

Wall & Floor Penetration Fire Stops (FM Approval Class Number 4990)

An important technique in property loss control is the subdivision of a building into compartments and sub-compartments. This subdivision is usually accomplished by erecting physical barriers that will limit the damage caused by an event to the room of origin. The loss caused by the spread of fire damage can be minimized when effective compartmentation is incorporated into a building's design.

One method of combating the spread of fire through openings in or around barriers is to properly design and install firestopping. Firestopping is intended for use in openings in or between fire resistant walls, floor/ceiling assemblies at head of walls and at construction joints between floors and walls.

Through penetrations submitted for Approval shall be evaluated for their ability to prevent the passage of flame through or around openings in fire rated walls and floor/ ceiling assemblies and their ability to limit the transmission of heat through the assembly. In addition, no openings shall develop that permit a projection of water beyond the unexposed surface during the hose stream test.

All through penetrations shall be subjected to a fire resistance test conducted in accordance with ASTM E814 (08) "Standard Method for Fire Tests of Through-Penetrations Fire Stops" followed by a hose stream test conducted in accordance with ASTM E2226 (07), "Practice for Application of Hose Stream". An hourly rating will be assigned based on the time period for which it successfully met the performance criteria.

Through penetrations that meet the fire resistance and hose stream test criteria shall be assigned three (3) separate ratings. They are called the F rating, the T rating and the T_{FM} rating.

The F rating denotes the period of time which the firestop:

- Withstood the fire resistance test without developing any through openings through which flames can pass;
- Withstood the fire resistance test without the occurrence of flaming on the unexposed side of the assembly;
- During the hose stream test, did not develop any opening that allows the projection of water during the hose stream test from the stream to the unexposed side.

The T rating shall denote the period of time which the firestop:

- Met all the criteria of the F rating;
- Limited the transmission of heat through the assembly, as measured by thermocouples located on the unexposed side of the test assembly, as specified in ASTM E814, from exceeding a 325°F (181°C) rise above ambient temperature.

The T_{FM} rating shall denote the period of time which the firestop:

- Met all the criteria of the F rating;
- Limited the transmission of heat through the assembly as measured by an individual thermocouple placed on the unexposed side of the fire stop material positioned 1 in. (25 mm) from the penetrating item from exceeding a 325°F (181°C) rise above ambient temperature.

FM Approvals does not consider the performance of the thermocouples placed directly on the penetrating item for purposes of determining the T_{FM} rating as it is not viewed as part of the firestopping materials provided in trying to protect the opening.

All joint systems between adjacent floor, wall or top of wall sections shall be subjected to a fire resistance and hose stream test conducted in accordance with ASTM E1966, "Standard Test method for Fire Resistance Joint Systems". If successful, the assembly will be assigned an Assembly Rating based on the time period in which it has successfully met the performance criteria. Floor-to-floor and floor-to-wall joint systems shall also be subjected to the same fire test but are not required to be subjected to a hose stream test.

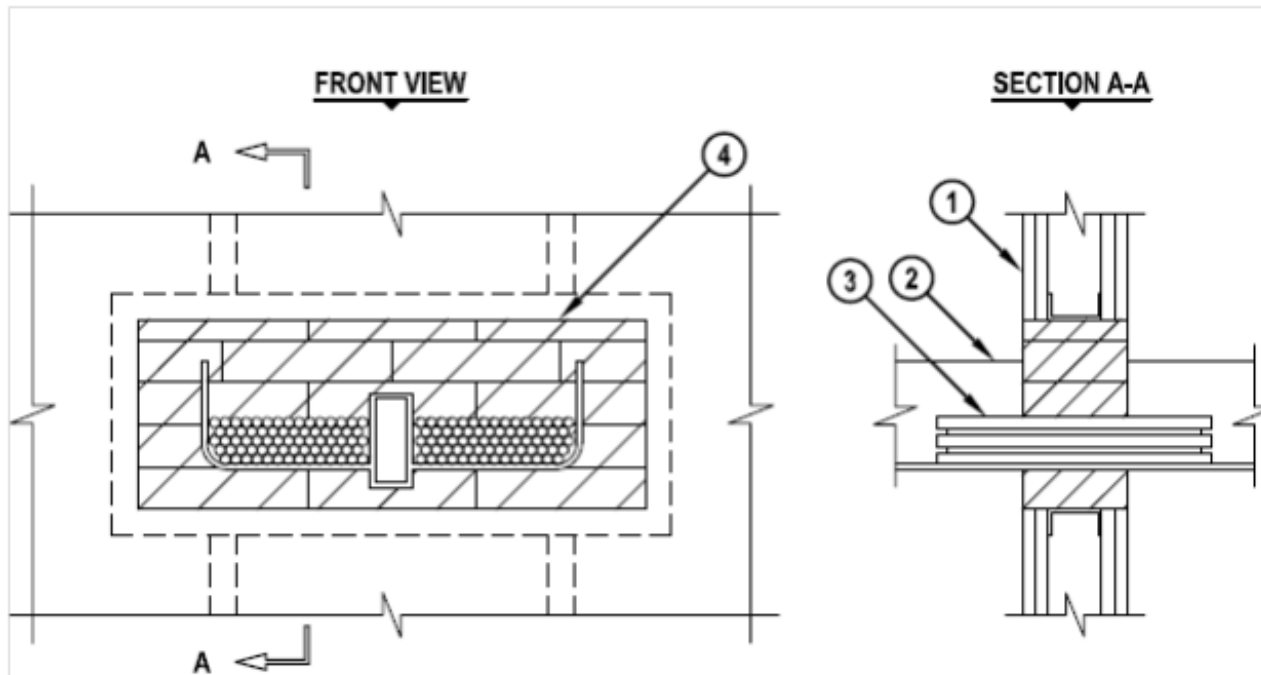
All joint systems shall be subjected to a cycling test conducted in accordance with ASTM E1966 prior to the fire resistance and hose stream test. Three (3) movement ratings are available – Type 1, Type 2 and Type 3.

