

# APPROVAL REPORT

## APPROVAL OF HILTI CABLE TRANSIT SYSTEM CFS-T FOR USE IN WALL AND FLOOR ASSEMBLIES RATED UP TO AND INCLUDING 2 HOURS

Prepared for:

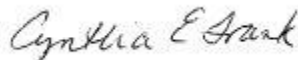
**HILTI, INC.  
5400 SOUTH 122<sup>ND</sup> EAST AVENUE  
TULSA, OK 74146**

**Project ID: 3046888**

**Class: 4990**

**Date of Approval: 1/16/2013**

**Authorized by:**



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Cynthia E. Frank, Group Manager  
Assistant Vice President

**APPROVAL OF HILTI CABLE TRANSIT SYSTEM CFS-T  
FOR USE IN WALL AND FLOOR ASSEMBLIES  
RATED UP TO AND INCLUDING 2 HOURS**

for

**HILTI, INC.  
5400 SOUTH 122<sup>ND</sup> EAST AVENUE  
TULSA, OK 74146**

**I INTRODUCTION**

- 1.1 Hilti, Inc. submitted their Cable Transit System CFS-T devices for examination to determine if they meet the FM Approvals requirements of the **Standard** listed below when installed in fire rated gypsum walls and concrete floor or wall assemblies. The units have an F Rating up to and including 2 hours. The T and T<sub>FM</sub> Ratings vary as shown elsewhere in this report.
- 1.2 A floor penetration fire stop system is a specific construction consisting of a floor assembly and a penetrating item passing through an opening in the floor assembly, and materials designed to prevent the spread of fire through the opening(s). A wall penetration fire stop system similarly pertains to wall assemblies.
- 1.3 The examination consisted of a fire endurance and hose stream tests conducted in accordance with the requirements of the standard listed below. The examination also included several small scale tests for comparison purposes. For details on the small scale tests, see Project ID 3047009.
- 1.4 This Report may be reproduced only in its entirety and without modification.
- 1.5 **Standard:**

| <b>Title</b>                       | <b>Number</b> | <b>Date</b> |
|------------------------------------|---------------|-------------|
| Approval Standard for Firestopping | 4990          | 2009        |

- 1.6 **Listings:** The products will appear in the Approval Guide, *an online resource of FM Approvals*, as described in Appendix A of this report.
- 1.7 As a manufacturer of products Approved by FM Approvals, the Hilti, Inc. manufacturing location(s) will be subjected to the FM Approvals follow-up Facilities and Procedures Audit inspection program. The purpose of the inspection(s) is to satisfy FM Approvals that the manufacturer is continuing to use sufficient quality controls to assure that continued production of units is equivalent to those originally tested and Approved.

## II MATERIAL DESCRIPTIONS

2.1 The Hilti Cable Transit System, Model CFS-T, is a system used to firestop openings in rated floors and walls. The units are designed principally for the shipping and offshore industries. The units are either rectangular or round in shape. The devices examined in the program consist principally of a galvanized steel frame, elastomeric sealing modules, steel anchor and a steel compression device with adjusting nut. The systems are modular and can be adapted to house various cables that are run through it. The frame is installed in the wall and the cables are routed through it. The modules are selected based on the size of the cable and are then installed around the cables and a compression unit is tightened. The penetrants are limited to the cable types and sizes as shown in the individual listings.

2.2 There are several models included in this program as shown below. The device nomenclature is CFS-T XX as follows:

XX = SB denotes that the overall module is rectangular in shape. This is then followed by a size such as 8 x 1, 8 x 2, etc. See the manufacturer's literature for details on the actual size of each unit. This unit can also be provided with an additional suffix of O. These units may be taken apart so that the frame can be slipped over cables in cases where the cables have been installed before the framing unit was installed. Once slipped over the existing cables, the top section is bolted to the other section.

XX = RR denotes that the overall module is round in shape. . The maximum size available is RR 200 which requires an opening that is 200 mm (7.9 in.) in diameter. Other sizes available are RR 50, RR 70, RR 100, RR 125 and RR 150 where the number represents the opening diameter in mm. While the overall shape of the unit is round, the inner area of the unit into which the modules are installed is square.

2.3 The rectangular units are provided with a basic sealing module and an adapter module. The units may also be provided with core modules or filler modules where the space is reserved for future cable installations. Each individual sealing module is square with dimensions of 15, 20, 30, 40, 60 and 120 mm (0.59, 0.79, 1.18, 1.57, 2.36 and 4.72 in). The filler modules come in squares sizes of 5, 10, 15, 20 and 30 mm (0.19, 0.39, 0.59, 0.79 and 1.18 in). Each individual sealing module is 60 mm (2.4 in) long.

2.4 The sealing and filler modules are placed within the steel frame row by row. After a row is completed, a steel anchor plate is inserted. After the final row of sealing or filler modules are installed, a steel compressive plate with an adjustable nut is installed. The nut is then tightened such that the modules cannot move.

