do not have the same dimensions. However, they both have the same inherent fire-resistive capability. The dimensions noted in Sections 602.4.1 through 602.4.7 refer to the nominal dimensions of solid sawn lumber that do not correlate to the actual dimensions of glue-laminated timbers. Table 602.4 provides a simple procedure to determine the dimensions that are required for glue-laminated timbers when designing to meet the requirements of Type IV construction.

TABLE 602.4.

The requirements for glued-laminated timbers were developed to recognize that the reduced width of glued-laminated timbers members (compared to timbers with the same nominal dimension) is required to be countered by increasing the depth to maintain similar cross-sectional areas. This table will prevent the misinterpretation of heavy timber sizes for structural glued-laminated timbers, such as using a 6³/₄-inch by 7¹/₂-inch (171 mm by 191 mm) glued-laminated tim-

ber [could be interpreted as nominal 8-inch by 8-inch (203 mm by 203 mm) since laminations are made from 8-inch (203 mm) nominal width lumber] for a column in a Type IV structure instead of the required 6³/₄-inch by 8¹/₂-inch (171 mm by 216 mm) or larger glued-laminated timbers.

602.4.1 Columns. Wood columns shall be sawn or glued laminated and shall not be less than 8 inches (203 mm), nominal, in any dimension where supporting floor loads and not less than 6 inches (152 mm) nominal in width and not less than 8 inches (203 mm) nominal in depth where supporting roof and ceiling loads only. Columns shall be continuous or superimposed and connected in an approved manner.

Minimum construction requirements and dimensions for timber columns are provided in this section. Columns are required to be a minimum of 8 inches (203 mm) nominal in any dimension if they support floor loads, or a minimum of 6 by 8 inches (152 by 203 mm) nominal if they support a roof and ceiling. Timber columns are required to be continuous or superimposed, positioned on or over each other, through floors for the entire height of the building. The design engineer or architect must provide details of all column connections. As with all structural members, each column must also be adequately fastened to other structural members in order to withstand the loads that will be placed upon the column. Some typical examples include reinforced concrete or metal caps, steel or iron column caps and timber splice plates [see Figures 602.4.1(1) and 602.4.1(2)].

602.4.2 Floor framing. Wood beams and girders shall be of sawn or glued-laminated timber and shall be not less than 6 inches (152 mm) nominal in width and not less than 10 inches (254 mm) nominal in depth. Framed sawn or glued-laminated timber arches, which spring from the floor line and support floor loads, shall be not less than 8 inches (203 mm) nominal in any dimension. Framed timber trusses supporting floor loads shall have members of not less than 8 inches (203 mm) nominal in any dimension.

Minimum construction requirements and dimensions for floor framing are provided in this section. Girders are the principal horizontal structural members that support columns or beams. Beams are the structural members that support a floor or roof. Both girders and

**TABLE 602.4
WOOD MEMBER SIZE**

MINIMUM NOMINAL SOLID SAWN SIZE		MINIMUM GLUED-LAMINATED NET SIZE	
Width, inch	Depth, inch	Width, inch	Depth, inch
8	8	6 ³ / ₄	8 ¹ / ₄
6	10	5	10 ¹ / ₂
6	8	5	8 ¹ / ₄
6	6	5	6
4	6	3	6 ⁷ / ₈

For SI: 1 inch = 25.4 mm.

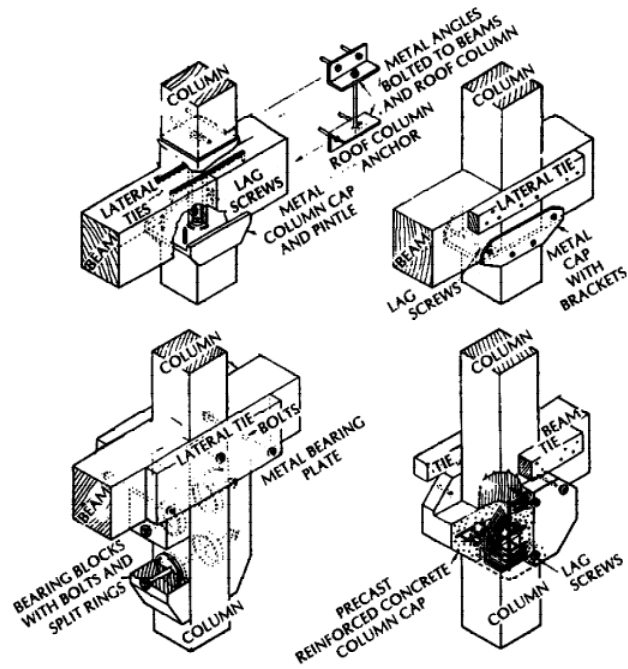


Figure 602.4.1(1)
HEAVY TIMBER—FLOOR BEAM AND COLUMN FRAMING

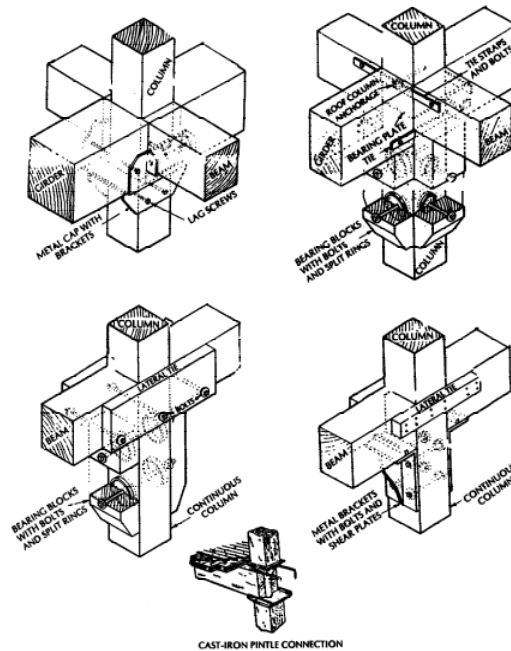


Figure 602.4.1(2)
COLUMN/FLOOR BEAM CONNECTIONS
American Institute for Timber Construction

beams are required to be a minimum 6 inches (152 mm) wide and 10 inches (254 mm) deep. Both framed timber trusses supporting floor loads and framed sawn or glue-laminated timber arches that spring from the floor line and support floor loads are required to be at least 8 inches (203 mm) in any dimension.

