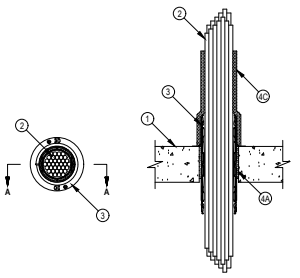
System No. C-AJ-3386

CAJ 3386

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 2 Hr	FT Rating — 2 Hr
L Rating At Ambient — Less Than 1 CFM (See Item 2)	FH Rating — 2 Hr
L Rating At 400°F — Less Than 1 CFM (See Item 2)	FTH Rating — 2 Hr
	L Rating At Ambient — Less Than 1 Ls (See Item 2)
	L Rating At 204°C — Less Than 1 Ls (See Item 2)



SECTION A-A

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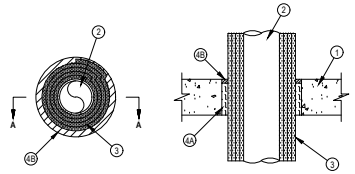
Hilti Firestop Systems

System No. C-AJ-5450

CAJ 5450

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating - 2 Hr	F Rating - 2 Hr
T Rating - 2 Hr	FT Rating - 2 Hr
L Rating At Ambient — 4 CFM/Sq Ft	FH Rating - 2 Hr
L Rating At 400°F — Less Than 1 CFM/Sq ft	FTH Rating - 2 Hr
	L Rating At Ambient — 20.3 L/s/m²
	L Rating At 204°C — Less Than 5.1 L/s/m²



SECTION A-A

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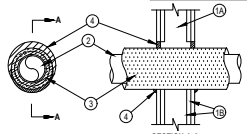
Hilti Firestop Systems

System No. W-L-5381

WL 5381

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 1 and 2 Hr (See Item 1)	FT Ratings — 1 and 2 Hr (See Item 1)
L Rating At Ambient — 4 CFM/Sq Ft	FH Ratings — 1 and 2 Hr (See Item 1)
L Rating At 400°F — Less Than 1 CFM/Sq Ft	FTH Ratings — 1 and 2 Hr (See Item 1)
	L Rating At Ambient — 20.2 L/s/m²
	L Rating At 204°C — Less Than 5.1 L/s/m²



SECTION A-A

1. Wall Assembly —The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs —Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-5/8 in. (92 mm) wide and spaced max 24 in. (610 mm) OC.
   B. Gypsum Board* —Min 5/8 in. (16 mm) thick with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual Wall and Partition Design. Max diam of opening is 9-1/2 in. (241 mm). The hourly F, T, FH and FTH Ratings of the firestop system are equal to the hourly fire rating of the wall assembly in which it is installed.
2. Through Penetrants —One metallic pipe or tubing to be installed within the firestop system. Pipe or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. Steel Pipe —Nom 4 in. (102 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. Iron Pipe —Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.
3. Pipe Covering Material* — Nom 0.5 in. (12.7 mm) flexible sheet material. Pipe covering shall be continuously wrapped around the penetrant for a minimum three layers, with a min 2 in. (51 mm) overlap at the final layer. Seam to be sealed with FSK or foil tape. Pipe covering to be secured in position using min No. 18 AWG steel tie wire located within 1 in. (25 mm) of wall and spaced max 6 in. (152 mm) OC. The annular space between pipe covering and periphery of opening shall be min 0 in. (point contact) to max 1-5/8 in. (41 mm).
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CFP-ES Endo-Shield
4. Fill, Void or Cavity Material* — Sealant —Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. At the point contact location between pipe covering and gypsum board, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the pipe covering/gypsum board interface on both surfaces of wall.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

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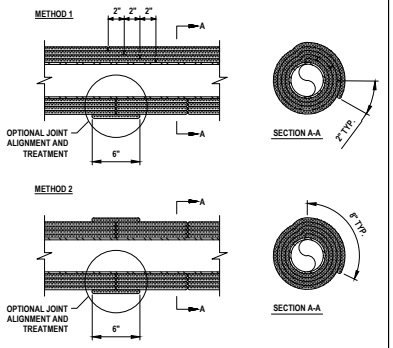
Hilti Firestop Systems