Fire Stop Design 661

F-Rating = 2 HR

T-Rating = 0 HR

T_{FM} -Rating = 3/4 HR



1. **WALL ASSEMBLY.** Two hour fire rated gypsum wall assembly consisting of steel channel studs.
 - a. Steel studs shall be a min 2-1/2 in. (65 mm) deep fabricated from 25 MSG galvanized steel, spaced a max of 24 in. (600 mm) on center. Additional framing members are applied around the opening.
 - b. Gypsum Board. Min 5/8 in. (16 mm) thick x 4 ft (1.2 m) wide gypsum wallboard applied to each side of the wall. The gypsum wallboard type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual wall assembly hourly rating design criteria however 2 hour walls shall use at least 2 layers of Type X gypsum board. Max size of the opening is 24 in. x 9 in. (610 mm x 229 mm).
2. **CABLE TRAY.** Max 18 in. (457 mm) wide x 6 in. (152 mm) deep "spine" cable tray. The 1.5 in. (38 mm) x 2.75 in. (70 mm) deep tubular spine is formed of 0.121 in. (3 mm) thick aluminum. The 6 in. (152 mm) deep "u" shaped rungs are spaced 6 in. (152 mm) o.c. formed from 0.5 in. (13 mm) x 0.5 in (13 mm) extruded aluminum tube. One cable tray to be installed in the opening. The annular space between the periphery of the opening shall be a min 1.0 in (25 mm) to 2.625 in. (67 mm). Cable tray to be rigidly supported on both sides of the wall assembly.
3. **CABLES.** Aggregate cross-sectional area of the cables in the cable tray to be a max 22% of the cross sectional area of the cable tray based on a max 6 in. (152 mm) cable loading depth within the cable tray. Any combination of the following types and sizes of cables can be used.
 - a. RG-6/U coaxial cable
 - b. Max 25 PR. No. 24 AWG Telephone Cable
 - c. Max 3/C No. 12 AWG metal clad cable
 - d. 24 fiber-optic cable
 - e. Max 2/C No.12 AWG Romex

4. **FIRESTOP SYSTEM.** Fire blocks installed with the 5 in. (127 mm) dimension projecting through the opening, centered within the thickness of the wall assembly. Blocks to be firmly packed and completely fill the entire opening. Blocks can be cut to smaller thicknesses where needed to assist in tight packing and filling any gaps or voids within the opening.

(Optional – not shown). Fill material (FS One or CFS-IS P High Performance Intumescent FireStop Sealant or CP618 or CFS-P ST FireStop Putty Stick) shall be permitted to be applied to fill any voids that may exist within the opening.

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Design Component	Product	Product Type	Listing Country	Certification Type	Class of Work
4	CFS-BL Firestop Block	Fill Material	Liechtenstein	FM Approved	4990-Penetration Seal & Fire Stop

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4	CFS-BL Firestop Block	Fill Material	United States of America	FM Approved	4990-Penetration Seal & Fire Stop

Fire Stop Design 661

Category:	Penetration Seal
Design Number:	661
Ratings:	2, 3/4, 0
Construction:	Wall
Penetrant:	Cable or Cable Tray
Floor/Wall Material Type:	Gypsum Drywall
Joint Type:	na
Min. Wall Thickness (in.):	5
Min. Wall Thickness (mm):	127
Class of Work:	4990-Penetration Seal & Fire Stop