

## 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.

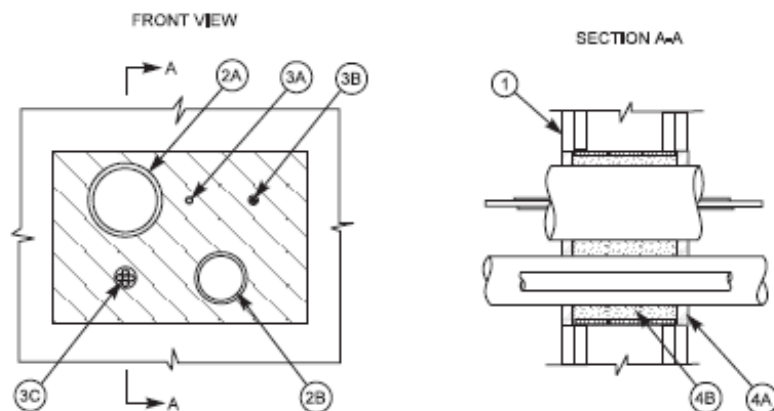
All joint systems shall be subjected to a cycling test conducted in accordance with ASTM E1966 prior to the fire resistance and hose stream test. Three (3) movement ratings are available – Type 1, Type 2 and Type 3.

## Fire Stop Design 288

**F-Rating = 2 HR**

**T-Rating = 0 HR**

**$T_{FM}$ -Rating = 1½ HR**



1. WALL ASSEMBLY. Min 2 hour fire rated gypsum wallboard/stud wall assembly consisting of min 3 5/8 in. (92 mm) thick steel or

nom 2 by 4 in. wood framing with two layers of 5/8 in. (16 mm) thick, Type X gypsum wallboard at each side of wall, vertically applied with all joints staggered and secured to studs with fasteners. Max 96 in<sup>2</sup> (0.06 m<sup>2</sup>) opening with max dimension of 12 in. (305 mm).

## 2. METALLIC PIPE.

- a. Max 3 in. (76 mm) dia. electrical metallic tubing (EMT).
- b. Max 2 in. (51 mm) dia. copper pipe.

## 3. CABLES.

- a. Max 25 pair No. 24 AWG cables (or smaller) with polyvinyl chloride (PVC) insulation and jacket.
- b. Max 3/C with ground - No. 10 AWG (or smaller) Type NM cable with PVC insulation and jacket.
- c. Max 350 kcmil (or smaller) power cable with PVC insulation and nylon jacket.

The through penetrating items to be rigidly supported on both sides of the wall assembly and located as shown in the table below:

Item No.	Max Distance Between Adjacent Pen. Items, in. (mm)	Min Distance Between Adjacent Pen. Items, in. (mm)	Max Distance From Through Opening, in. (mm)	Min Distance From Through Opening, in. (mm)
2a	7 7/16 (189)	1 11/16 (43)	7 7/16 (189)	1/2 (13)
2b	7 7/16 (189)	1 11/16 (43)	7 7/16 (189)	1/2 (13)
3a	7 7/16 (189)	1 11/16 (43)	7 7/16 (189)	1/2 (13)
3b	7 7/16 (189)	1 11/16 (43)	7 7/16 (189)	1/2 (13)
3c	7 7/16 (189)	1 11/16 (43)	7 7/16 (189)	1 1/2 (38)

## 4. FIRE STOP COMPONENTS.

- a. Packing Material. Min 4 in. (102 mm) thickness of min 4 pcf (64 kg/m<sup>3</sup>) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from both surfaces of wall min 1/2 in. (13 mm). No. 8 steel wire mesh used to support packing material if required.

- b. Fill Material. Sealant installed a min 1/2 in. (13 mm) depth applied within the annulus, flush with both surfaces of the wall.

Max hourly rating based on penetrating items in the assembly. Any combination of the penetrating items above may be used:

Item	F-Rating (hrs)	T-Rating (hrs)	T <sub>FM</sub> -Rating (hrs)
2a	2	0	1 1/2
2b	2	0	2
3a	2	0	2
3b	2	0	2
3c	2	0	1 1/2

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Design Component	Product	Product Type	Listing Country	Certification Type	Class of Work
4b	CFS-IS P High Performance Intumescent Firestop Sealant	Fill Material	Liechtenstein	FM Approved	4990-Penetration Seal & Fire Stop
4b	FS-ONE MAX Intumescent Firestop Sealant	Fill Material	Liechtenstein	FM Approved	4990-Penetration Seal & Fire Stop

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**Fire Stop Design 288**

<b>Category:</b>	Penetration Seal
<b>Design Number:</b>	288
<b>Ratings:</b>	1/2, 0, 1/2
<b>Construction:</b>	Floor, Wall
<b>Penetrant:</b>	Blank
<b>Floor/Wall Material Type:</b>	Concrete
<b>Joint Type:</b>	na
<b>Min. Wall Thickness (in.):</b>	4 1/2
<b>Min. Wall Thickness (mm):</b>	114
<b>Min. Floor Thickness (in.):</b>	4 1/2
<b>Min. Floor Thickness (mm):</b>	114
<b>Class of Work:</b>	4990-Penetration Seal & Fire Stop