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## Technical Bulletin

### International Building Code Highlights for Fireproofing

The International Building Code, or IBC, is now widely accepted as the main building code in the United States. The IBC was created to provide a single building code that includes the Building Officials and Code Administrators (BOCA), Southern Building Code Congress International (SBCCI), and the Uniform Building Code (UBC). The intent of this document is to outline the main sections of the IBC as they relate to the fire protection of commercial / architectural or light industrial structures. Architects and specifiers commonly utilize both intumescent fireproofing and Spray-applied Fire Resistive Materials (SFRMs) to meet commercial fire ratings detailed in the current version of the IBC. The pertinent sections are outlined below.

#### **Section 202 Definitions – Defines Primary Structural Frame and Secondary Members**

**Primary Members** - The primary structural frame shall include all of the following structural members:

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

**Secondary Members** - The following structural members shall be considered secondary members and not part of the primary structural frame.

1. Structural members not having direct connections to the columns.
2. Members of floor and roof construction not having direct connections to the columns.
3. Bracing members other than those that are part of the primary structural frame.

**Section 703.2.3 Restrained Classification – Clarifies restrained and unrestrained classification**, “Fire-resistance rated assemblies tested under ASTM E119 or UL 263 shall not be considered to be restrained unless evidence satisfactory to the building official is furnished by the registered design professional showing that the construction qualifies for a restrained classification in accordance with ASTM E119 or UL 263. Restrained construction shall be identified on the plans.”

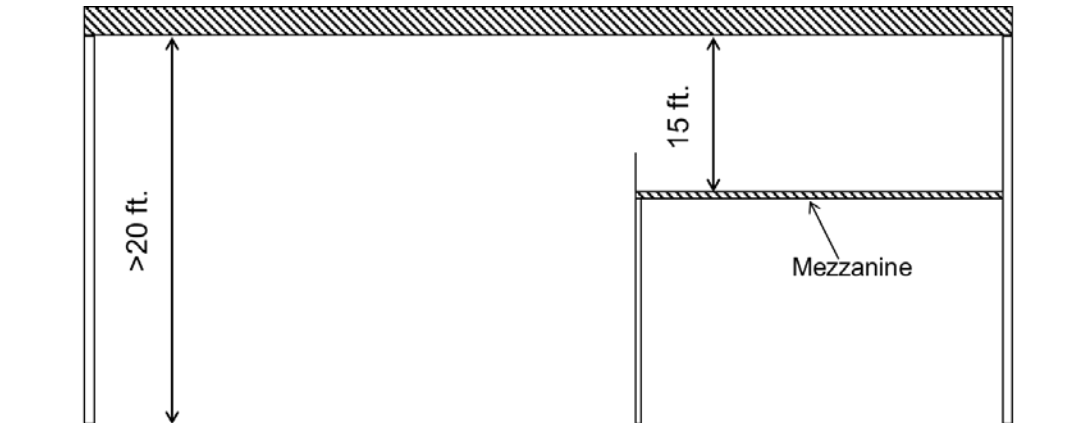
**Table 601 / Table 602 – Fire Resistance Rating Requirements for Building Elements** specifies the hourly fire resistive requirements for building elements such as structural framing, floor and roof construction, and walls and partitions.

Table 601 Fire Resistance Rating Requirements For Building Elements (Hours)								
Building Element	Type I		Type II		Type III		Type V	
	A	B	A	B	A	B	A	B
Primary structural frame (see section 202)	3 <sup>a</sup>	2 <sup>a</sup>	1	0	1	0	1	0
Bearing Walls								
Exterior	3	2	1	0	2	2	1	0
Interior	3 <sup>a</sup>	2 <sup>a</sup>	1	0	1	0	1	0
Floor Construction and Associated Secondary Members (see Section 202)	2	2	1	0	1	0	0	0
Roof Construction and Associated Secondary Members (see Section 202)	1-1/2 <sup>b</sup>	1 <sup>b,c</sup>	1 <sup>b,c</sup>	0 <sup>c</sup>	1 <sup>b,c</sup>	0	1 <sup>b,c</sup>	0

- 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.

Table 601 (footnote a) states, "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."

