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.

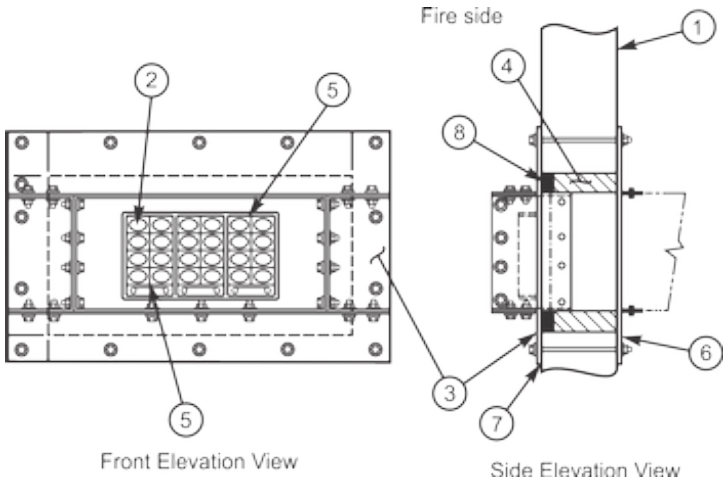
All joint systems shall be subjected to a cycling test conducted in accordance with ASTM E1966 prior to the fire resistance and hose stream test. Three (3) movement ratings are available – Type 1, Type 2 and Type 3.

Fire Stop Design 674

F-Rating = 1 HR

T-Rating = 1 HR

T_{FM}-Rating = 1 HR



1. **WALL ASSEMBLY.** Min 8 in. (200 mm) thick l normal weight concrete wall, or minimum 8 in. (200 mm) thick concrete block wall. Max size of opening is 31 ½ in. wide x 21 5/8 in. (300 mm x 280 mm) high.

2. **CABLES**. Max 24 individual cables arranged as shown. Each cable to be 1-1/4 inch (32 mm) in diameter designated as stranded 500 mcm - -750 copper power cables with 8 – 15 kV XLPE jacket.The transit frame (see item 5) shall be completely filled with insert modules with a cable penetrating each module with no blanks. Cables shall be rigidly supported on both sides of the wall assembly.

3. **FIRESTOP ASSEMBLY FRAME**. Firestop assembly frame fabricated from 0.25 in. (6.4 mm) thick stainless steel plates. Centered in the opening and consisting of a firestop throat and dress-up plates. Max opening size is 26 in. wide x 15 ¾ in. high (660 mm x 400 mm) x 8-1/4 in. (210 mm) deep. Fire rated side of the assembly utilizes top, bottom, left and right dress-up plates. Dress-up plates bolted together using ½ in. (12.7 mm) diameter bolts with nuts and washers. Dress-up plates bolted to the wall with ½ in. (12.7 mm) diameter bolts spaced around the perimeter.

4. **FILL MATERIAL.** A nominal 3 in. (76 mm) depth of fill material is back filled within the space on the top, bottom and both sides of the opening between the dress-up plates on each side of the wall.

5. **TRANSIT FRAME ASSEMBLY**. Firestop device located on the rated (fire) side of the assembly. The device consists of a rectangular steel frame, elastomeric sealing insert modules and steel compression and stay plates. The rectangular opening(s) of each device frame shall be filled with multiple rows of multi-diameter elastomeric sealing modules with a max of one (1) cable per sealing module. During the installation of the elastomeric sealing modules, thin steel anchor plates shall be used to separate the rows of sealing modules and to retain the sealing modules within the steel frame. After installation of the modules, the bolts of the compression unit are tightened to form an effective seal around the penetrants and insert modules. The device shall be installed in accordance with the manufacturer's written installation instructions.

6. **COMPOSITE SHEET.** One layer of composite sheet place on the non-rated side of the wall placed between the wall and dress-up plates. Sheet is field cut to follow the contours of the penetrating cables.

7. **SEALANT**. All metal to metal and metal to concrete joints filled with sealant.

8. **PACKING MATERIAL.** Mineral wool, minimum 4 lbs/ft^3 (64 kg/m^3) density batt used within the wall cavity on the rated (fire) side. Three (3) layers of ½ in. x 4 in. (13 mm x 100 mm) tightly friction fit between the wall cavity and dress-up plate.

3M Co (The)
3M Center, Saint Paul, Minnesota 55144, USA

Design Component	Product		Product Type	Listing Country	Certification Type	Class of Work
6	3M Fire Barrier Composite Sheet CS-195+		Misc Firestopping Devices	United States of America	FM Approved	4990-Penetration Seal & Fire Stop
7	3M Fire Barrier CP-25WB+		Misc Firestopping Devices	United States of America	FM Approved	4990-Penetration Seal & Fire Stop

Hilti AG
Feldkircherstrasse 100, Box 333 , 9494 Schaan , Liechtenstein

Design Component	Product		Product Type	Listing Country	Certification Type	Class of Work
4	CP620 Firestop Foam or CFS-F-SOL Firestop Foam		Misc Firestopping Devices	Liechtenstein	FM Approved	4990-Penetration Seal & Fire Stop

Hilti Inc.
7250 Dallas Pkwy, Legacy Tower, Suite 1000, Plano, Texas 75024, USA

Design Component	Product		Product Type	Listing Country	Certification Type	Class of Work

4	CP620 Firestop Foam or CFS-F-SOL Firestop Foam	Misc Firestopping Devices	United States of America	FM Approved	4990-Penetration Seal & Fire Stop

Fire Stop Design 674

Category:	Penetration Seal
Design Number:	674
Ratings:	1, 1, 1
Construction:	Wall
Penetrant:	Cable or Cable Tray, Plastic Pipe
Floor/Wall Material Type:	Concrete
Joint Type:	na
Min. Wall Thickness (in.):	8
Min. Wall Thickness (mm):	203
Class of Work:	4990-Penetration Seal & Fire Stop