

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.

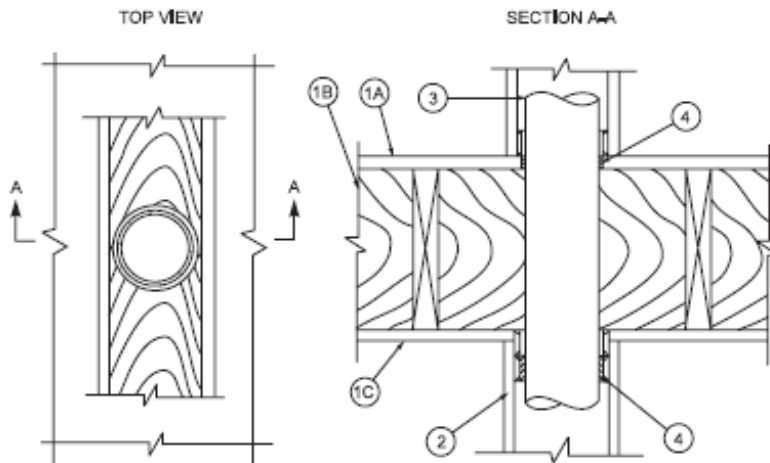
All joint systems shall be subjected to a cycling test conducted in accordance with ASTM E1966 prior to the fire resistance and hose stream test. Three (3) movement ratings are available – Type 1, Type 2 and Type 3.

Fire Stop Design 273

F-Rating = 1 HR

T-Rating = 0 HR

T_{FM} -Rating = 1 HR



1. FLOOR - CEILING ASSEMBLY. Min one hour fire rated wood joist floor assembly constructed as follows
 - a. Flooring System. Lumber or plywood subfloor with finish of lumber, plywood or gypsum wallboard (Item 1c).
 - b. Wood Joists. Nominal 2 by 10 in. (51 x 254 mm) lumber joists spaced 16 in. (406 mm) o.c. with nominal 1 by 3 in. (25 by 76 mm) lumber bridging and with ends fire-stopped.
 - c. Gypsum Wallboard. Nominal 4 ft. (1.22 m) wide by 5/8 in. (16 mm) thick Type X gypsum wallboard screw-attached to the wood joists.

Penetrating item (see table in Item #3 below) to be rigidly supported on both sides of the floor-ceiling assembly and to be installed midway between wood joists. Opening to be hole-sawed through flooring system and the gypsum wallboard ceiling.

2. WALL ASSEMBLY. Min 4 3/4 in. (121 mm) thick drywall partition, min 1 hour fire rated. Min 3 1/2 in. (89 mm) thick steel or wood framing with one layer of 5/8 in. (16 mm) thick, Type X gypsum wallboard at each side of wall, vertically applied and secured to studs with fasteners.

3. NONMETALLIC PIPE.

- a. Max 1.5 in. (38 mm) polyvinyl chloride (PVC) Schedule 40 pipe for use in drain, waste or vented piping systems.
- b. Max 2 in. (51 mm) polyvinyl chloride (PVC) Schedule 40 pipe for use in drain, waste or vented or closed piping systems.
- c. Max 1 in. (25 mm) cross-linked polyethylene (XLPE) pipe for use in drain, waste or vented piping systems.

Approved fire stop assemblies including max opening dia., pipe types, annular spaces (minimum and maximum) and assemblies requiring steel pipe sleeve are listed below with their respective ratings:

Opening Dia. (max) in., (mm)	Pipe Type	Annular Space (min-max) in., (mm)
3 (76)	a	1/4-3/4 (6.4-19)
3 (76)	b	1/4-1/4 (6.4-6.4)
1 1/2 (38)	c	0-1/2 (0-13)

4. FILL MATERIAL. Firestop material installed a min 3/4 in. (19 mm) depth installed in the annular space between the pipe and the subfloor and a min 3/4 in. (19 mm) depth installed in the annular space between the pipe and the top plate.

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

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Fire Stop Design 273

Category:	Penetration Seal
Design Number:	273
Ratings:	1, 0, 1
Construction:	Floor, Wall
Penetrant:	Plastic Pipe
Floor/Wall Material Type:	Gypsum Drywall
Joint Type:	na
Min. Wall Thickness (in.):	4 3/4
Min. Wall Thickness (mm):	121
Min. Floor Thickness (in.):	4 3/4
Min. Floor Thickness (mm):	121
Class of Work:	4990-Penetration Seal & Fire Stop