2.5 The formulation and construction details of the above products are proprietary and are on file at FM Approvals.

## III TESTS: CRITERIA AND PROCEDURES

3.1 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.

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- 3.2 Approval Standard 4990 requires that 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.
- 3.3 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<sub>FM</sub> rating.
- 3.3.1 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.
- 3.3.2 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.
- 3.3.3 The T<sub>FM</sub> 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.
- 3.3.3.1 FM Approvals does not consider the performance of the thermocouples placed directly on the penetrating item for purposes of determining the T<sub>FM</sub> rating as it is not viewed as part of the firestopping materials provided in trying to protect the opening.
- 3.4 A series of fire endurance and hose stream tests were conducted at the Hilti Test Lab located in Tulsa, OK. The tests were conducted on July 30<sup>th</sup> and 31<sup>st</sup>, 2012. A representative of FM Approvals witnessed the tests. The test data was analyzed to determine if the fire stop designs, when subjected to a fire and hose stream exposure in accordance with FM Approvals criteria, met the criteria in Paragraph 3.3.
- 3.5 The sealing units used in this test program were manufactured prior to FM Approvals' involvement. After the fire tests were completed, several leftover samples were taken for analysis and comparative small scale testing. Additional production run samples were obtained during the initial quality control audit of the manufacturing facility for analysis and comparative small scale testing. The results of the small scale tests were compared to ensure that the samples used in the fire testing were equivalent to those whose production was witnessed. The comparative small scale testing was conducted in a companion project (Project ID 3047009). For details on the testing that was conducted and the results refer to Project ID 3047009.

#### IV TEST ASSEMBLIES

4.1 This test program consisted of two (2) wall assemblies and one (1) floor assembly. The wall assemblies incorporated two (2) openings while the floor assembly incorporated three (3) openings. A description of the test assembly is given below.

4.1.1 Test Specimen No. 1 (Ref. TBTL 908a) consisted of a 2 hour fire rated gypsum wall with steel studs. The wall contained two (2) separate openings as described below. This opening is used as the basis of Fire Stop Design Nos. 666 and 667.

Opening 1 is identified as TBT 2292. It consisted of a nominal 12 in. x 5.5 in. (300 mm x 140 mm) opening that had been framed with steel studs. Installed within the opening was a Hilti Cable Transit CFS-T SB 8x1 device. Installed within the unit were a number of sealing modules each penetrated by a single cable (identical to Unit B below). A 1 in. (25 mm) wide strip of Hilti CP619 Putty Roll was placed around the perimeter of the opening prior to installing the flanged steel unit. This acted as a seal between the wall and the flange.

Opening 2 is identified as TBT 2293. It consisted of an 8.5 in. (215 mm) diameter opening. Installed within the opening was a Hilti Cable Transit CFS-T RR-200 GS device. Installed within the unit were a number of sealing modules each penetrated by a single cable. A 1 in. (25 mm) wide strip of Hilti CP619 Putty Roll was placed around the perimeter of the opening prior to installing the flanged steel unit. This acted as a seal between the wall and the flange.

4.1.2 Test Specimen No. 2 (Ref. TBTL 906a) consisted of a 48 in. x 48 in. (1.2 m x 1.2 m), 4-1/2 in. (114 mm) thick concrete slab. It contained three (3) separate openings. These openings are used as the basis of Fire Stop Design Nos. 668, 669 and 670.

Opening 1 is identified as TBT 2286. It was 12 in. x 10.5 in. (305 mm x 267 mm). Installed within the opening was a Hilti Cable Transit CFS-T SBO 8x2 device. This device was further separated into units A and B. Unit A was filled with a number of the filler sealing modules of different sizes but no cables penetrated the unit (100% empty of penetrants). Unit B was identical to unit A except that each sealing module was penetrated by a single cable. For details on the type of cables penetrating the unit, see the Project Data Record. A 1 in. (25 mm) wide strip of Hilti CP619 Putty Roll was placed around the perimeter of the opening on the face of the concrete prior to installing the flanged steel unit. This acted as a seal between the concrete and the flange.

Opening 2 is identified as TBT 2287. It was 12 in. x 5.5 in. (300 mm x 140 mm). Installed within the opening was a Hilti Cable Transit CFS-T SBO 8x1 device. Installed within the unit were a number of sealing modules each penetrated by a single cable (identical to Unit B above). A 1 in. (25 mm) wide strip of Hilti CP619 Putty Roll was placed around the perimeter of the opening on the face of the concrete prior to installing the flanged steel unit. This acted as a seal between the concrete and the flange.

Opening 3 is identified as TBT 2288. It was 8 inches (203 mm) in diameter. Installed within the opening was a Hilti Cable Transit CFS-T RR-200 GS device. Installed within the unit were a number of sealing modules each penetrated by a single cable. A 1 in. (25 mm) wide strip of Hilti CP619 Putty Roll was placed around the perimeter of the opening on the inside surface of the opening prior to installing the flanged steel unit. This acted as a seal between the concrete and the flange.