Hilti Corporation Design Number HI/AF 120-01 Applied Fireproofing Hilti CPF-ES Endo-Shield ASTM E1725 Ratings:

HI/AF 120-01

Min. 1 in. Tubing, 3 Layers of Hilti Endo-Shield: 1 Hour
Min. 1 in. Tubing, 5 Layers of Hilti Endo-Shield: 2-1/2 Hour
Min. 4 in. Tubing, 4 Layers of Hilti Endo-Shield: 2 Hour



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Hilti Firestop Systems

System No. C-AJ-3386

CAJ 3386

1. Floor or Wall Assembly —Reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) concrete. Min 4-1/2 in. (114 mm) thick floors and min 5 in. (127mm) thick walls. Wall may also be constructed of any UL Classified Concrete Blocks*. Floor may also be constructed of any min 6 in. thick UL Classified hollow-core Precast Concrete Units*. Opening in floor or wall to be max 3 in. (76 mm) diam for 2 in. (51 mm) device and max 5 in. (127 mm) diam for 4 in. (102 mm) device.
   See Concrete Blocks (CAZT) and Precast Concrete Units (CFTV) categories in the Fire Resistance Directory for names of manufacturers.
2. Cables —Within the loading area for each firestop device, the cables may represent a 0 to 100 percent visual fill. Cables to be tightly bundled within the device and rigidly supported on both sides of floor or wall assembly. Any combination of the following types of cables may be used:
   A. Max 100 pair No. 24 AWG (or smaller) copper conductor telecommunication cable with polyvinyl chloride (PVC) jacketing and insulation.
   B. Max 7/C No. 12 AWG copper conductor control cable with PVC or XLPE jacket and insulation.
   C. Max 4/0 AWG Type RHH ground cable.
   D. Max 4 pr No. 22 and 23 AWG Cat 6 and Cat 7 computer cables.
   E. Max RG 6/U coaxial cable with fluorinated ethylene insulation and jacketing.
   F. Max 48 fiber, fiber optic cable with polyvinyl chloride (PVC) or polyethylene (PE) jacket and insulation having a max diam of 5/8 in. (16 mm).
   G. Max 20/C No. 22 AWG shielded printer cable with PVC jacket.
   H. Through-Penetrating Product* —Two copper conductors No. 18 AWG (or smaller) Power or Non Power Limited Fire Alarm Cable with or without a jacket under a metal armor.
   AFC CABLE SYSTEMS INC
   I. Max 1/4 in. (6 mm) diameter S-Video Cable consisting of 2 max 24 AWG 75 ohm coax or twisted pair cable with PE insulation and PVC jacket.
   See Table below for L Ratings.

Max Cable Fill	Cable Type	L Rating, CFM/Sq Ft (L/s/m²)		L Rating, CFM (L/s)	
		Ambient	400°F or 204°C	Ambient	400°F or 204°C
0%	-	1 (5.1)	2 (10.1)	Less than 1	Less than 1
100%	Any cables (Item 2) in any combination	7 (35.4)	7 (35.4)	Less than 1	Less than 1

