

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.

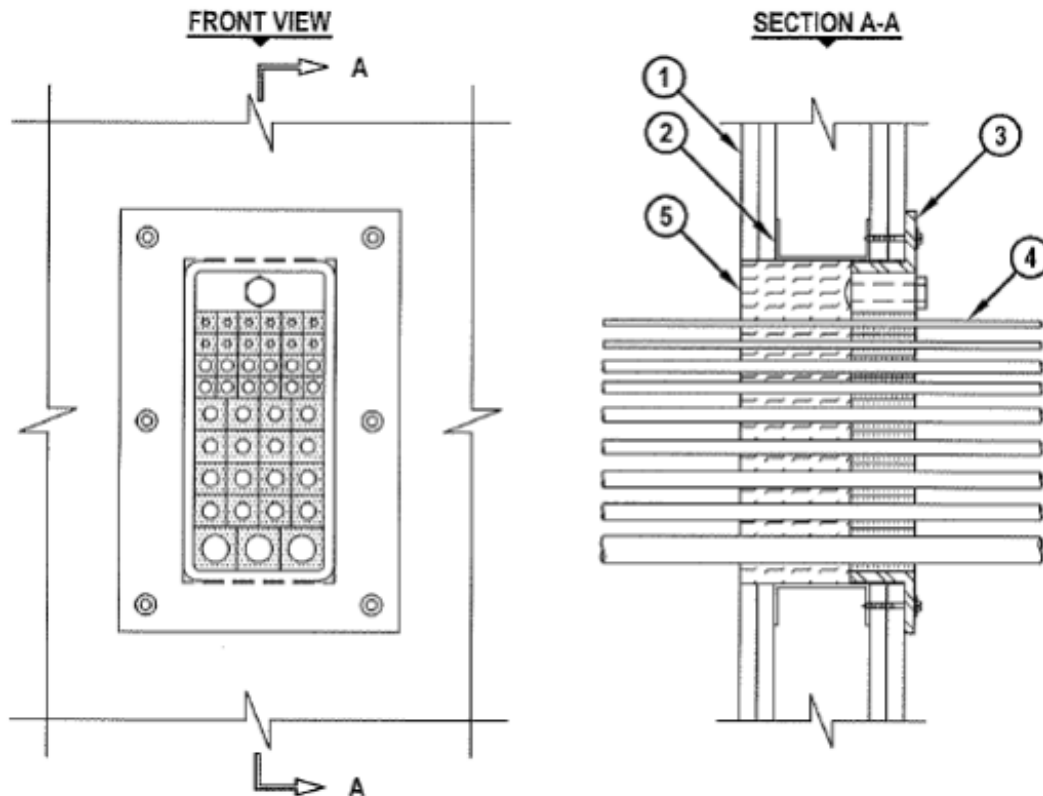
All joint systems shall be subjected to a cycling test conducted in accordance with ASTM E1966 prior to the fire resistance and hose stream test. Three (3) movement ratings are available – Type 1, Type 2 and Type 3.

Fire Stop Design 666

F Rating – 2 HR

T Rating – ½ and ¾ HR (see Item 4)

T_{FM} Rating – ¾ HR



1. WALL ASSEMBLY. Two hour fire rated gypsum wall assembly consisting of steel channel studs.

Gypsum Board. Min 5/8 in. (16 mm) thick x 4 ft (1.2 m) wide gypsum wallboard applied to each side of the wall. The gypsum wallboard type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual wall assembly hourly rating design criteria however 2 hour walls shall use at least 2 layers of Type X gypsum board. Max size of the opening is 11.8 in. x 5.5 in. (300 mm x 140 mm).

2. WALL STUDS. Steel studs shall be a min 2-1/2 in. (65 mm) deep fabricated from 25 MSG galvanized steel, spaced a max of 24 in. (600 mm) on center. Additional framing members are applied around the opening.

3. FIRESTOP SYSTEM. The firestop system shall consist of the following:

- a. Rectangular Firestop Devices – 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 framed opening on one side of the wall assembly. The steel flange of each firestop device shall be secured to the steel stud framing of the wall assembly through the gypsum wallboard layer by means of No. 8 x 3 in. (75 mm) long self-drilling, self-tapping steel screws through the predrilled holes in the 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

4. 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 either or both the 4/0 AL Grnd or 150 pair telephone cables are present, the rating will be ½ hour. If not present, the rating is ¾ 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.

5. **PACKING MATERIAL.** Mineral wool, minimum 4 lbs/ft³ (64 kg/m³) density batt insulation cut to line the four (4) sides of the through opening within the wall cavity. Pieces are cut to length and tightly friction fit between the framing of the wall opening and cables and in-between cables flush with the wall surface.
6. **FILL MATERIAL (not shown).** Prior to installing the flanged unit (No. 3 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 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.

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

Design Component	Product	Product Type	Listing Country	Certification Type	Class of Work
6	CP619T Putty Roll	Misc Firestopping Devices	Liechtenstein	FM Approved	4990-Penetration Seal & Fire Stop
3a	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
6	CP619T Putty Roll	Misc Firestopping Devices	United States of America	FM Approved	4990-Penetration Seal & Fire Stop
3a	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 666

Category:	Penetration Seal
Design Number:	666
Ratings:	2, 3/4, 1/2, 3/4
Construction:	Wall
Penetrant:	Cable or Cable Tray
Floor/Wall Material Type:	Gypsum Drywall
Joint Type:	na
Min. Wall Thickness (in.):	5
Min. Wall Thickness (mm):	127
Class of Work:	4990-Penetration Seal & Fire Stop