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- 4.1.3 Test Specimen No. 3 (Ref. TBTL 909a) consisted of a 2 hour fire rated gypsum wall with steel studs. The test specimen was identical to Test Specimen No. 1. When installed within a wall, the units are not symmetrical. One side of the wall contains the unit while the other side of the wall contains mineral wool. Since it could not be determined which side would be more critical, separate fire tests had to be conducted exposing each side of the wall to the fire. This opening is used as the basis of Fire Stop Design Nos. 666 and 667.
- 4.1.4 Test Specimen No. 4 (Ref. TBTL 906a Dupe) consisted of a 4-1/2 in. (114 mm) thick concrete slab. The test specimen was identical to Test Specimen No. 2 and is used for the duplicate hose stream test.
- 4.1.5 Test Specimen No. 5 (Ref. TBTL 908a Dupe) consisted of a 2 hour fire rated gypsum wall with steel studs. The test specimen was identical to Test Specimen No. 1 and is used for the duplicate hose stream test.

## **V TEST RESULTS**

- 5.1 The Hilti, Inc. Cable Transit System CFS-T Devices satisfactorily withstood the fire endurance and hose stream test requirements and meet Approval requirements as shown below for use in the designated Fire Stop Design as noted in Appendix A.
- 5.2 In all cases, the test assemblies met the following criteria required for the F rating.
- 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 to the unexposed side. When a projection of water did pass through the assembly, the assembly was successfully subjected to a separate hose stream test on a duplicate specimen for a period of 1 hour as allowed by the test standard.
- 5.3 Assemblies met the following criteria required for the T rating.
- 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.
- 5.4 Assemblies met the following criteria required for the T<sub>FM</sub> rating.
- 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 or at the perimeter of the fire stop, from exceeding a 325°F (181°C) rise above ambient temperature.

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5.5 A brief summary of each opening is shown as follows:

| Test Specimen | Opening  | F Rating (max)        |        |              | T Rating (max)        |        |              | T <sub>FM</sub> Rating (max) |        |              | Design No. |
|---------------|----------|-----------------------|--------|--------------|-----------------------|--------|--------------|------------------------------|--------|--------------|------------|
|               |          | Time at Failure (min) | Reason | Rating (hrs) | Time at Failure (min) | Reason | Rating (hrs) | Time at Failure (min)        | Reason | Rating (hrs) |            |
| 1 (908a)*     | 1(2292)  | 120                   | NA     | 2            | 34/58                 | TR     | ½ / ¾        | 50                           | TR     | ¾            | 666        |
|               | 2(2293)  | 120                   | NA     | 2            | 38                    | TR     | ½            | 30                           | TR     | ½            | 667        |
| 2 (906a)*     | 1a(2286) | 120                   | NA     | 2            | 49                    | TR     | ¾            | 49                           | TR     | ¾            | 668        |
|               | 1b(2286) | 120                   | NA     | 2            | 47                    | TR     | ¾            | 84                           | TR     | 1            | 668        |
|               | 2 (2287) | 120                   | NA     | 2            | 57/79                 | TR     | ¾ / 1        | 69                           | TR     | 1            | 669        |
|               | 3 (2288) | 120                   | NA     | 2            | 38/79                 | TR     | ½ / 1        | 78                           | TR     | 1            | 670        |
| 3 (909a)**    | 1(2294)  | 120                   | NA     | 2            | 34/58                 | TR     | ½ / ¾        | 50                           | TR     | ¾            | 666        |
|               | 2(2295)  | 120                   | NA     | 2            | 38                    | TR     | ½            | 30                           | TR     | ½            | 667        |

- NA denotes assembly did not exhibit any flaming during classification period
- TR denotes failure caused by temperature rise on the unexposed surface
- \* denotes that the sample did not pass the original hose stream test and qualified by passing the duplicate hose stream test
- \*\* denotes that the sample passed the original hose stream test

- 5.5.1 Test Specimen Nos. 1 and 3 are identical. Since the assembly is not symmetrical, it had to be tested from both sides. Because of this, the rating will default to the lower result at each location from each test. 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.
- 5.5.2 Test Specimen No. 2, Opening No. 2. When either or both the 4/0 AL Grnd or the TEK cables are present, the rating will be ¾ hour. If not present, the rating is 1 hour.
- 5.5.3 Test Specimen No. 2, Opening No. 3. When either or all the 7/C #12, 150 pair of telephone cable or TEK cables are present, the rating will be ½ hour. If not present, the rating is 1 hour.
- 5.6 Test Specimen Nos. 4 and 5 are not shown in the above chart. These tests were conducted solely for the duplicate hose stream test. The temperatures on the unexposed surface were not monitored nor where they required to be monitored.

**VI MARKING**

- 6.1 The following information shall appear on the fire stop products identified in Section II.
  - Manufacturer's name.
  - Product trade name.
  - The FM Approvals mark of Approval.
- 6.2 Markings denoting Approval shall be applied by the manufacturer only within and on the premises of manufacturing locations that are under the FM Approvals Facilities and Procedures Audit Program.
- 6.3 The manufacturer agrees that the use of the Approval mark is subject to the conditions and limitations of the Approval.