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Hilti Firestop Systems

System No. C-AJ-5450

CAJ 5450

1. Floor or Wall Assembly — Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) concrete floor or min 5 in. (127 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) concrete wall. Floor may also be constructed of any min 6 in. (152 mm) thick UL Classified hollow-core Precast Concrete Units*. Wall may also be constructed of any UL Classified Concrete Blocks*. Max diam of opening is 10 in. (254 mm). Max diam of opening in floor constructed of hollow-core precast concrete units is 7 in. (178 mm).
   See Concrete Blocks (CAZT) and Precast Concrete Units (CFTV) categories in the Fire Resistance Directory for names of manufacturers.
2. Through Penetrants — One metallic pipe to be installed either concentrically or eccentrically within the firestop system. Pipe to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes may be used:
   A. Steel Pipe — Nom 4 in. (102 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. Iron Pipe — Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.
3. Pipe Covering Material* — Nom 0.5 in. (12.7 mm) flexible sheet material. A min of three layers of pipe covering shall be continuously wrapped around the penetrant with a min 2 in. (51 mm) overlap at the final layer. All seams to be sealed with FSK or foil tape. Wrap layers secured in place with 18 ga steel tie wire spaced max 6 in. (152 mm) on center on outermost layer. The annular space between pipe covering material and opening shall be min 1/2 in. (13 mm) to max 1-1/4 in. (32 mm).
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CFP-ES Endo-Shield
4. Firestop System — The firestop system shall consist of the following:
   A. Packing Material — Min 4 in. (102 mm) thickness of min 4 pcf (64 kg/m3) mineral wool batt insulation compressed and firmly packed within annular space. Packing material to be recessed from top surface of floor or from both surfaces of wall to accommodate the required thickness of fill material (Item 4B).
   B. Fill, Void or Cavity Material* — Sealant — Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

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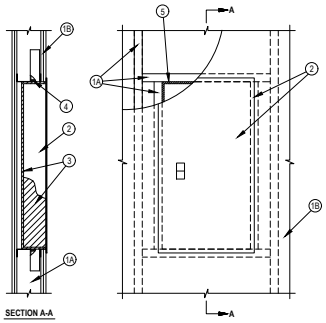
Hilti Firestop Systems

System No. W-L-7324

WL 7324

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 1 and 2 Hr (See Item 1)	FT Ratings — 1 and 2 Hr (See Item 1)
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Ratings — 1 and 2 Hr (See Item 1)



SECTION A-A

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Hilti Firestop Systems

Hilti Corporation Design Number HI/AF 120-01 Applied Fireproofing Hilti CPF-ES Endo-Shield ASTM E1725 Ratings:

HI/AF 120-01

Min. 1 in. Tubing, 3 Layers of Hilti Endo-Shield: 1 Hour
Min. 1 in. Tubing, 5 Layers of Hilti Endo-Shield: 2-1/2 Hour
Min. 4 in. Tubing, 4 Layers of Hilti Endo-Shield: 2 Hour

1. **CERTIFIED MANUFACTURER:** Hilti Corporation

   CERTIFIED PRODUCT: Applied Fireproofing

   CERTIFIED MODEL: Hilti CPF-ES Endo-Shield

   Install Hilti Endo-Shield layers to achieve the desired fire resistance rating.

   METHOD 1 - INDIVIDUALLY WRAPPED

   LAYER 1 - Using ½ in wide filament tape, aluminum foil tape, or FSK tape, attach leading edge of Hilti Endo-Shield onto the tubing (Item 3). Wrap Hilti Endo-Shield tightly around the tubing and overlapping 2 in. at the longitudinal seam. For the longitudinal seam, apply 3 in. wide aluminum foil tape or FSK tape centered for the full length of the seam. Additional wrap sections are added to insulate all straight runs of tubing. The radial seams are butted end-to-end without an overlap. For the radial seams, apply 3 in. wide aluminum foil tape or FSK tape over the seam and overlap 2 in. back onto itself.

   The elbows are each fitted with a gore segment cut to accommodate the elbow radius that occurs as the Hilti Endo-Shield is wrapped radially around the elbow. Using min. ½ in. wide filament tape, aluminum foil tape, or FSK tape, attach edge of gore segment to tubing and wrap segment tightly around tubing overlapping 2in. at the longitudinal seam which shall be located at the long radius of the elbow. Apply 3-in. wide aluminum foil tape or FSK tape centered for the full length of the longitudinal seam. The radial seam butted between the gore end segment and adjoining straight section is filled with Hilti CP 606 or FS-ONE MAX Firestop Sealant (Item 2). Apply 3 in. wide aluminum foil tape or FSK tape over the radial seam and overlap 2 in. back onto itself.

