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.

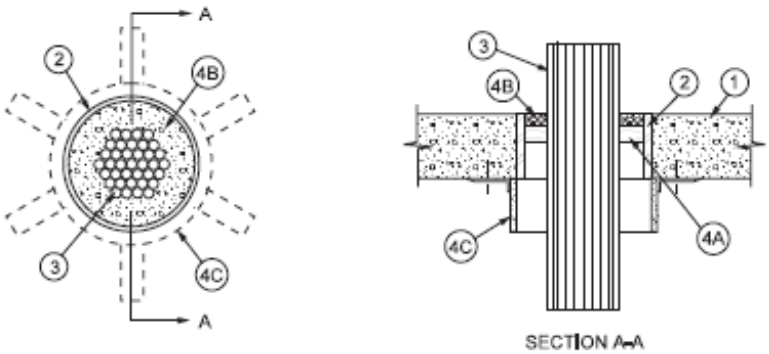
All joint systems shall be subjected to a cycling test conducted in accordance with ASTM E1966 prior to the fire resistance and hose stream test. Three (3) movement ratings are available – Type 1, Type 2 and Type 3.

Fire Stop Design 265

F-Rating = 2 HR

T-Rating = 0 HR

T_{FM}-Rating = 2 HR



1. FLOOR OR WALL. Min 4 1⁄2 in. (114 mm) thick lightweight or normal weight concrete. Nominal 6 in. (152 mm) opening dia.

2. STEEL PIPE SLEEVE. Nominal 6 in. (152 mm) dia. Schedule 10 or heavier steel pipe sleeve.

3. CABLES. Max 40% aggregate cross-sectional area of cables in steel pipe sleeve (Item 2). Any combination of the following types and sizes of conductor cables may be used:

   a. Max 350 kcmil single-conductor power cable with PVC insulation and jacket.

   b. 7/C No. 12 AWG copper conductor control cable with PVC insulation and jacket.

   c. Max 25 pair No. 24 AWG copper conductor telephone cable with PVC insulation and jacket.

   d. Multifiber optical fiber cable.

4. FIRE STOP COMPONENTS.

   a. Backing material. Mineral fiber of monimal 4 pcf (64 kg/m3) density. A small amount is tightly packed by hand within and around cables and recessed 1⁄2 in. (12.7 mm) from each concrete surface.

   b. Fill Material. Sealant is installed within and around cables within recessed space to a min depth of 1⁄2 in. (12.7 mm). For walls, sealant shall be applied symmetrically to a min depth of 1⁄2 in. (12.7 mm) on each side.

   c. Steel Collar. Nominal 6.0 in. (152 mm) dia. steel retaining collar with an intumescent inlay fastened with 6 mounting tabs. Collars are fabricated of 0.040 in. (1.0226 mm) thick zinc plated steel and supplied in coil form. Fit the collar around the cable bundle and press together the open ends firmly until it closes with an audible "click". Locate and attach the appropriate number of mounting tabs around the collar. Use the appropriate Hilti anchors. (See Hilti product literature for the proper attachment method) to secure the CP 642 Collar to the wall or ceiling.

. For wall systems, the system described above shall be installed symmetrically on both sides of the wall.

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Design Component	Product	Product Type	Listing Country	Certification Type	Class of Work
4b	CP 611A High Performance Intumescent Firestop Sealant	Fill Material	Liechtenstein	FM Approved	4990-Penetration Seal & Fire Stop
4b	CFS-IS P High Performance Intumescent Firestop Sealant	Fill Material	Liechtenstein	FM Approved	4990-Penetration Seal & Fire Stop
4c	CP 643N Firestop Collar	Collar	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 265

Category:	Penetration Seal
Design Number:	265
Ratings:	2, 0, 2
Construction:	Floor, Wall
Penetrant:	Cable or Cable Tray
Floor/Wall Material Type:	Concrete
Joint Type:	na
Min. Wall Thickness (in.):	4 1/2
Min. Wall Thickness (mm):	114
Min. Floor Thickness (in.):	4 1/2
Min. Floor Thickness (mm):	114
Class of Work:	4990-Penetration Seal & Fire Stop