602.4.3 Roof framing. Wood-frame or glued-laminated arches for roof construction, which spring from the floor line or from grade and do not support floor loads, shall have members not less than 6 inches (152 mm) nominal in width and have less than 8 inches (203 mm) nominal in depth for the lower half of the height and not less than 6 inches (152 mm) nominal in depth for the upper half. Framed or glued-laminated arches for roof construction that spring from the top of walls or wall abutments, framed timber trusses and other roof framing, which do not support floor loads, shall have members not less than 4 inches (102 mm) nominal in width and not less than 6 inches (152 mm) nominal in depth. Spaced members shall be permitted to be composed of two or more pieces not less than 3 inches (76 mm) nominal in thickness where blocked solidly throughout their intervening spaces or where spaces are tightly closed by a continuous wood cover plate of not less than 2 inches (51 mm) nominal in thickness secured to the underside of the members. Splice plates shall be not less than 3 inches (76 mm) nominal in thickness. Where protected by approved automatic sprinklers under the roof deck, framing members shall be not less than 3 inches (76 mm) nominal in width.

Minimum construction requirements and dimensions for arches and other types of roof framing are provided in this section. Other types of roof framing included in this section are heavy timber trusses with spaced members. When the members of a heavy timber truss are split and placed on either side of a main member, such as a web connecting a chord, each component of the web must be 3 inches (76 mm) or more in nominal thickness. The space between the two web members must be protected with a 2-inch-thick (51 mm) cover plate [see Figure 602.4.3(1)], or solidly filled with blocking [see Figure 602.4.3(2)]. The size of the roof framing members is dependent on the configuration used and is regulated by this section.

If a building of Type IV construction is equipped with approved automatic sprinklers under the roof deck, the minimum size of the roof framing members is reduced to 3 inches (76 mm). Roof framing members of a smaller size will have a lower resistance to fire than the 6-inch by 8-inch (152 mm by 203 mm) or 4-inch by 6-inch (102 mm by 152 mm) members required by this section. The trade-off allowing smaller roof framing members when the building is equipped with an automatic sprinkler system is consistent with the concept of maintaining "equivalent risk" for the building.

602.4.4 Floors. Floors shall be without concealed spaces. Wood floors shall be of sawn or glued-laminated planks, splined or tongue-and-groove, of not less than 3 inches (76 mm) nominal in thickness covered with 1-inch (25 mm) nominal dimension tongue-and-groove flooring, laid crosswise or diagonally, or 0.5-inch (12.7 mm) particleboard or planks not

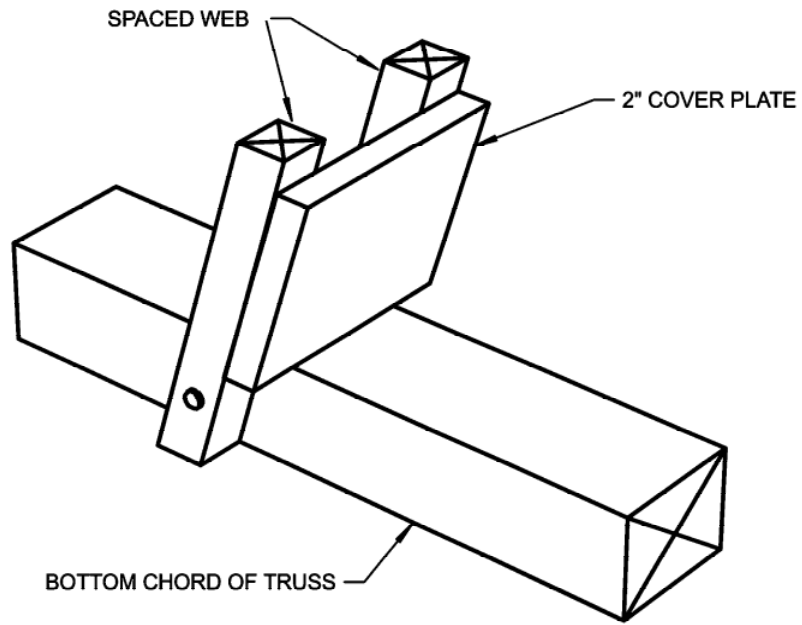
less than 4 inches (102 mm) nominal in width set on edge close together and well spiked and covered with 1-inch (25 mm) nominal dimension flooring or ¹⁵/₃₂-inch (12 mm) wood structural panel or 0.5-inch (12.7 mm) particleboard. The lumber shall be laid so that no continuous line of joints will occur except at points of support. Floors shall not extend closer than 0.5 inch (12.7 mm) to walls. Such 0.5-inch (12.7 mm) space shall be covered by a molding fastened to the wall and so arranged that it will not obstruct the swelling or shrinkage movements of the floor. Corbeling of masonry walls under the floor shall be permitted to be used in place of molding.

HT flooring is required to consist of minimum 3-inch-thick (76 mm) sawn or glued-laminated planks, splined floors or tongue-and-groove floors with an over-layment of 1-inch (25 mm) tongue-and-groove flooring, laid crosswise or diagonally. HT flooring may also consist of ¹/₂-inch (12.7 mm) particleboard or planks at least 4 inches (102 mm) in width set on edge and secured together, with an appropriate overlayer, such as 1-inch (25 mm) hardwood flooring or a ¹⁵/₃₂-inch (12.7 mm) wood structural panel. Flooring in Type IV construction is not permitted to have concealed spaces because an undetected fire can spread quickly in combustible concealed floor spaces [see Figure 602.4.4(1)]. Because of the support afforded by adjacent members, continuous joints must only occur over supports.