## **VII MANUFACTURER'S RESPONSIBILITIES**

- 7.1 Approval is based upon the fabrication of the fire stop assemblies in accordance with this Approval Report, satisfactory field experience, and continued use of acceptable quality control procedures as determined by Facilities and Procedures Audits.
- 7.2 The manufacturer shall be responsible for the continuous high quality of all components and shall notify FM Approvals of intended changes in any component, raw material or formulation used to manufacture any product listed in this report.
- 7.3 All requests for changes shall be made and agreed to in writing utilizing FM Approvals Form 797, Approved Product-Revision Report, prior to fabrication and/or distribution for sale.
- 7.4 The manufacturer shall supply all the necessary instructions and other assistance to the installer to ensure a proper installation and maintenance.
- 7.5 The manufacturer shall establish and adhere to sufficient quality controls to ensure that the marking denoting Approval shall only be applied to products conforming to the requirements set forth in this report.

## **VIII FACILITIES AND PROCEDURES AUDITS**

- 8.1 The manufacturing location in Prevalje, Slovenia where the components are manufactured and the units assembled shall be subject to follow-up audit inspections. The facilities and quality control procedures in place have been found to be satisfactory to manufacture product identical to that examined and tested as described in this report.
- 8.2 Continued Approval is contingent upon satisfactory field performance, production of products in accordance with this report and acceptable quality control procedures as determined by follow-up Facilities and Procedures Audits.
- 8.3 Unsatisfactory results of Facilities and Procedures Audits may result in additional Facilities and Procedures Audits as deemed necessary by FM Approvals or forfeiture of Approval recognition.
- 8.4 A re-examination may be required to assure any changes in the composition or specified properties of the product.

## **IX CONCLUSIONS**

- 9.1 The Hilti, Inc. Cable Transit System CFS-T Devices have been examined and found to meet the Approval requirements when installed as described in this report.
- 9.2 The fire penetration devices examined and listed in this report have satisfactorily withstood fire endurance and hose stream tests while mounted on a test assembly. The tests were conducted in accordance with FM Approval Standard 4990. The tests were conducted at the Hilti Test Lab and witnessed by a representative of FM Approvals. The test data was analyzed and found to meet the following criteria for the classification periods shown. In addition, comparative small scale testing was successfully conducted (see Paragraph 3.5).



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- 9.3 For the specific constructions, limitations and hourly rating see Appendices A – E, Fire Stop Design Nos. 666 - 670.
- 9.4 Continued Approval is contingent upon satisfactory field performance, production of products in accordance with this report and acceptable quality control procedures as determined by follow-up Facilities and Procedures Audits.
- 9.5 The floor and wall penetration firestop devices examined in this report meet FM Approval requirements and, as such, are eligible to bear a marking signifying the Approval Mark of FM Approvals.
- 9.6 The fire resistant rating of floor and penetration fire stop systems is obtained only by strict conformity with the constructions as shown in this report and the attached Appendix.
- 9.7 Since a duly signed Master Agreement is on file for this customer, Approval is effective as of the date of this report.

**PROJECT DATA RECORD: Project I.D. 3046888 and 3047009**

**ORIGINAL TEST DATA:** NA

**ATTACHMENTS:**

|                   |                             |                  |
|-------------------|-----------------------------|------------------|
| <b>Appendix A</b> | <b>Fire Stop Design 666</b> | <b>(2 pages)</b> |
| <b>Appendix B</b> | <b>Fire Stop Design 667</b> | <b>(2 pages)</b> |
| <b>Appendix C</b> | <b>Fire Stop Design 668</b> | <b>(2 pages)</b> |
| <b>Appendix D</b> | <b>Fire Stop Design 669</b> | <b>(2 pages)</b> |
| <b>Appendix E</b> | <b>Fire Stop Design 670</b> | <b>(2 pages)</b> |

