



INFORMATIONAL BULLETIN

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FIRE RESISTANCE RATING AND PROTECTION REQUIREMENTS FOR BUILDING ELEMENTS

Reference: California Building Code (CBC) Chapter 6 Types of Construction, Chapter 7 Fire and Smoke Protection Features.

Introduction: Many design benefits result from the selection of fire resistive construction types. For example, allowable building area, height and number of stories are all increased through the selection of fire resistive construction. Additionally, for certain types of construction, some occupancies are only allowed when fire resistive construction is specified.

Such design benefits are a trade-off for enhancing the building's resistance to fire. A decision to use fire resistive construction is an economic choice whereby the designer has decided that rather than increase the type of construction from say, Type VB to Type IIIB, it is more economical to design to Type VA standards where the "A" signifies fire resistive construction, typically, for all building elements except interior non-bearing walls and partitions.

Fire resistive designs require greater attention to construction detailing *and* coordination between design professionals. Additionally, to ensure the design is properly executed during the construction phase, the contractor must more carefully plan the sequence of construction and additional intermediate City inspections must be coordinated.

The referenced chapters of the CBC, in part, define fire resistance rating and protection requirements for building elements. Requirements are generally based on a building's specified type of construction and applicable fire separations.

In addition, Chapter Seven covers the protection requirements for membrane and through penetrations for each type of rated wall assembly and for horizontal assemblies which the Code defines as a "fire-resistance rated" roof-ceiling or floor-ceiling assembly.

Purpose: The purpose of this informational bulletin is to:

- Highlight certain code provisions;

- Establish a policy for minimum plan content; and
- Define inspection requirements that ensure proper installation of fire protection features.

WALLS

Wall assemblies are required under various code provisions to be constructed to meet fire resistance ratings. Additionally, certain code defined wall types are required to meet specific provisions, for example, structural stability, materials of construction, continuity, opening limitations or protections, penetrations and joints.

Fire Rating: The minimum fire resistance rating is generally the highest requirement as specified by Table 601 or 602. Where a wall serves an additional or other function not specifically covered by either table; however, a firewall for example, a higher fire resistance rating may apply.

Information Required in the Plans: For design clarity, all wall assemblies required to meet fire resistance ratings shall be identified in the plans by distinct symbols that correspond to the plan legend. Symbol descriptions shall include the fire resistance rating in hours and any applicable code designation, i.e. *Fire Wall, Fire Barrier, Fire Partition, Smoke Barrier, Exterior Bearing or Non-bearing Wall and Interior Bearing or Non-bearing Wall*. Any wall with such a designation that also acts as a *Smoke Partition* shall be identified with both designations.

Additionally, all standard notes as contained in the City of Irvine Standard Title Sheet For New Construction, commencing with the January 2017 version, under the heading FIRE RESISISTIVE CONSTRUCTION shall be included.

Construction detailing shall be provided as specified below.

PRIMARY STRUCTURAL FRAME

General fire resistance requirements are provided in Table 601 FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS. **Section 202 Definitions** of the CBC states: The primary structural frame shall include all of the following structural members:

1. The columns;
2. Structural members having direct connections to the columns, including girders, beams, trusses and spandrels;
3. Members of the floor construction and roof construction having direct connections to the columns; and

4. Bracing members that are essential to the vertical stability of the primary structural frame under gravity loading shall be considered part of the primary structural frame whether or not the bracing member carries gravity loads.

Columns: All columns are elements of the primary structural frame. Per **Section 704.2 Column Protection**, when protection is required, a column must be provided *individual* encasement protection by protecting it on all sides for the full column length, including connections to other structural members, with materials having the required fire resistance rating. (**Note:** Generally, no credit is given for any wall cover that may occur. Individual encasement must be sufficient on its own to provide the prescribe level of protection. One exception may be permitted based on a new exception to **Section 704.2** effective in the 2018 International Building Code, which eliminates individual encasement for “Studs, columns, and boundary elements that are integral elements in walls of light-frame construction and are located entirely between the top and bottom plates or tracks...” In such a case, as long as the membrane protection meets the rating requirement, individual encasement will not be required.)

Fire Rating: The minimum fire resistance rating is the requirement as specified by Table 601 for primary frames, unless the column is located on the exterior of the building or within an exterior wall. In these cases, the higher rating for exterior walls as specified by Table 601 or 602 shall govern.

Other Than Columns: For primary structural members that are not columns, e.g. beams, “individual encasement protection by protecting it on all sides for the full length, including connections to other structural members” is required by **Section 704.3 Protection of the Primary Structural Frame Other Than Columns**. This requirement only applies to those primary structural members which are not columns and that support:

1. More than two floors;
2. More than one floor and roof;
3. A load-bearing wall; or
4. A nonload-bearing wall more than two stories high.

Fire Rating: The minimum fire resistance rating is the requirement as specified by Table 601 for primary frames, unless the element in question supports an assembly with a higher rating, in which case the higher rating would apply to the element.