Wood flooring must be fastened to supports that are perpendicular to the planking. Fastening must not be made to beams or girders that are parallel to the planks [see Figure 602.4.4(2)]. This precaution is intended to prevent separation of the planks because of differential movement of the beam relative to the girders and possible expansion/contraction due to differing moisture or humidity levels. This section requires a ¹/₂-inch (12.7 mm) clearance between the wood flooring and exterior walls. This will prevent damage to the walls if the flooring expands due to rain during construction. This space also creates a potential flue for flames and hot gases. It should be emphasized that the integrity of the floor assembly must be maintained to provide the equivalent of a 1-hour fire-resistance rating. In addition, the ¹/₂-inch (12.7 mm) gap must be protected by a molding connected to the wall so that any possible contracting or expanding of the floor is not impeded. If masonry walls are utilized, corbeling of the masonry may be used as an alternate to the molding requirements.

602.4.5 Roofs. Roofs shall be without concealed spaces and wood roof decks shall be sawn or glued laminated, splined or tongue-and-groove plank, not less than 2 inches (51 mm) nominal in thickness, 1¹/₈-inch-thick (32 mm) wood structural panel (exterior glue), or of planks not less than 3 inches (76 mm) nominal in width, set on edge close together and laid as required for floors. Other types of decking shall be permitted to be used if providing equivalent fire resistance and structural properties.

Minimum construction requirements and dimensions for roof decks are provided in this section. As required



For SI: 1 inch = 25.4 mm

Figure 602.4.3(1)
SPACED MEMBERS WITH COVER PLATE

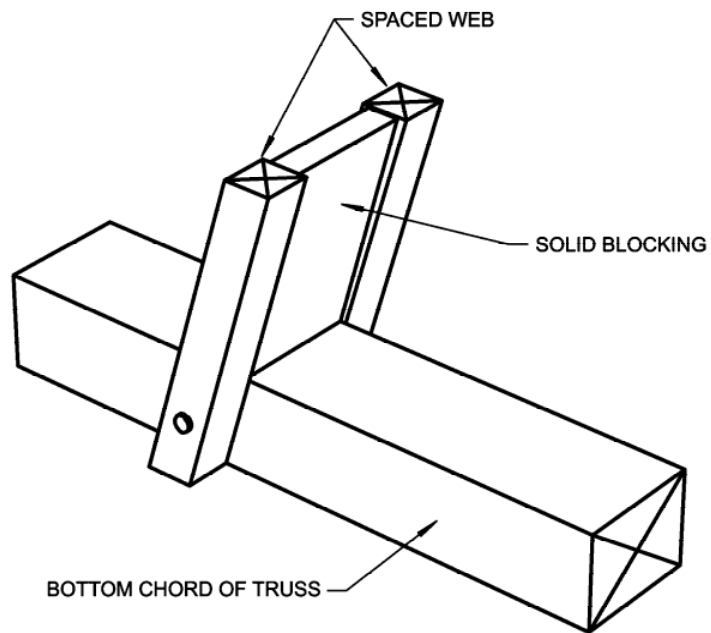


Figure 602.4.3(2)
SOLID BLOCKING OF SPACED MEMBERS

TYPES OF CONSTRUCTION

for floors, roofs are not permitted to have concealed spaces [see Figure 602.4.4(1)]. If the materials used in roof construction are different from those described in this section, the roof must have a 1-hour fire-resistance rating and be of the same structural properties.

602.4.6 Partitions. Partitions shall be of solid wood construction formed by not less than two layers of 1-inch (25 mm) matched boards or laminated construction 4 inches (102 mm) thick, or of 1-hour fire-resistance-rated construction.

Minimum construction requirements and dimensions for partitions are provided in this section. Partitions must either be formed by not less than two layers of 1-inch (25 mm) matched boards or laminated construction 4 inches (102 mm) thick if they are constructed of solid wood. Partitions are permitted to be constructed of materials other than solid wood if they have a 1-hour fire-resistance rating. An example of the use of alternative materials is when a fire-resistance rating for an exit access corridor wall is required. It is common practice to utilize a 1-hour fire-resistance-rated stud and gypsum wallboard assembly between the exposed columns to form the walls of the exit access corridor.

602.4.7 Exterior structural members. Where a horizontal separation of 20 feet (6096 mm) or more is provided, wood columns and arches conforming to heavy timber sizes shall be permitted to be used externally.

Columns and arches that conform to minimum dimensional requirements may be used on the exterior if a fire separation distance of at least 20 feet (6096 mm) is maintained, although the exterior wall itself must be of noncombustible construction. If a fire separation distance of at least 20 feet (6096 mm) is maintained, the risk of exposure of the wood members to fire from an adjacent building is reduced, and the HT columns and arches are permitted to be exposed to the exterior.

If a building of Type IV construction has a fire separation distance of less than 20 feet (6096 mm), the wood columns and arches are to be located on the interior side of the exterior wall. The noncombustible construction of the exterior wall will provide some degree of protection to the interior timber members; therefore, placing the wood structural members inside an exterior wall is preferable to placing them within 20 feet (6096 mm) of a lot line or adjacent building with no exposure protection.

602.5 Type V. Type V construction is that type of construction in which the structural elements, exterior walls and interior walls are of any materials permitted by this code.