   LAYER 2 - Wrap a second layer of Hilti Endo-Shield in the same manner as Layer 1. The start of Layer 2 begins at the longitudinal seam of Layer 1, secured with 3 in. wide aluminum foil tape or FSK tape covering the full length of the seam. Offset the Layer 2 radial seam 2 in. from the radial seam of Layer 1. Tightly wrap Layer 2 over Layer 1 and overlap the longitudinal seam by 2 in. Cover the full length of the longitudinal and radial seam with 3 in. wide aluminum foil tape or FSK tape.

   The elbows are each fitted with a gore segment cut to accommodate the elbow radius that occurs as the Hilti Endo-Shield is wrapped radially around the elbow in the same manner as Layer 1. The gore segment is attached to Layer 1 with 3 in. wide aluminum foil tape or FSK tape and wrapped tightly around Layer 1, overlapping 2 in. at the longitudinal seam. The longitudinal seam of Layer 2 is located at the short radius of the elbow. Apply 3 in. wide aluminum foil tape or FSK tape centered for the full length of the longitudinal seam. The radial seam butted between the gore end segment and adjoining straight Layer 2 section is filled with Hilti CP 606 or FS-ONE MAX Firestop Sealant (Item 2). The elbow and straight section butt joints of Layer 1 and Layer 2 are in alignment and not offset. Apply 3 in. wide aluminum foil tape or FSK tape over the seams and overlap 2 in. back onto itself.

   LAYER 3, 4, AND 5 - As required, wrap a third, fourth, or fifth layer layer of Hilti Endo-Shield in the same manner as Layer 2 to obtain desired rating.

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Hilti Firestop Systems

System No. C-AJ-3386

CAJ 3386

3. Firestop Device* —Firestop device consists of a corrugated steel tube with an inner plastic housing, intumescent material rings, tightly twisted inner fabric smoke seal, flanges and gasket material (not shown). Firestop device to be installed in accordance with the accompanying installation instructions. Device slid into floor or wall such that ends project an equal distance from the approximate centerline of the assembly. As an option, in floors, steel sleeve of device may be installed flush with bottom of floor. The annular space between the device and the periphery of the opening shall be min 0 in. (point contact) to max 1/2 in. (13 mm). Device provided with flange(s) that are spun clockwise onto device threads, over gasket material butting tightly to top side of floor or both sides of floor or wall. In floors, when one device flange is used, device flange to be secured to floor with min two 1-1/4 in. (32 mm) long masonry screws or anchors. As an alternate to gasketing material, sealant (Item 4B) may be used.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 653 and CP 653 BA 2" Speed Sleeve, CP 653 and CP 653 BA 4" Speed Sleeve, CP 653 4" BA ILS and CFS-SL GA L ILS Speed Sleeve
4. Firestop System —The firestop system shall consist of the following:
   A. Packing Material —Min 4 in. (102 mm) thickness of min 4 pcf (64 kg/m3) mineral wool batt insulation firmly packed into annular space between firestop device and opening as a permanent form. Packing material to be installed flush with bottom of floor and recessed from top surface of floor or from both surfaces of wall to accommodate the required thickness of fill material.
   B. Fill, Void or Cavity Material* — Sealant (Not Shown) —As an alternate to gasketing material (see Item 3), min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall. For L Ratings when sealant is used, an additional 1/4 in. (6 mm) bead of fill material shall be applied at the device/floor or device/wall interface on top side of floor or both sides of wall assembly prior to installing flange(s).
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 606 Sealant or FS-ONE MAX Intumescent Sealant.
   C. Pipe Covering Material* — Nom 0.5 in. (12.7 mm) flexible sheet material faced on two sides. One layer of pipe covering shall be continuously wrapped around the device sleeve and penetrant, extending min 12 in. (305 mm) above the floor, with a min 2 in. (51 mm) overlap at the seam. All seams to be sealed with FSK or foil tape. In walls, pipe covering to be installed on both sides of wall.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CFP-ES Endo-Shield

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

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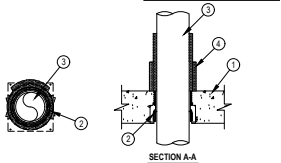
Hilti Firestop Systems