**REPORT BY:**

*Jeffrey E. Gould*

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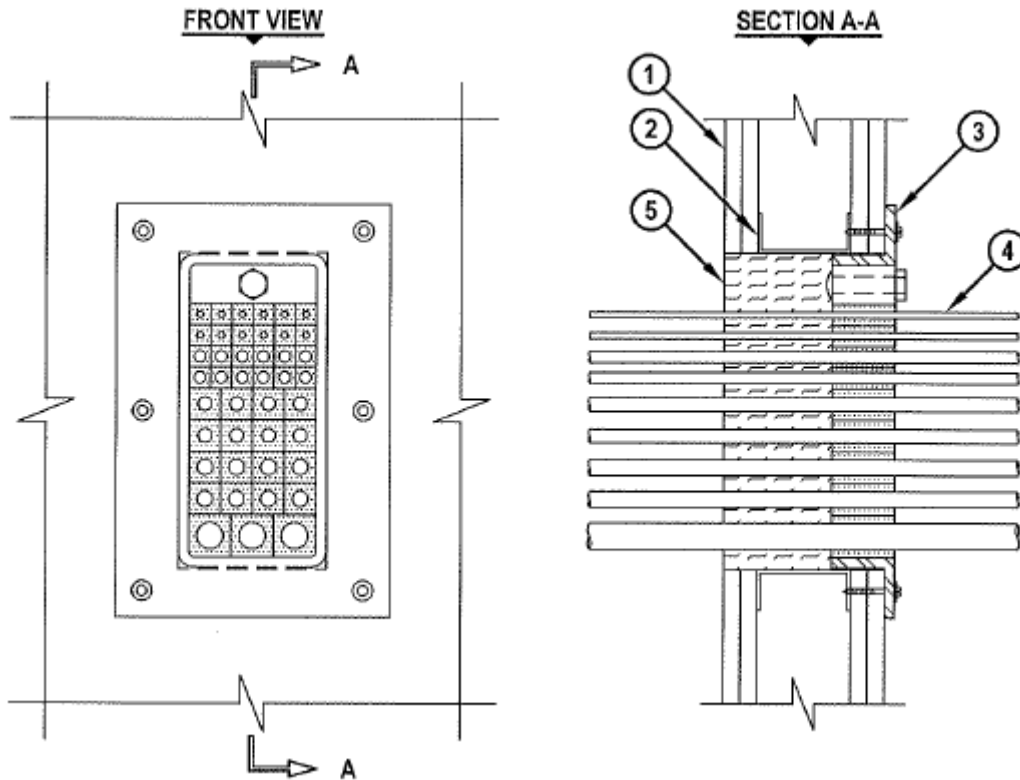
*L. N. D'Angelo*

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**Leonard N. D'Angelo**  
**Technical Team Manager**  
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**FIRE STOP DESIGN 666**  
**F Rating – 2 HR**  
**T Rating – ½ and ¾ HR (see Item 4)**  
**T<sub>FM</sub> 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.

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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.

**Hilti Inc, 5400 S 122<sup>nd</sup> East Ave, Tulsa, OK 74146**

Cable Transit System CFS-T Frame and Sealing Modules – Types CFS-T SB 2x1; CFS-T SB 4x1; CFS-T SB 6x1; CFS-T SB 8x1; CFS-T SBO 2x1; CFS-T SBO 4x1; CFS-T SBO 6x1; CFS-T SBO 8x1;

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/ft<sup>3</sup> (64 kg/m<sup>3</sup>) 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.

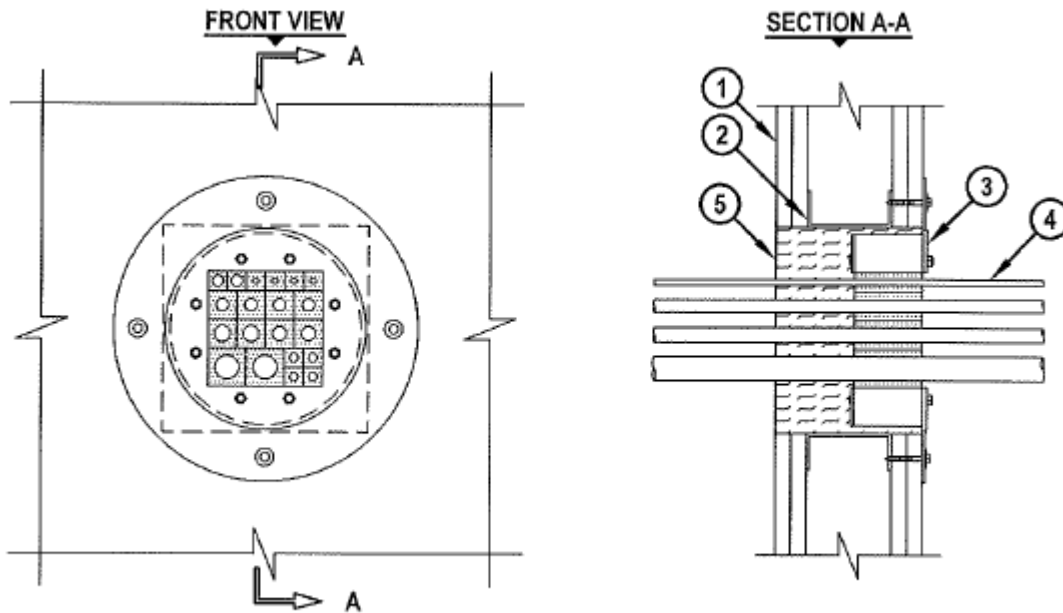
6. FILL MATERIAL (not shown). Prior to installing the flanged unit (No. 3 above), a 1 in. (25 mm) wide strip of putty is placed around the perimeter of the opening to form a gasket like seal between the wall and the steel flange. The material shall be located between the edge of the opening and the line of fasteners around the entire perimeter of the frame’s opening.

