

## 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.

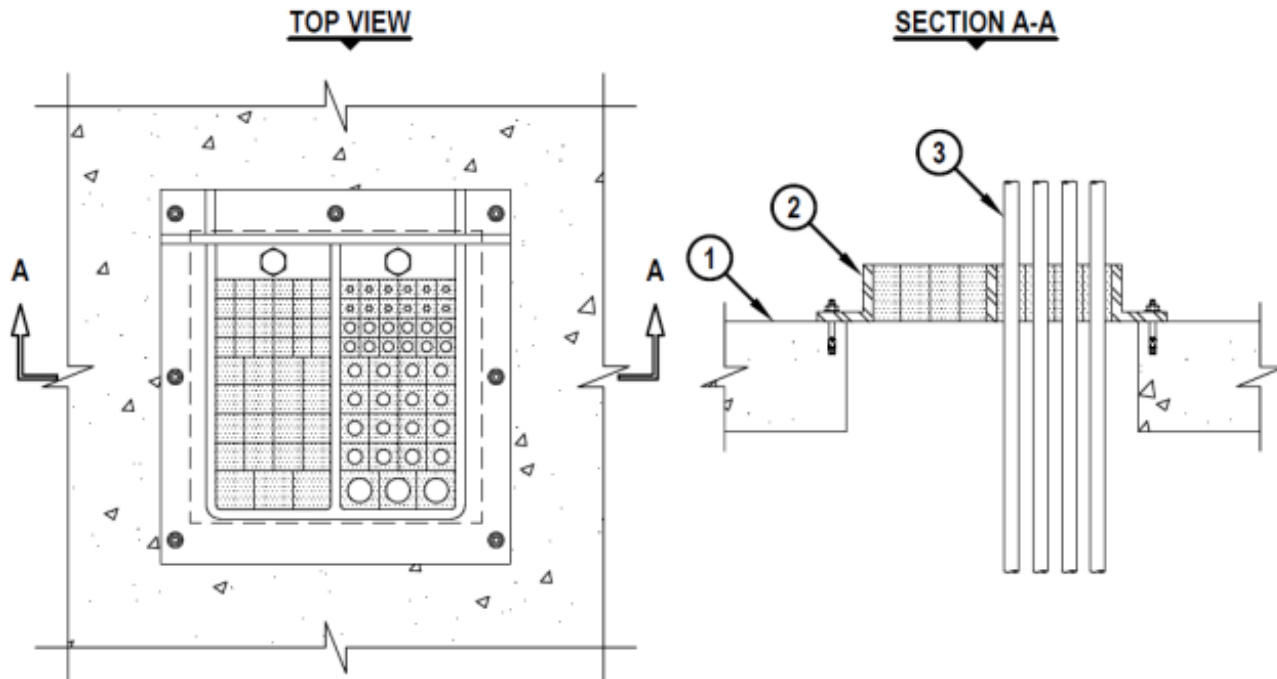
All joint systems shall be subjected to a cycling test conducted in accordance with ASTM E1966 prior to the fire resistance and hose stream test. Three (3) movement ratings are available – Type 1, Type 2 and Type 3.

## Fire Stop Design 668

**F Rating – 2 HR**

**T Rating – ¾ HR**

**$T_{FM}$  Rating – ¾ HR and 1 HR (see item 3)**



1. **FLOOR OR WALL ASSEMBLY.** Min 4-1/2 in. (114 mm) thick lightweight or normal weight concrete floor or wall, or minimum 8 in. (200 mm) thick concrete block wall. Max size of opening is 11.8 in. x 11.0 in. (300 mm x 280 mm).
2. **FIRESTOP SYSTEM.** The firestop system shall consist of the following:  
 Rectangular Firestop Devices – Firestop device located on the top side of the floor or both sides of a wall. Each firestop device consists of a rectangular steel frame, multi-diameter elastomeric sealing modules, steel anchor plates and a wedge seal unit. The firestop device shall be inserted into the opening with the steel flange of each firestop device secured to the wall or floor with Hilti Kwik-Bolts through the predrilled holes in the mounting flange. 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. When the number of sealing modules exceeds the number of cables, the solid cylindrical cores of the unpenetrated multi-diameter sealing modules shall be left in place or “blank” (solid) sealing modules shall be used. 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.
3. **CABLES. Aggregate** cross-sectional area of the cables in each device shall be from 0 to 100% fill. Cables shall be rigidly supported on both sides of the wall assembly. Any combination of the following types and sizes of cables can be used. **When no cables are present, the T<sub>FM</sub> rating is ¾ hour. When cables are present, T<sub>FM</sub> rating is 1 hour.**
  - a) RG-U6 coaxial cable with pvc jacket.
  - b) 7/C No.12 AWG power cables with PVC or XLPE insulation and pvc jacket.
  - c) Max 24 fiber, fiber optic cables with pvc jacket.
  - d) 3/C No.8 Romex cable.
  - e) 4/0 AWG aluminum ground cable.
  - f) 15 pair No. 24 AWG telephone cable.
  - g) Max 1 in. diameter metal clad TEK cable with PVC jacket.
4. **FILL MATERIAL (not shown).** Prior to installing the flanged unit (No. 2 above), a 1 in. (25 mm) wide strip of putty is placed around the perimeter of the opening to form a gasket like seal between the wall (or floor) and the steel flange. The material shall be located between the edge of the opening and the line of fasteners around the entire perimeter of the frame’s opening.

Design Component	Product	Product Type	Listing Country	Certification Type	Class of Work
4	CP619T Putty Roll	Misc Firestopping Devices	Liechtenstein	FM Approved	4990-Penetration Seal & Fire Stop
2	Cable Transit System CFS-T Frame and Sealing Modules	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	CP619T Putty Roll	Misc Firestopping Devices	United States of America	FM Approved	4990-Penetration Seal & Fire Stop
2	Cable Transit System CFS-T Frame and Sealing Modules	Misc Firestopping Devices	United States of America	FM Approved	4990-Penetration Seal & Fire Stop

#### Fire Stop Design 668

<b>Category:</b>	Penetration Seal
<b>Design Number:</b>	668
<b>Ratings:</b>	2, 3/4, 1, 3/4
<b>Construction:</b>	Floor, Wall
<b>Penetrant:</b>	Cable or Cable Tray
<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