Type V construction allows the use of all types of materials, both noncombustible and combustible, but is most commonly constructed of dimensional lumber (see Figure 602.5 for an example of Type V construction). It is divided into two subclassifications: Types VA and VB. An example of a typical building of Type VA construction is a wood-frame building in which the interior and exterior load-bearing walls, floors, roofs and

all structural members are protected to provide a minimum 1-hour fire-resistance rating. (See note c for exceptions to the required fire resistance ratings for roofs.) An example of a building of Type VB construction is found in the typical single-family home, where a fire-resistance rating is not required for the structural members. Type V construction is required to comply with Table 601 and Chapter 23.

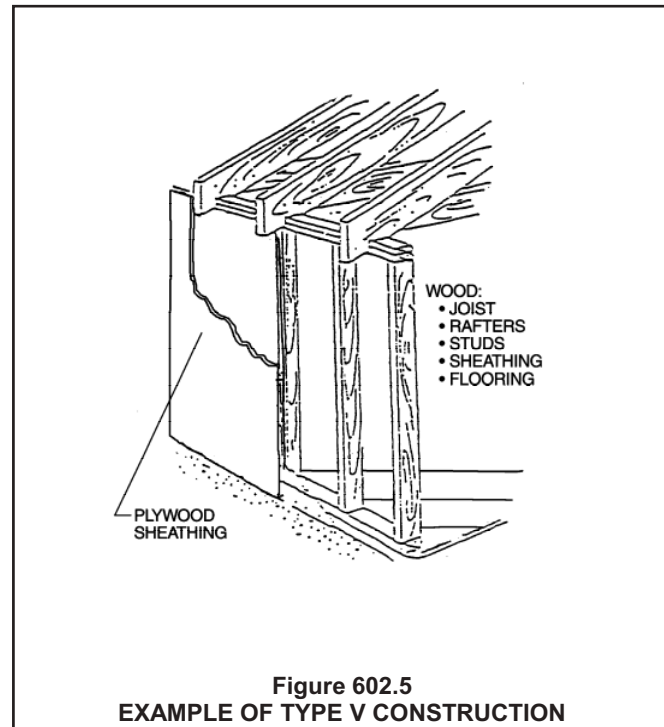


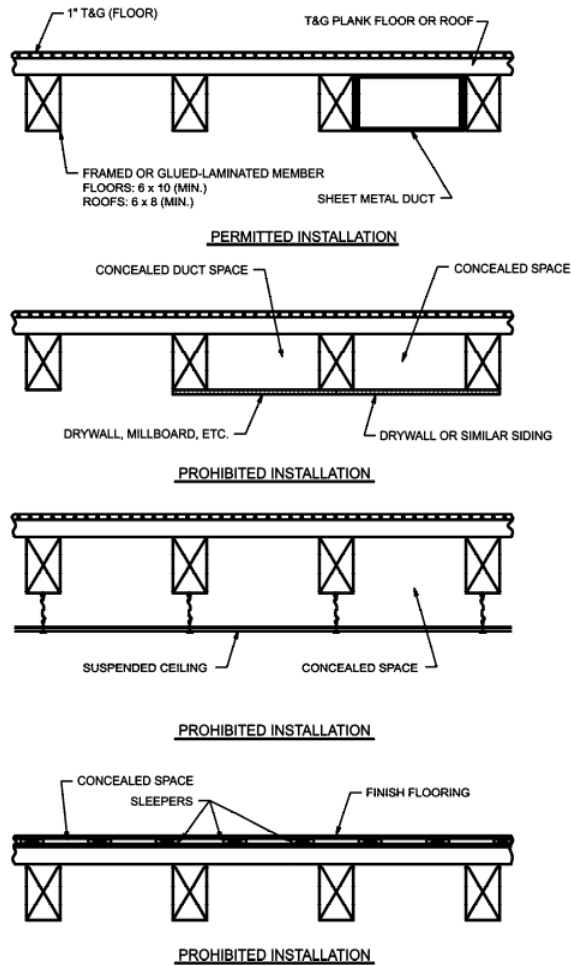
Figure 602.5
EXAMPLE OF TYPE V CONSTRUCTION

SECTION 603 COMBUSTIBLE MATERIAL IN TYPE I AND II CONSTRUCTION

603.1 Allowable materials. Combustible materials shall be permitted in buildings of Type I or Type II construction in the following applications and in accordance with Sections 603.1.1 through 603.1.3:

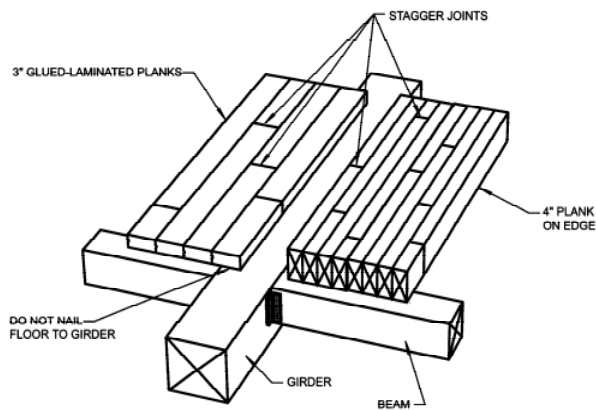
1. Fire-retardant-treated wood shall be permitted in:
 - 1.1. Nonbearing partitions where the required fire-resistance rating is 2 hours or less.
 - 1.2. Nonbearing exterior walls where no fire rating is required.
 - 1.3. Roof construction, including girders, trusses, framing and decking.

Exception: In buildings of Type I construction exceeding two stories in height, fire-retardant-treated wood is not permitted in roof construction when the vertical distance from the upper floor to the roof is less than 20 feet (6096 mm).



For SI: 1 inch = 25.4 mm.

Figure 602.4.4(1)
CONCEALED SPACES



For SI: 1 inch = 25.4 mm.