**Hilti Inc, 5400 S 122<sup>nd</sup> East Ave, Tulsa, OK 74146**

CP619T Putty Roll

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**FIRE STOP DESIGN 667**  
**F Rating – 2 HR**  
**T Rating – ½ HR**  
**T<sub>FM</sub> Rating – ½ 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 8.5 in. x 8.5 in. (215 mm) or 8.5 in. (215 mm) in diameter.

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.

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

Circular Firestop Devices – Circular firestop device for use in preformed openings. The firestop device shall be inserted into the framed opening and friction fit on one side of the wall assembly.

Each device consists of a seal plug unit with compression device and single/multi-diameter elastomeric sealing modules. The square openings of each device frame shall be filled with a single elastomeric sealing module with a max of one (1) cable per sealing module. 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 device frame mounting flange. After installation of the modules into the device, the bolts of the compression device are tightened to form an effective seal around the cables. The device shall be installed in accordance with the manufacturer's written installation instructions.

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Cable Transit System CFS-T Frame and Sealing Modules – Types CFS-T RR-50 GS; CFS-T RR-75 GS; CFS-T RR-100 GS; CFS-T RR-125 GS; CFS-T RR-150 GS; CFS-T RR-200 GS; and corresponding flanges CFS-T SLF-50 GS; CFS-T SLF-75 GS; CFS-T SLF-100 GS; CFS-T SLF-125 GS; CFS-T SLF-150 GS and CFS-T SLF-200 GS

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.

- a) RG-U6 coaxial cable with pvc jacket.
- b) 7/C No.12 AWG power cables 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/ft<sup>3</sup> (64 kg/m<sup>3</sup>) 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.

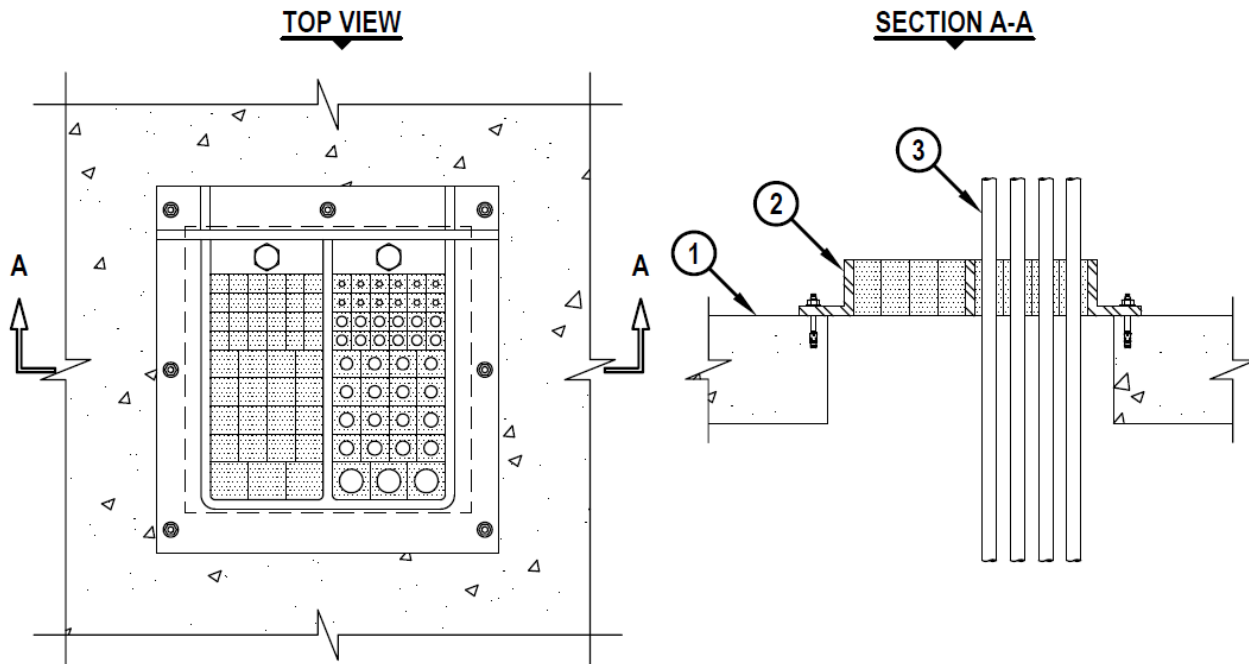
6. FILL MATERIAL (not shown). Prior to installing the flanged unit (No. 3 above), a 1 in. (25 mm) wide strip of putty is placed around the perimeter of the opening to form a gasket like seal between the wall and the steel flange. The material shall be located between the edge of the opening and the line of fasteners around the entire perimeter of the frame's opening.

**Hilti Inc, 5400 S 122<sup>nd</sup> East Ave, Tulsa, OK 74146**

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Appendix C  
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**FIRE STOP DESIGN 668**  
**F Rating – 2 HR**  
**T Rating – ¾ HR**  
**T<sub>FM</sub> 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, 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

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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.

