

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.

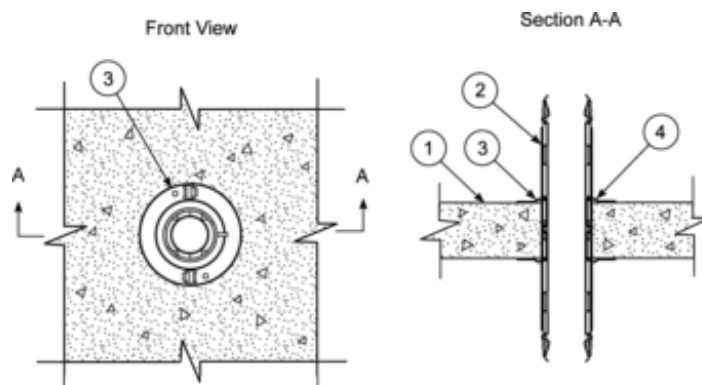
All joint systems shall be subjected to a cycling test conducted in accordance with ASTM E1966 prior to the fire resistance and hose stream test. Three (3) movement ratings are available – Type 1, Type 2 and Type 3.

Fire Stop Design 577

F-Rating = 2 HR

T-Rating = 3/4 HR

T_{FM} -Rating = 0 HR



1. FLOOR OR WALL ASSEMBLY. Min 2 1/2 in. (64 mm) thick lightweight or normal weight concrete. Opening diameter shall be a maximum of 1 inch (25 mm) larger than the cable sleeve diameter.

2. CABLE SLEEVE. Max 4 in. (102 mm) diameter.
3. METALLIC FLANGES. Two flanges, one on each side of floor or wall, threaded tightly onto Cable Sleeve after application of fill material. When the smoke gasket (alternate Item 4) is used, the flanges shall be secured to both sides of the wall with a minimum of two 1.5 in (38 mm) long concrete anchors.
4. FILL MATERIAL. Min. 1/2 in. (12.7 mm) sealant installed within the annular space and an additional 1/4 in. (6.4 mm) bead applied on the floor or wall surface around the cable sleeve on both sides of the assembly. As an alternate, the fill material may be omitted and replaced by the manufacturer's smoke gasket. The smoke gasket is placed over the device and rests against both sides of the floor or wall.
5. CABLE BUNDLE (not shown). Cables shall be installed from 0 – 100% fill area. Any combination of the following types and sizes of cables shall be permitted to be used.
 - a) Max 4 pair Cat 6 data cable (23 AWG)
 - b) RG 6/U Coaxial cables
 - c) Max. 24 Fiber Optic cable with PVC or PE jacket and insulation
 - d) Max 100 pair telephone cable with PVC jacket
 - e) Max 7/C No. 12 AWG power cable with PVC or PE jacket and insulation
 - f) Max 2/C No. 18 AWG fire alarm cable with metal jacket
 - g) Max 4/0 AWG type RHH ground cable
 - h) RS 232 printer cable

Hilti AG

Feldkircherstrasse 100, Box 333 , 9494 Schaan , Liechtenstein

| Design Component | Product | Product Type | Listing Country | Certification Type | Class of Work |
|------------------|---|---------------------------|-----------------|--------------------|-----------------------------------|
| 2 | Firestop Speed Sleeve CP653 | Misc Firestopping Devices | Liechtenstein | FM Approved | 4990-Penetration Seal & Fire Stop |
| 2 | Firestop Speed Sleeve CFS-SL S or M | Misc Firestopping Devices | Liechtenstein | FM Approved | 4990-Penetration Seal & Fire Stop |
| 3 | Firestop Speed Sleeve CP653 Flange | Misc Firestopping Devices | Liechtenstein | FM Approved | 4990-Penetration Seal & Fire Stop |
| 3 | Firestop Speed Sleeve CFS-SL Flange | Misc Firestopping Devices | Liechtenstein | FM Approved | 4990-Penetration Seal & Fire Stop |
| 2 | Firestop Speed Sleeve CFS-SL GA S, CFS-SL GA M or CFS-SL GA L | Misc Firestopping Devices | Liechtenstein | FM Approved | 4990-Penetration Seal & Fire Stop |
| 4 | CP606 Flexible Firestop Sealant | Fill Material | Liechtenstein | FM Approved | 4990-Penetration Seal & Fire Stop |
| 4 | CFS-S-ACR Flexible Firestop Sealant | Fill Material | 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 |
|------------------|---|---------------------------|--------------------------|--------------------|-----------------------------------|
| 2 | Firestop Speed Sleeve CP653 2" or 4" BA | Misc Firestopping Devices | United States of America | FM Approved | 4990-Penetration Seal & Fire Stop |
| 2 | Firestop Speed Sleeve CP653 2" or 4" BA (with smoke gasket) | Misc Firestopping Devices | United States of America | FM Approved | 4990-Penetration Seal & Fire Stop |

| | | | | | |
|---|---|---------------------------------|--------------------------------|-------------|--------------------------------------|
| 2 | Firestop Speed Sleeve CFS-SL 2" or 4" BA | Misc Firestopping Devices | United States of America | FM Approved | 4990-Penetration Seal & Fire Stop |
| 2 | Firestop Speed Sleeve CFS-SL 2" or 4 " BA (with smoke gasket) | Misc Firestopping Devices | United States of America | FM Approved | 4990-Penetration Seal & Fire Stop |
| 3 | Firestop Speed Sleeve CP653 Flange | Misc Firestopping Devices | United States of America | FM Approved | 4990-Penetration Seal & Fire Stop |
| 3 | Firestop Speed Sleeve CFS-SL Flange | Misc Firestopping Devices | United States of America | FM Approved | 4990-Penetration Seal & Fire Stop |
| 4 | CP606 Flexible Firestop Sealant | Fill Material | United States of America | FM Approved | 4990-Penetration Seal & Fire Stop |
| 4 | CFS-S-ACR Flexible Firestop Sealant | Fill Material | United States of America | FM Approved | 4990-Penetration Seal & Fire Stop |

Fire Stop Design 577

| | |
|----------------------------|-----------------------------------|
| Category: | Penetration Seal |
| Design Number: | 577 |
| Ratings: | 2, 3/4, 0 |
| Construction: | Floor, Wall |
| Penetrant: | Blank |
| Floor/Wall Material | |
| Type: | Concrete |
| Joint Type: | na |
| Min. Wall Thickness | |
| (in.): | 2 1/2 |
| Min. Wall Thickness | |
| (mm): | 64 |
| Min. Floor | |
| Thickness (in.): | 2 1/2 |
| Min. Floor | |
| Thickness (mm): | 64 |
| Class of Work: | 4990-Penetration Seal & Fire Stop |