Figure 602.4.4(2)
HEAVY TIMBER FLOORING

2. Thermal and acoustical insulation, other than foam plastics, having a flame spread index of not more than 25.

Exceptions:

1. Insulation placed between two layers of noncombustible materials without an intervening airspace shall be allowed to have a flame spread index of not more than 100.
2. Insulation installed between a finished floor and solid decking without intervening airspace shall be allowed to have a flame spread index of not more than 200.
3. Foam plastics in accordance with Chapter 26.
4. Roof coverings that have an A, B or C classification.
5. Interior floor finish and interior finish, trim and millwork such as doors, door frames, window sashes and frames.
6. Where not installed over 15 feet (4572 mm) above grade, show windows, nailing or furring strips and wooden bulkheads below show windows, including their frames, aprons and show cases.
7. Finished flooring applied directly to the floor slab or to wood sleepers that are fireblocked in accordance with Section 717.2.7.
8. Partitions dividing portions of stores, offices or similar places occupied by one tenant only and that do not establish a corridor serving an occupant load of 30 or more shall be permitted to be constructed of fire-retardant-treated wood, 1-hour fire-resistance-rated construction or of wood panels or similar light construction up to 6 feet (1829 mm) in height.
9. Stages and platforms constructed in accordance with Sections 410.3 and 410.4, respectively.
10. Combustible exterior wall coverings, balconies and similar projections and bay or oriel windows in accordance with Chapter 14.
11. Blocking such as for handrails, millwork, cabinets and window and door frames.
12. Light-transmitting plastics as permitted by Chapter 26.
13. Mastics and caulking materials applied to provide flexible seals between components of exterior wall construction.
14. Exterior plastic veneer installed in accordance with Section 2605.2.
15. Nailing or furring strips as permitted by Section 803.4.
16. Heavy timber as permitted by Note d to Table 601 and Sections 602.4.7 and 1406.3.
17. Aggregates, component materials and admixtures as permitted by Section 703.2.2.
18. Sprayed fire-resistant materials and intumescent and mastic fire-resistant coatings, determined on the basis of fire-resistance tests in accordance with Section

703.2 and installed in accordance with Section 1704.10 and 1704.11, respectively.

19. Materials used to protect penetrations in fire-resistance-rated assemblies in accordance with Section 712.
20. Materials used to protect joints in fire-resistance-rated assemblies in accordance with Section 713.
21. Materials allowed in the concealed spaces of buildings of Type I and II construction in accordance with Section 717.5.
22. Materials exposed within plenums complying with Section 602 of the *Florida Building Code, Mechanical*.

FRTW does not meet the criteria in the code for a noncombustible material. It is, however, permitted as an alternative to noncombustible materials in specific locations in Type I and II construction. For example, the use of FRTW in walls of Type I and II construction has been limited to nonload-bearing partitions with a fire-resistance rating of no greater than 2 hours and nonload-bearing exterior walls without a fire-resistance rating. Additionally, roofs in buildings of Types I and II construction are permitted to be constructed of FRTW. The exception to Item 1.3 does not permit FRTW in the roofs of buildings of Type I construction over two stories in height if the distance from the uppermost floor to the roof is less than 20 feet (6096 mm). If the distance is 20 feet (6096 mm) or greater, then FRTW is acceptable in the roof. FRTW is permitted in the roof of any Type I building two stories or less in height regardless of the distance from the floor to the roof. Similarly, FRTW is permitted in the roof of any Type II building (no height restrictions) regardless of the distance from the floor to the roof.

While combustible roofs must be of FRTW if used in a Type I or II building, roof coverings, blocking, nailers and furring strips are permitted to be combustible without the use of FRTW (Items 4, 11 and 15).

"Roof covering" is defined as the membrane covering the roof that provides weather resistance, fire resistance and appearance. As long as a noncombustible roof deck (or FRTW) is provided as the structural element, foam plastic insulation, wood structural panels, nailing/furring strips and roof coverings may be applied.

Untreated wood blocking or nailers used to support fixtures, railings, cabinets, interior and exterior finishes, etc., are permitted within walls and partitions required to be of noncombustible construction. Item 15 permits combustible nailers and blocking as stipulated in Section 803.4. Section 803.4.1 indicates that "furring strips not exceeding 1.75 inches (44 mm)" are permitted to be used in concrete or masonry construction for securing trim and finishes. Although locating these combustible elements within noncombustible frame partitions is not specifically identified in this section, the presence of combustible nailers within noncombustible construction types, other than concrete and masonry, represents an equivalent circumstance. Therefore, it is the intent of the code to permit

the use of combustible nailers and blocking within Type I and II construction.

Other permitted uses of combustible materials in buildings of Type I and II construction include thermal and acoustical insulation having a flame spread index of no greater than 25 when tested in accordance with ASTM E 84. Foam plastics complying with Chapter 26 are also permitted as elements of noncombustible construction. Doors and windows are not among the elements required to be noncombustible.

In addition to the above, the remaining items serve as a further listing of the various code sections that regulate the use of combustible materials in noncombustible construction.

603.1.1 Ducts. The use of nonmetallic ducts shall be permitted when installed in accordance with the limitations of the *Florida Building Code, Mechanical*.

Ducts are not addressed by construction type requirements and the use of these must not be controlled by construction type provisions. The *Florida Building Code, Mechanical* (FBCM) provides requirements for nonmetallic ducts that deal with the issue of flammability, flame spread, etc. This section clarifies that this chapter is not intended to override those requirements.

603.1.2 Piping. The use of combustible piping materials shall be permitted when installed in accordance with the limitations of the *Florida Building Code, Mechanical* and the *Florida Building Code, Plumbing*.

Piping is not addressed by construction type requirements and the use of piping must not be controlled by construction type provisions. The *Florida Building Code, Plumbing* (FBCP) provides requirements for combustible piping materials, such as plastic, that deal with the issue of flammability, flame spread, etc. This section clarifies that this chapter is not intended to override those requirements.