Information Required in the Plans: For design clarity, all primary frame elements requiring individual encasement shall be identified on the structural

framing plans via use of a symbol or other acceptable method. Said designation shall indicate the fire resistance rating and be cross referenced to appropriate construction details.

Construction detailing shall be provided as specified below.

(**Note:** For secondary members and primary members, excluding columns, which are not subject to the criteria above, protection may be provided via individual encasement *or* by the membranes of the horizontal or wall assembly in which they are located. The code defines secondary members as: 1) Structural members not having direct connections to the columns; 2) Members of the floor construction and roof construction not having direct connections to the columns; and 3) Bracing members other than those that are part of the primary structural frame.)

CONSTRUCTION DETAILING

For each horizontal assembly type, wall type, frame element and condition, construction detailing, cross referenced via detail call-outs in plan views and/or sections, shall be provided depicting the assembly or the elements necessary to achieve the specified fire resistance rating. All such details and assemblies shall be justified as specified in **SECTION 703 Fire-Resistance Rating and Fire Tests**. If justification is based on pre-qualified assemblies found within the CBC tables 721.1(1), 721.1(2), 721.1(3) or the latest Gypsum Association Fire Resistance Design Manual, the CBC table or manual shall be referenced along with the assembly number. If a proprietary product is used to achieve the fire resistance rating, the manufacturer and product name and listing report number shall be specified in the detail. The manufacturer's recommendations and the listing report shall be provided for plan check review. Should the listing report or manufacturer's recommendations require calculations to determine product thickness or other use parameters, justifying calculations shall be provided for each condition.

Fire resistance may also be justified via calculation per **Section 722 Calculated Fire Resistance**. Calculations for any detail or assembly utilizing this approach shall be verified during plan check review. (**Note:** For wood assemblies, Section 722.6 limits the calculation method to a maximum fire resistance rating of one-hour.)

OPENINGS AND PENETRATIONS

Openings and penetrations of horizontal assemblies and many fire resistance rated wall types require fire protection. **Sections 705 through 710** are specific to the various wall types and **Section 711** addresses horizontal assemblies.

These sections contain provisions relating to the protection of openings, penetrations, joints, and ducts and air transfer openings.

Fire Rating: Various code provisions define minimum fire protection requirements. The best practice is to first define the fire resistance rating of the wall or horizontal assembly, then from the specific code section that addresses the wall type, **Section 705** through **710**, or **Section 711** for horizontal assemblies, determine the section that addresses the type of opening or penetration.

Information Required in the Plans: Any door or window opening protection requirement must be reflected in plan view and cross referenced to a door or window schedule that indicates the required level of fire protection.

General notes shall specify the fire rating requirements for penetration and joint protection for all applicable conditions. Plans shall indicate where protections for duct and air transfer openings are required, and shall be cross referenced to specific detailing that indicates the level of fire resistive protection.

TYPE III CONSTRUCTION- SPECIAL CONSIDERATION, FIRE-RETARDANT-TREATED WOOD FRAMING IN LIEU OF NON-COMBUSTIBLE MATERIALS

Section 602.3 Type III generally requires non-combustible material for the exterior walls in Type III construction. Where the required fire resistance rating of such an exterior wall does not exceed two hours, however, fire-retardant-treated wood framing may be used as a substitute.

This general requirement and permissible substitution also applies to any cantilevered frame element that supports exterior frame elements above, such as a column or wall. It is advisable that the structural designer and the architect coordinate closely to ensure that fire-retardant-treated wood framing is appropriately specified and considered in the structural design and that no engineered wood products are specified where fire-retardant-treated wood framing is required.

(Note: Per Section 2303.2.5, the structural design must account for the strength reduction resulting from the fire-retardant-treatment.)

ADDITIONAL INSPECTIONS FOR PROJECTS HAVING FIRE RESISTIVE CONSTRUCTION

Due to the added complexity of fire resistive construction a pre-erection meeting is required. This meeting is to take place after the foundation has been placed, but before any framing elements have been incorporated into the project. It

shall be the contractor's responsibility to coordinate said meeting with the assigned City inspector. At this meeting, the contractor along with all involved subcontractors will be responsible for reviewing with the City inspector the fire protection detailing and planned sequence of construction to ensure that full encasement of primary structural frame elements may be achieved and that an effective plan is developed for areas requiring partial drywall placement in advance of rough frame approvals, e.g. behind tubs and showers at rated walls or floor-ceiling and roof-ceiling assemblies through which significant penetrations occur.

In addition to the above, **all fire-retardant-treated wood** shall remain bundled until the City inspector has verified that the lumber is labeled in conformance to **Section 2303.2.4** which requires: 1) The identification mark of an *approved agency* in accordance with Section 1703.5; 2) Identification of the treating manufacturer; 3) The name of the fire-retardant treatment; 4) The species of wood treated; 5) Flame spread and smoke-developed index; 6) Method of drying after treatment; 7) Conformance with appropriate standards in accordance with Sections 2303.2.2 through 2303.2.5; 8) For fire-retardant-treated wood exposed to weather, damp or wet locations, include the words "No increase in the listed classification when subjected to the Standard Rain Test" (ASTM D 2898).