**Hilti Inc, 5400 S 122<sup>nd</sup> East Ave, Tulsa, OK 74146**

Cable Transit System CFS-T Frame and Sealing Modules – Types CFS-T SB 2x1; CFS-T SB 2x2; CFS-T SB 4x1; CFS-T SB 4x2; CFS-T SB 6x1; CFS-T SB 6x2; CFS-T SB 8x1; CFS-T SB 8x2; CFS-T SBO 2x1; CFS-T SBO 2x2; CFS-T SBO 4x1; CFS-T SBO 4x2; CFS-T SBO 6x1; CFS-T SBO 6x2; CFS-T SBO 8x1; CFS-T SBO 8x2;

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 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

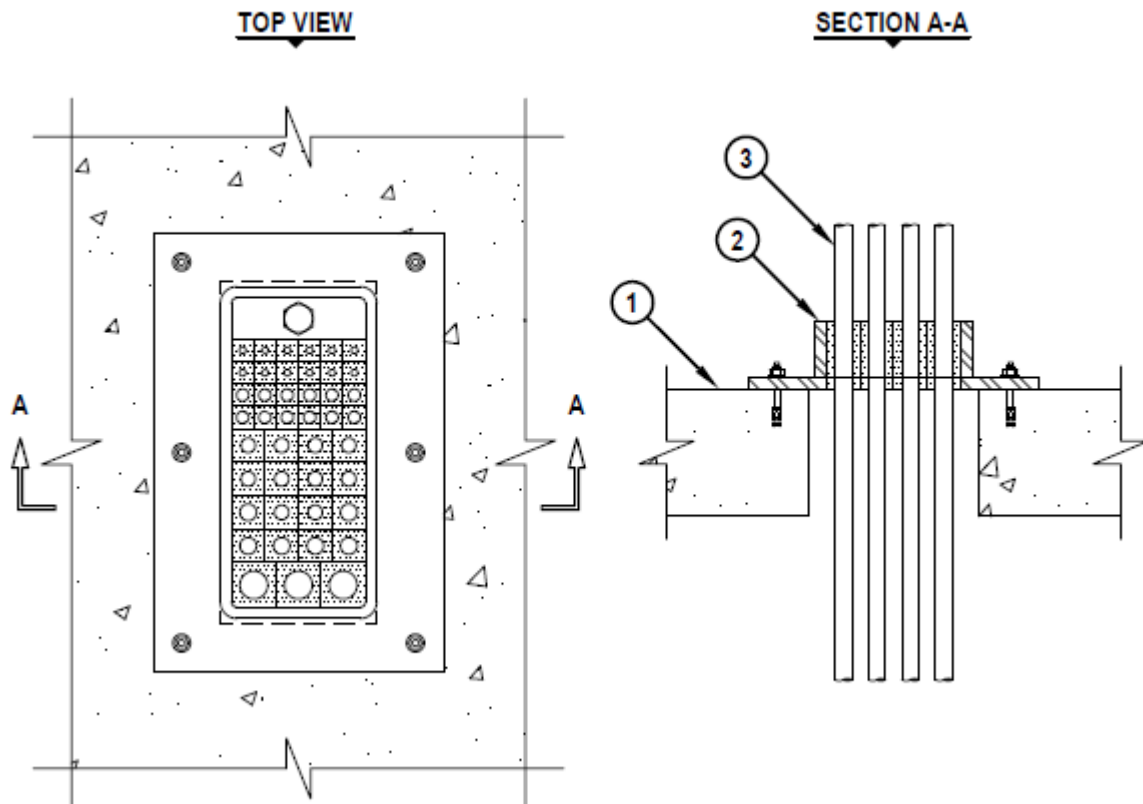
4. FILL MATERIAL (not shown). Prior to installing the flanged unit (No. 2 above), a 1 in. (25 mm) wide strip of putty is placed around the perimeter of the opening to form a gasket like seal between the wall (or floor) and the steel flange. The material shall be located between the edge of the opening and the line of fasteners around the entire perimeter of the frame’s opening.

**Hilti Inc, 5400 S 122<sup>nd</sup> East Ave, Tulsa, OK 74146**

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**FIRE STOP DESIGN 669**  
**F Rating – 2 HR**  
**T Rating – ¾ HR and 1 HR (see item 3)**  
**T<sub>FM</sub> Rating – 1 HR**



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 the opening is 11.8 in. x 5.5 in. (300 mm x 140 mm).

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

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



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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.