603.1.3 Electrical. The use of electrical wiring methods with combustible insulation, tubing, raceways and related components shall be permitted when installed in accordance with the limitations of Chapter 27 of the *Florida Building Code, Building*.

The *National Electrical Code* (NEC) provides requirements for combustible wiring materials that deal with the issue of flammability, flame spread, etc. This sec-

tion clarifies that Chapter 6 is not intended to override those requirements.

TABLE 601.

Table 601 has three components: types of construction and their subclassifications, building elements that are regulated by the table, required fire-resistance rating, in hours, for the various elements based on the required type of construction of the building. Notes a through i apply as specifically referenced in the table.

While the definition of Type IA construction compared to Type IB construction (Types IIA and IIB, Types IIIA and IIIB, Types VA and VB as well) is not specifically defined in the Code, Table 601 essentially defines the differences between them. Type IB construction is Type I construction as defined in Section 602.2 with the fire-resistance ratings as required in Table 601. The "A" and "B" essentially signify different fire-resistance ratings for that particular type construction.

The number of construction types is now five (from six in the first version of the *Florida Building Code*) and the subclassifications are now A and B (from protected and unprotected in the first version of the *Florida Building Code*). These new construction type/subclassification designations are not precisely the same as, but are comparable to, the first version's designations as shown in Figure 600.

Often, Type A and B are referred to as protected and unprotected construction, respectively. Please note this terminology does not refer to whether the building is sprinklered or not.

The following describes the items in the left column of the table titled "Building Element."

Row 1: *Structural frame.* This category includes the structural (load bearing) components of the building frame. To extend the vertical (i.e., gravity) load-carrying capacity of a building under fire exposure, the structural components are required to maintain a minimum degree of fire resistance. The components listed, with the exception of Type IV construction, must also comply with Section 714.

Structural members supporting a wall include such components as columns,

2004 FBC	IA	IB	IIA	IIB	IIIA	IIIB	IV	VA	VB
2001 FBC	I	II	IV 1hr protected	IV unprotected	V 1hr protected	V unprotected	III	VI 1hr protected	VI unprotected

**Figure 600
CONSTRUCTION TYPES COMPARISON**

girders, trusses, lintels and beams. As required for all structural components, the members supporting a wall are required to have a minimum degree of fire resistance to prevent collapse of both the member itself and the wall it is supporting. Structural members supporting walls, therefore, are required to comply with Table 601 and Section 714. A structural member supporting a wall must have a fire-resistance rating that is equal to or greater than the fire-resistance rating required for the wall it is supporting.

Row 2: *Load-bearing walls—exterior and interior.* Exterior walls are the outermost walls that enclose the structure and support any structural load other than its own weight. Their required fire-resistance rating is established by the higher of two fire-resistance ratings. The first component of determining the fire-resistance rating is based on the type of construction of the building. The second component of determining the fire-resistance rating is based on the exterior wall's fire separation distance (Table 602). Whichever of the two requires the higher fire-resistance rating will dictate the minimum required fire-resistance rating of the exterior wall.

In addition to Tables 601 and 602, exterior walls must comply with Section 704 and Chapter 14. Also, Section 705.5.1 has fire-resistance rating requirements for exterior walls on each side of the intersection of the fire wall.

There are also several requirements related to exterior walls mentioned in Chapter 10, and Section 1020.1.4 has specific fire-resistance-rating requirements for exterior walls adjacent to an exit stairway. Section 1007.8 has fire-resistance-rating requirements for exterior walls adjacent to exterior areas for assisted rescue. Section 1023.6 has fire-resistance-rating requirements for exterior walls adjacent to exterior exit stairways.

Additionally, this category includes the structural (load bearing) interior walls of a building. To delay vertical load-carrying collapse of a building due to fire exposure for a predetermined amount of time, the structural partitions are required to maintain a minimum degree of fire resistance. Structural frame elements supporting such walls must comply with Table 601, as well as have at least the same degree of fire resistance as the supported wall.

Row 3: *Nonload-bearing walls—exterior.* This category includes all exterior walls that only

support their own weight. The fire-resistance rating, unlike for load-bearing walls, is based solely on the exterior wall's fire separation distance (Table 602). Where they occur in buildings of Type I or II construction, the walls can be constructed of FRTW if no rating is required.

Row 4: *Nonload-bearing walls—interior.* This category includes all interior nonload-bearing walls and partitions (for example, the common wall separating two offices in the same suite). These walls must comply with all of the material requirements associated with their type of construction classification. Nonload-bearing interior walls and partitions are not required to have a fire-resistance rating. Where they occur in buildings of Type I or II construction and are to be constructed of wood, the wood must be fire-retardant treated as indicated in Section 603.1. Nonload-bearing interior walls may be required to be fire-resistance rated when they separate mixed occupancies (see Section 508.3.3), dwelling units, tenant spaces in covered malls, sleeping units and corridor walls (see Sections 706 and 708).

Row 5: *Floor construction.* Floor construction provides a natural fire compartment in a building by means of a horizontal barrier that retards the vertical passage of fire from floor to floor. In order to accomplish this, floor assemblies, including the beams and structural members supporting the floor, must comply with Table 601 and Section 711. Ceilings are included if they are part of the tested assembly.