Table 601 (footnote b) states, "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. Footnote b applies to the construction of the roof and related secondary members including roof framing and decking not to primary structural frame. If any portion of roof is greater than 20 feet above floor, the entire structural member (roof) must be protected (not just where it is above 20 feet.



**Note:** Fire resistance rating of a column must also be continuous and not reduced or eliminated at a height of 20' and above.

Fire Separation Distance X (feet)	Type Of Construction	Occupancy H	Occupancy F-1, M, S-1	Occupancy A,B,E,F-2,I,R,S-2,U
X < 5	All	3	2	1
5 ≤ X < 10'	IA	3	2	1
	Others	2	1	1
10 ≤ X < 30'	IA, IB	2	1	1
	IIB, VB	1	0	0
	Others	1	1	1
X ≥ 30'	All	0	0	0

Fire-resistance ratings for exterior walls are based on fire separation distance between adjacent buildings, type of construction, and occupancy of the structure.

**Section 403 High-Rise Buildings** - Within this section there are requirements for minimum bond strength values determined by the building height which is measured from above the lowest level of the fire department vehicle access to the highest occupied floor level. The higher the structure, the higher the minimum bond strength requirements for the Spray-applied Fire Resistive Material.

**Section 403.3.4 Sprayed Fire-Resistant Materials (SFRM)** - The bond strength of the SFRM installed throughout the building shall be in accordance with the following table. The IBC does not set forth minimum requirements for density of the SFRM for these height requirements, it only defines the bond strength requirements.

Height of Building	Minimum Bond Strength
Up to 75 feet	150 psf
Up to 420 feet	430 psf
Greater than 420 feet	1,000 psf

**Section 1705.13 Sprayed fire-resistant materials** - "Special inspection for sprayed fire-resistive materials applied to floor, roof, and wall assemblies and structural members shall be in accordance with Sections 1705.13.1 through 1705.13.6. Special inspections shall be based on the fire resistive design as designated in the approved construction documents." Special inspections shall be performed after the rough installation of electrical, automatic sprinkler, mechanical and plumbing systems, but before walls and partitions are in place.

**Special inspections** - "The special inspections shall include the following tests to demonstrate compliance with the listing and fire resistance rating:

1. Condition of substrate
2. Thickness of application
3. Density in pounds per cubic foot (kg/m<sup>3</sup>)
4. Bond strength adhesion/cohesion
5. Condition of substrate

**Section 1705.13.4 Thickness** - No more than 10% of the thickness measurements of the SFRM applied to floor, roof, or wall assemblies and structural members shall be less than the thickness required by the approved fire-resistance design, but in no case less than the minimum allowable thickness required. For design thicknesses 1 inch (25 mm) or greater, the minimum allowable individual thickness shall be the design thickness minus ¼" (6.4 mm). For design thicknesses less than 1 inch (25 mm), the minimum allowable individual thickness shall be the design thickness minus 25%. All thickness measurements shall be made in accordance with ASTM E605.

**Section 1705.13.5 Density** - The density of the sprayed fire-resistant material shall not be less than the density specified in the approved fire resistance design. The density of the sprayed fire-resistant material shall be determined in accordance with ASTM E605 "Standard Test Method for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members" (Determine the dry density of each sample using the bead displacement method in section 8.3).

**Section 1705.13.5 Bond Strength** - The cohesive/adhesive bond strength of the cured SFRM applied to floor, roof, or wall assemblies and structural members shall be in accordance to Table 403.2.4 SFRM Minimum Bond Strength Requirements above. The cohesive/adhesive bond strength shall be determined using the field test specified in ASTM E736 by testing in place samples of the SFRM selected in accordance with Sections 1705.13.6.1 through 1705.13.6.3.

**Section 1705.14 Mastic and Intumescent Fire-resistant coatings** - Special inspections for mastic and intumescent fire-resistant coatings applied to structural steel elements and decks shall be in accordance with AWCI 12-B. Special inspections shall be based on the fire-resistance design as designated in the approved construction documents.

This document is only a general summary of the IBC requirements for fire-resistive materials. If you have any questions, please contact our Fireproofing Technical Service Department at 800-848-4645.