**Hilti Inc, 5400 S 122<sup>nd</sup> East Ave, Tulsa, OK 74146**

Cable Transit System CFS-T Frame and Sealing Modules – Types CFS-T SB 2x1; CFS-T SB 4x1; CFS-T SB 6x1; CFS-T SB 8x1; CFS-T SBO 2x1; CFS-T SBO 4x1; CFS-T SBO 6x1; CFS-T SBO 8x1;

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 either or both the 4/0 AL Grnd or the TEK cables are present, the rating will be ¾ hour. If not present, the rating is 1 hour.**

- a) RG-U6 coaxial cable with pvc jacket.
- b) 7/C No.12 AWG power cables 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

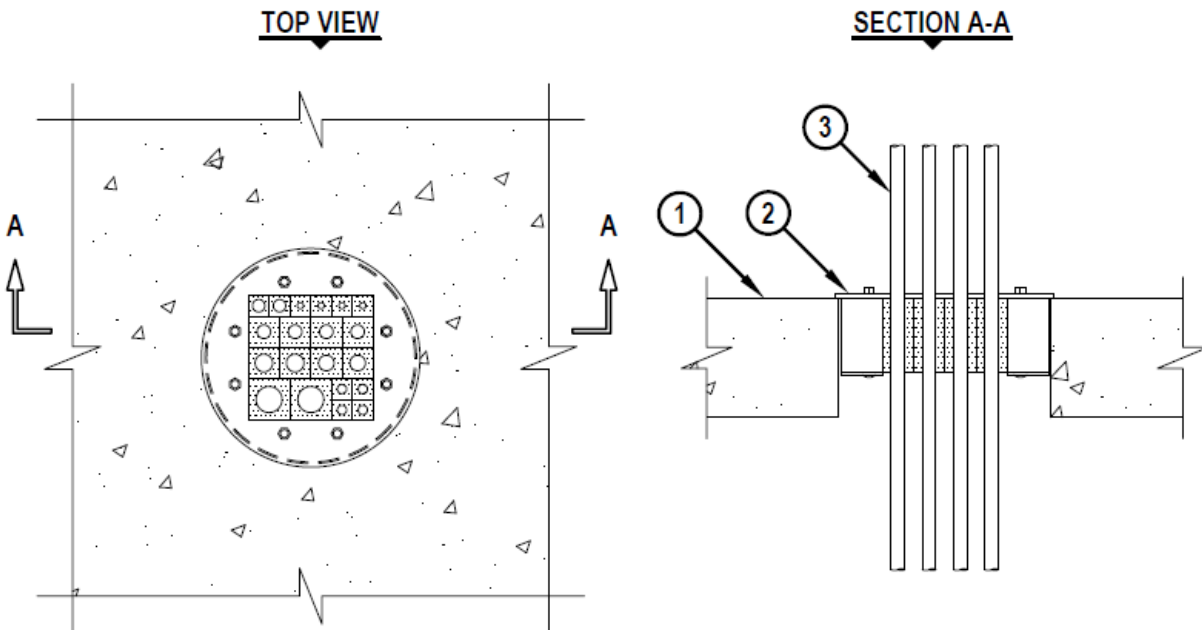
4. FILL MATERIAL (not shown). Prior to installing the flanged unit (No. 2 above), a 1 in. (25 mm) wide strip of putty is placed around the perimeter of the opening to form a gasket like seal between the wall (or floor) and the steel flange. The material shall be located between the edge of the opening and the line of fasteners around the entire perimeter of the frame' opening.

**Hilti Inc, 5400 S 122<sup>nd</sup> East Ave, Tulsa, OK 74146**

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Appendix E  
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**FIRE STOP DESIGN 670**  
**F Rating – 2 HR**  
**T Rating – ½ HR and 1 HR (see item 3)**  
**T<sub>FM</sub> Rating – 1 HR**



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 the opening is or 8.5 in. (215 mm) in diameter.

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

Circular Firestop Devices – Circular firestop device for use in preformed openings. Firestop device located on the top side of the floor or both sides of a wall. The firestop device shall be inserted into the framed opening and friction fit on one side of the wall assembly. Each device consists of a seal plug unit with compression device and single/multi-diameter elastomeric sealing modules. The square openings of each device frame shall be filled with a single elastomeric sealing module with a max of one (1) cable per sealing module. 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. After installation of the modules into the device, the bolts of the compression device are tightened to form an effective seal around the cables. The device shall be installed in accordance with the manufacturer's written installation instructions.

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Hilti Inc, 5400 S 122<sup>nd</sup> East Ave, Tulsa, OK 74146

Cable Transit System CFS-T Frame and Sealing Modules – Types CFS-T RR-50 GS; CFS-T RR-75 GS; CFS-T RR-100 GS; CFS-T RR-125 GS; CFS-T RR-150 GS; CFS-T RR-200 GS; and corresponding flanges CFS-T SLF-50 GS; CFS-T SLF-75 GS; CFS-T SLF-100 GS; CFS-T SLF-125 GS; CFS-T SLF-150 GS and CFS-T SLF-200 GS

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 either or all the 7/C #12. 150 pair of telephone cable or TEK cables are present, the rating will be ½ hour. If not present, the rating is 1 hour.**

- a) RG-U6 coaxial cable with pvc jacket.
- b) 7/C No.12 AWG power cables 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.

Hilti Inc, 5400 S 122<sup>nd</sup> East Ave, Tulsa, OK 74146

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