Row 6: *Roof construction.* Proper roof construction is necessary to prevent collapse from fire as well as potential impingement on adjacent buildings. Roof construction must comply with Table 601 and Section 711. Additionally, when a portion of the roof construction is less than 20 feet (6096 mm) above the floor immediately below, the entire structural member must be protected to meet the minimum fire-resistance rating requirements. In Figure 601, the roof construction is assumed to be comprised of one structural member. While a majority of the roof construction is greater than 20 feet (6096 mm) above the floor below, a portion of the roof construction is only 15 feet (4572 mm) above the mezzanine. As such, the entire length of the structural member, or in this case, the entire roof must be rated for 1 hour. The fire-resistance rating is not permitted to terminate at the portion where the roof is 20 feet (6096 mm) above the floor

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

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
	A	B	A	B	A	B	HT	A	B
Structural frame ^a	3 ^{b,h}	2 ^b	1	0	1	0	HT	1	0
Bearing walls									
Exterior ^g	4	3	1	0	2	2	2	1	0
Interior	4 ^b	3 ^b	1	0	1	0	2 ^b /HT	1	0
Nonbearing walls and partitions	See Table 602								
Exterior									
Nonbearing walls and partitions	0	0	0	0	0	0	See Section 602.4.6	0	0
Interior ^f									
Floor construction	3 ^h	2	1 ^e	0 ^{e,i}	1 ^e	0 ^{e,i}	HT	1	0 ⁱ
Including supporting beams and joists									
Roof construction	1 1/2 ^{c,h}	1 ^{c,d}	1 ^{c,d}	0 ^d	1 ^d	0 ^d	HT	1 ^{c,d}	0
Including supporting beams and joists									

For SI: 1 foot = 304.8 mm.

- a. The structural frame shall be considered to be the columns and the girders, beams, trusses and spandrels having direct connections to the columns and bracing members designed to carry gravity loads. The members of floor or roof panels which have no connection to the columns shall be considered secondary members and not a part of the structural frame.
- b. Fire-resistance ratings of structural frame and bearing walls are permitted to be reduced by 1 hour where supporting one floor or one roof only.
- c. Except in Group F-1, H, I, 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.
- d. In all occupancies, heavy timber shall be allowed where a 1-hour or less fire-resistance rating is required.
- e. Group B and M occupancies of Type II or III construction five or more stories in height shall be required to have a minimum 2-hour fire-resistance rating for the floor construction located over the basement.
- f. Not less than the fire-resistance rating required by other sections of this code.
- g. Not less than the fire-resistance rating based on fire separation distance (see Table 602).
- h. For Group A, B, E, F and R occupancies and parking garages, the required fire-resistance ratings for the structural frame, floor and roof construction, including supporting beams and joists, shall be permitted to be reduced by 1 hour where the building is protected throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1, but the fire-resistance rating shall not be less than 1 hour.
- i. For unsprinklered Group E occupancies of Type, IIB, IIIB, IV or VB construction, the floor construction located immediately above useable space in basements shall have a fire-resistance rating of not less than 1 hour.

below unless the structural member ends at that point. The fire-resistance rating of a column must also be continuous for the full height of the column and not reduced or eliminated at a height of 20 feet (6096 mm) and above (see Note c).

Note a clarifies the extent of the structural frame of the building or structure. Any structural item that provides direct connections to columns and bracing members that are designed to carry a gravity load is considered part of the structural frame. Secondary members (e.g., floor or roof panels without a connection to the column) are not considered part of the structural frame and as such are not required to be rated in accordance with Table 601.

Note b permits the fire-resistance ratings of structural frame and interior load-bearing walls in buildings of Type IA and IB construction to be reduced by 1 hour if the members are supporting only the roof.

Note c permits the roof construction to

not have a fire-resistance rating when all structural members of the roof are at least 20 feet (6096 mm) above the floor immediately below. Structural members located less than 20 feet (6096 mm) above the floor immediately below must be rated for the entire length of the member. This alternative is applicable for all occupancy classifications except Groups F-1, H, M and S-1. In buildings of Type I and II construction, fire-retardant-treated wood (FRTW) may be utilized for unprotected roof members. Please note that FRTW is not required in the roof of buildings of Type IIIA or VA construction since combustible materials are already permitted by Sections 602.3 and 602.5, respectively. Please note that Note c does not mandate that a 1-hour rating for the roof construction be provided in Type IIB buildings if the provisions are not satisfied. Type IIB buildings are already permitted to have no rating for the roof, so the 20 foot (6096 mm) height limitation is not

applicable.

Note d permits HT construction to be utilized in the roof construction as an alternative to having a fire-resistance rating of 1 hour or less. Note that HT cannot be used in Type IA construction since the roof is required to have a rating greater than 1 hour (i.e., 1½).

Notes e, h and i bring forward specific fire separation requirements from the 2001 FBC. Notes e and i pertain to the fire resistance rating of floors over basements in certain occupancies. Note h permits the fire-resistance rating of the structural frame, floor and roof construction to be reduced by 1 hour when the building is protected with an approved (NFPA 13) automatic sprinkler system in accordance with 903.3.1.1. This applies only to Groups A, B, E, F and R of Type I construction, and the rating cannot be less than 1 hour. In order to use this trade-off, the automatic sprinkler system must not be required for any other reason, including increases in allowable height and area (See Section 504.2, Exception 3). This note is applicable in very limited circumstances.

Note f is applicable only to interior nonload-bearing walls. While nonload-bearing interior walls are not required to have a rating per Table 601, other sections of the code may require a rating (e.g., corridor walls, dwelling unit separation, sleeping unit separation). If other sections of the code require a rating, this would override the requirements of Table 601 stating no rating is required. In addition, interior nonload-bearing walls in

buildings of Type IV (Heavy Timber, HT) construction shall be of solid wood construction formed by not less than two layers of 1-inch (25 mm) matched boards or laminated construction 4 inches (102 mm) thick, or of 1-hour rated construction.

Note g is a reminder that exterior load-bearing walls must also comply with the fire-resistance rating listed in Table 602 based on the fire separation distance. Exterior load-bearing walls must satisfy the higher of the two fire-resistance ratings.

TABLE 602.

