

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.

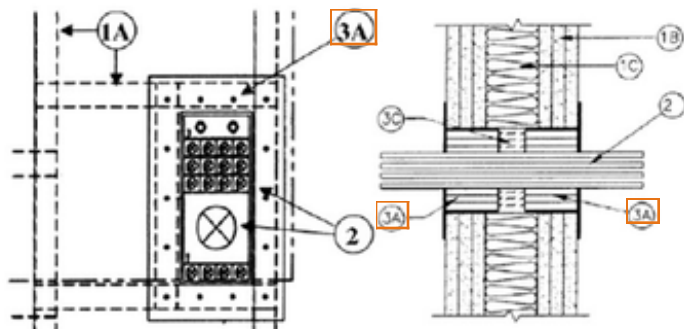
All joint systems shall be subjected to a cycling test conducted in accordance with ASTM E1966 prior to the fire resistance and hose stream test. Three (3) movement ratings are available – Type 1, Type 2 and Type 3.

Fire Stop Design 642

F Rating – 3 HR

T Rating – 1-½ HR

T_{FM} Rating – 3 HR



1. **WALL ASSEMBLY.** One or two hour fire rated gypsum wall assembly constructed with wood or steel channel studs.

- a. Wood studs to consist of nominal 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) o.c. with nominal 2 by 4 in. (51 by

102 mm) lumber. Steel studs are channel shaped, min 3-5/8 in. (92 mm) deep and 1-5/8 in. (41 mm) wide with ½ in. (13 mm) folded back flanges. Fabricated from 20 MSG galvanized steel, spaced a max of 16 in. (400 mm) on center. Additional framing members are to be installed to form a rectangular box having dimensions which are a max ¼ in. (6 mm) greater than the width and height of the firestop device frame (Item 3A), excluding mounting flanges. Max area of framed opening is 72 in² (465 cm²) [G-8x1 Device]. Max dimension of the opening is 6 in. wide x 12 in. high (150 mm x 300 mm) [G-8x1 Device].

- b. Gypsum Board. Min three (3) layers of ½ in. (13 mm) thick Type C gypsum wallboard.
 - c. Mineral Wool. Mineral wool batts or blankets shall completely fill the stud cavity.
2. **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.
- Max 3/C No. 500 kcmil MC type copper conductor power cable with ethylene propylene rubber (EPR) insulation and PVC jacket material.
- Max 19/C No. 14 AWG TC or TC-ER type copper conductor control power cable with ethylene propylene rubber (EPR) insulation and chlorinated polyethylene (CPE) jacket materials.
- Max 3/C No. 14 AWG MC type copper conductor power cable with XLP insulation and PVC jacket material.
3. **FIRESTOP SYSTEM.** The firestop system shall consist of the following:
- a. **Firestop Devices** – Each firestop device consists of a rectangular steel frame, multi-diameter elastomeric sealing modules, steel stay plates and a compression unit consisting of a Roxtec Wedge. 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 spaced a max of 3-1/2 in. (89 mm) on center in the device frame mounting flange. When wood studs are used, fasteners shall be ¼ x 3 in. (6.4 x 75 mm) long wood screws. 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. The sheets of the multi-diameter sealing module halves are removed one by one until a max gap of 0.04 in. (1 mm) is formed between the two modules halves. 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 stay 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 firestop device shall be installed in accordance with the manufacturer’s written installation instructions.
 - b. **Silicone RTV Sealant** (not shown) – A min ¼ in. (6 mm) diameter bead of silicone RTV sealant shall be applied as a gasket between the device frame mounting flange and the gypsum wallboard. The sealant bead shall be located between the edge of the opening and the line of fasteners around the entire perimeter of the framed opening.
 - c. **Packing Material** – Pieces of minimum 3 in. (75 mm) thick, min 2.8 lbs/ft³ (45 kg/m³) density mineral wool 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.

3a.

Frame, Sealing Modules

Frames

G-2x1; G-4x1; G-6x1; G-8x1; GH-2x1; GH-4x1; GH-6x1; GH-8x1; GH-2x1 FL100; GH-4x1 FL100; GH-6x1 FL100; GH-8x1 FL100; GH BG-2x1; GH BG-4x1; GH BG 6x1; GH BG 8x1; GHM-2x1; GHM-4x1; GHM-6x1; GHM-8x1; GHM BG 2X1; GHM BG 4X1; GHM BG 6X1; GHM BG 8X1; SF-2x1; SF-4x1; SF-6x1; SF-8x1;

Sealing Modules

RM, RM ES, RM PE, RM BG, RM ES B, RM BG B or RM PE B Sealing Modules

*When RM ES B, RM BG B or RM PE B sealing modules are used, the T and T_{FM} ratings are 0 Hr.

Company Name:	Roxtec International AB
Company Address:	Box 540, SE-371 23 Karlskrona, Sweden

Company Website:	http://roxtec.com
New/Updated Product Listing:	No
Product Type:	Misc Firestopping Devices
Listing Country:	Sweden
Certification Type:	FM Approved
Class of Work:	4990-Penetration Seal & Fire Stop