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 desig

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.

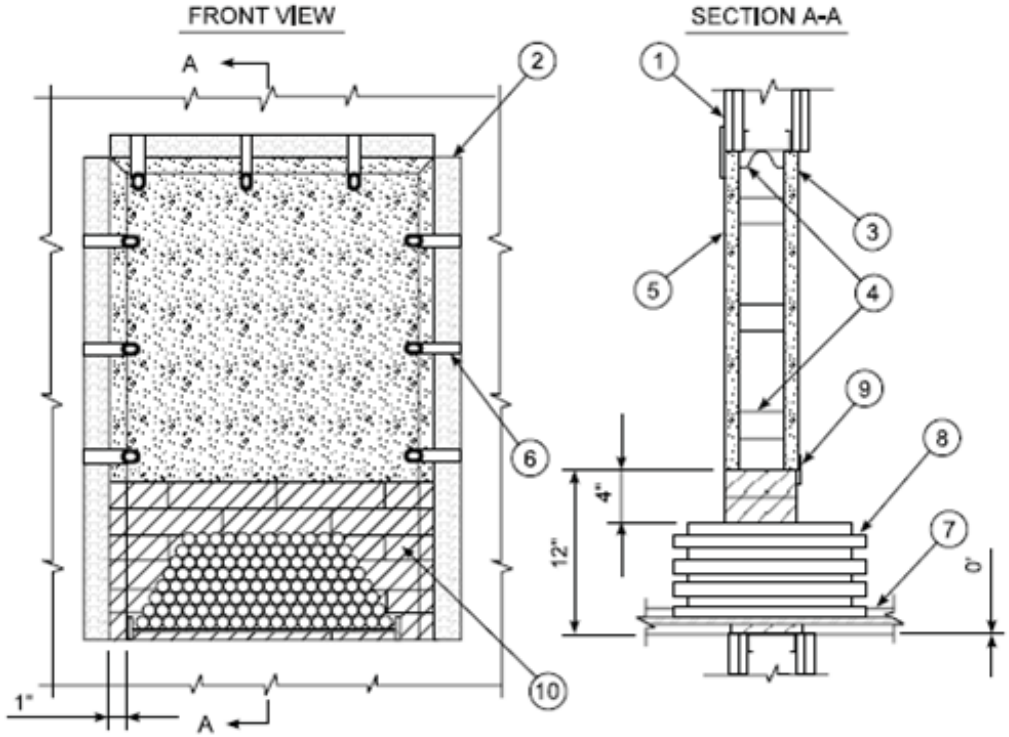
FM Approvals does not consider the performance of the thermocouples placed directly on the penetrating item for purposes of determining the T_{FM} rating as it is not viewed as part of the firestopping materials provided in trying to protect the opening.

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 519

F Rating – 1 HR
T Rating – 0 HR
T_{FM} Rating – 1 HR



1. **WALL ASSEMBLY**. Min two (2) hour fire rated gypsum wallboard/stud wall assembly consisting of min 2 in. (51 mm) thick steel framing or min 2 x 4 lumber with two (2) layers of 5/8 in. (16 mm) thick Type X gypsum wallboard installed at each side of the wall and installed vertically with all joints staggered and secured to studs with fasteners. Max opening size is 864 in^2 (0.56 m^2) with largest dimension 36 in. (915 mm).

2. **FIRE STOP FRAME.** A 5 in. (125 mm) deep Hilti firestop frame is installed within the opening and secured on three sides of the opening max 8 in. (200 mm). o.c.

3. **FILL MATERIAL.** Board material, max 24 in. (610 mm) wide by max 24 in. (610 mm) tall is cut to fit within the back side of the opening. The width of the board material shall be equal to the opening width.

4. **STEEL SPACER.** Steel spacer material is fitted over the Fill Material (Item #3) max 8 in. (200 mm) o.c. and inserted flush with the backside of the Firestop Frame (Item #2).

5. **FILL MATERIAL.** Board material, max 24 in. (610 mm) wide by max 24 in. (610 mm) tall is cut to fit within the front side of the opening. The width of the board material shall be equal to the opening width. The board material is installed flush with the side of the wall.

6. **STEEL LATCHES.** Steel latch material is located at every other connection point (max 8 in. [200 mm] o.c.) and installed to secure the Fill Material (Item #3) to the front side of the Firestop Frame (Item #2).

7. **CABLE TRAY.** Max 20 in. (510 mm) wide by 2 in. (50 mm) deep open back ladder steel cable tray within the opening. The annular space between the cable tray and the periphery of the opening shall be min point contact to max 4 in. (102 mm).

8. **CABLES**. Max 5 in. (125 mm) cable height installed in the cable tray (Item #7). Any combination of the following types and sizes of copper conductor cables may be used.

   a. Max 12 – 1/C-750 kcmil power cables.

   b. Max 70 – 7/C-No. 12 AWG power cables.

c. Max 70 – 150 pair No. 24 AWG telephone cables.

d. Max 20 – 24 fiber ½ in. (13 mm) diameter fiber optic cables.

e. Max 12 – 300 pair No. 24 AWG copper cables.

9. **STEEL T-BAR**. Steel T-Bar material is installed at transition between the Fill Material (Item #3) and the Firestop Material (Item #10) on the back side of the Firestop Frame (Item #2).

10. **FILL MATERIAL.** Pillow-like material packed horizontally into the space between the Cable Tray (Item #7), Cables (Item #8), Fill Material (Items #3 and #5) and the Firestop Frame (Item #2). Max opening size between the Fill Material (Item #3 and #5) and the Firestop Frame (Item #2) is 240 in^2 (0.15 m^2). Max width of opening is 24 in. (610 mm) and max height of opening is 12 in. (305 mm). Max two layers (4 in. [100 mm]) of fill material applied over the top of the Cables (Item #8). Prior to installation, the pillow-like material shall be patted down by hand or with a flat board on a flat surface to evenly distribute contents.

11. **PUTTY MATERIAL** (Not shown). A 1 in. (25 mm) wide strip of Putty Material is installed between the Fill Material (Items #3 and #5) and the Firestop Frame (Item #2), between the Fill Material (Items #3 and #5) and the Steel “T-Bar” (Item #9), and between the Fill Material (Item #10) and the Steel “T-Bar” (Item #9).

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Design Component	Product		Product Type	Listing Country	Certification Type	Class of Work
3,5	CP 675T Firestop Board		Fill Material	Liechtenstein	FM Approved	4990-Penetration Seal & Fire Stop
10	CFS-BL		Fill Material	Liechtenstein	FM Approved	4990-Penetration Seal & Fire Stop
11	CP617 Firestop Putty Pads CP618 Firestop Putty Sticks		Fill Material	Liechtenstein	FM Approved	4990-Penetration Seal & Fire Stop

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Fire Stop Design 519

Category:	Penetration Seal
Design Number:	519
Ratings:	1
Construction:	Wall
Penetrant:	Cable or Cable Tray
Floor/Wall Material Type:	Gypsum Drywall
Joint Type:	na

Min. Wall Thickness (in.):	4 1/2
Min. Wall Thickness (mm):	115
Class of Work:	4990-Penetration Seal & Fire Stop