Table 602 establishes the minimum fire-resistance ratings for all exterior walls. The required ratings are based on the fuel load, probable fire intensity of the various occupancy classifications and the fire separation distance (see Figure 602A). In using the table, the occupancy classification of the building and the fire separation distance of the walls must be determined. Once determined, the required fire-resistance rating is obtained by referring to the appropriate row and column corresponding to these parameters. It should be noted that the fire-resistance-rating requirements of Table 601, which are based on construction type, also apply. Exterior load-bearing walls must conform to the higher of the fire-resistance ratings specified in Tables 601 and 602. Exterior nonload-bearing walls need only comply with Table 602.

The amount of openings permitted in exterior walls, protected and unprotected, are addressed in Section 704 (See Commentary to Section 704.8).

Note b refers to private garages and carports that are greater than 1,000 square feet (93 m²) area but less than 3,000 square feet (279 m²) in area. As long as the fire separation distance is at least 5 feet (1524 mm), no fire-resistance rating would be required for

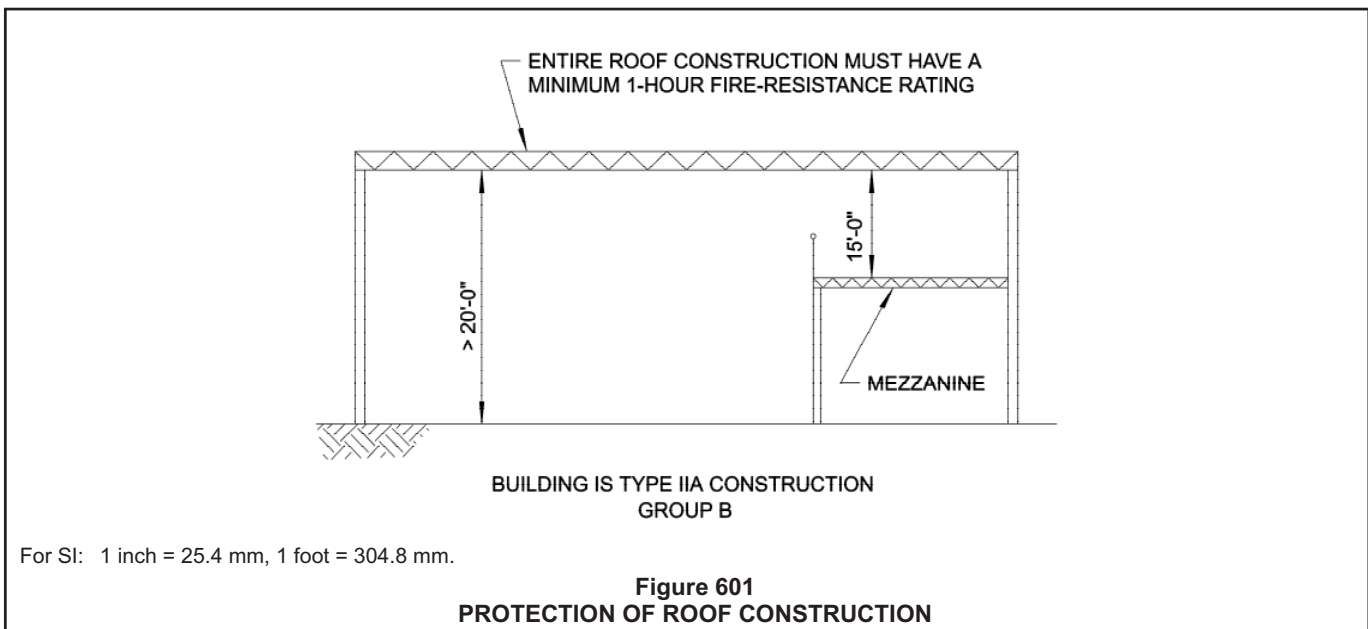


TABLE 602
FIRE-RESISTANCE RATING REQUIREMENTS FOR EXTERIOR WALLS BASED ON FIRE SEPARATION DISTANCE^{a, e}

FIRE SEPARATION DISTANCE = x (feet)	TYPE OF CONSTRUCTION	GROUP H	GROUP F-1, M, S-1	GROUP A, B, E, F-2, I, R, S-2, U ^b
x < 5 ^c	I-A, I-B, III-A, III-B, IV	3	3	3
	Others	3	2	1
5 ≤ x < 10	I-A, I-B, III-A, III-B, IV	3	2	2
	Others	2	1	1
10 ≤ x < 20	I-A, I-B, III-A, III-B, IV	2	2	2 ^d
	IIB, VB	1	0	0
	Others	1	1	1 ^d
20 ≤ x < 30	I-A, I-B, III-A, III-B, IV	1	1	1 ^d
	Others	1	0	0
x ≥ 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 406.1.2
- c. See Section 705.1.1 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.

the exterior walls. This footnote does not apply to other Group U occupancies not used for the storage of motor vehicles. Other Group U occupancies would have a minimum 1-hour fire-resistance rating for a fire separation distance of less than 10 feet (3048 mm).

Note c requires walls that are located on property lines between adjacent buildings (i.e., zero fire separation distance) to be constructed as fire walls and have a 4 hour fire-resistance rating in accordance with Section 705.1.1.

Note d permits the exterior walls of an open parking garage to not have a fire-resistance rating when the fire separation distance is at least 10 feet (3048 mm). The exception to Section 402.7.1 indicates that when a garage is more than 10 feet (3048 mm) from the covered mall, Table 602 is to be used rather than the 2-hour fire-resistance rating. At a distance of 10 feet (3048 mm), the fire separation distance would be between 5 feet (1524 mm) and 10 feet (3048 mm). Table 704.8 allows the openings to be unlimited for open parking garages at 10 feet (3048 mm) of fire separation distance. If the amount of openings is no longer limited, then the entire wall could be removed.

Note e clarifies that the fire-resistance rating of each wall in each story of a building must be determined separately. Should a multistory building be configured such that the fire separation distance of each story is different, the required fire-resistance ratings associated with each of the exterior walls in each of those stories is established separately (see Figure 602B).

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