System No. F-A-1207

FA 1207

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Ratings — 1 and 2 Hr (See Item 4)	FT Ratings — 1 and 2 Hr (See Item 4)
L Rating At Ambient —1 CFM/sq ft	FH Rating — 2 Hr
L Rating At 400°F — Less Than 1 CFM/sq ft	FTH Ratings — 1 and 2 Hr (See Item 4)
	L Rating At Ambient — 5.1 L/s/m²
	L Rating At 204°C — Less Than 5.1 L/s/m²



SECTION A-A

1. Floor Assembly —Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) concrete. As an alternate, any min 2 hr fire rated D700, D800 or D900 Series Floor-Ceiling Design in the UL Fire Resistance Directory having a min 4-1/2 in. (114 mm) thickness of lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) concrete topping over the steel deck may be used.
2. Firestop Device* —Cast in place firestop device permanently embedded during concrete placement or grouted in concrete floor assembly in accordance with accompanying installation instructions. Device sized to nom diam of penetrant. Device is to be trimmed flush with the top surface of the floor.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 680-M 2", CP 680-M 3", CP 680-M 4", CP 680-P 2", CP 680-P 3", CP 680-P 4", CP 680-PX 2", CP 680-PX 3" Cast-In Firestop Devices.
3. Through-Penetrant —One metallic pipe installed concentrically or eccentrically within opening. Penetrant to be rigidly supported on both sides of floor assembly. The following types and sizes of penetrants may be used:
   A. Steel Pipe —Nom 4 in. (102 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. Iron Pipe —Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.
   C. Conduit —Nom 4 in. (102 mm) diam (or smaller) rigid steel conduit or nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing.
4. Pipe Covering Material* — Nom 0.5 in. (12.7 mm) flexible sheet material. One layer of pipe covering shall be continuously wrapped around the penetrant, extending min 12 in. (305 mm) above the floor. For a 2 hr T, FT and FTH Rating, an additional layer of pipe covering shall be tightly wrapped around the first layer and extend min 6 in. (152 mm) above the floor. All seams to overlap min 2 in. (51 mm) and to be sealed with FSK or foil tape.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CFP-ES Endo-Shield

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

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Hilti Firestop Systems

System No. W-L-7324

WL 7324

1. Wall Assembly —The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner described in the individual U400, V400 or W400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs —Wall framing may consist of steel channel studs. Steel studs to be min 3-5/8 in. (92 mm) wide and spaced max 24 in. (610 mm) OC. Additional studs installed horizontally at the top and bottom of the steel box. Additional studs installed vertically as required for steel box attachment.
   B. Gypsum Board* —Gypsum board type, thickness, number of layers, and orientation shall be as specified in the individual Wall and Partition Design. Size of cutout made to accommodate steel box (Item 2) and wrap material (Item 3).
   The hourly Ratings of the firestop system are equal to the hourly fire rating of the wall assembly in which it is installed.
2. Steel Box —Max 14-3/8 in. (365 mm) wide by 39 in. (991 mm) by max 3-7/8 (98 mm) by minimum 20 ga steel electrical panel box, steel utility box, or steel mud-gas valve box with hinged steel door and mounting flange. Mounting flange to cover opening in gypsum board. Sides of steel box attached from inside the box to wall framing using steel screws after application of wrap material (Item 3). Top, bottom and/or sides of steel box may be penetrated by maximum twenty (20) total penetrants of nom 1/2 in. (13 mm) to 2 in. (51 mm) diam steel pipe, iron pipe, copper pipe or tube, steel conduit, flexible steel conduit or EMT. Steel conduit connectors may be used at interface with steel box. Open ends of pipes, tubes or conduits which terminate inside the box to be plugged with sealant or putty (Item 4).
3. CPF-ES Endo Shield* —Nom 0.5 in. (13 mm) thick flexible sheet wrap material. One layer sized to cover back and four sides of steel box. At corners of steel box, wrap cut horizontally or vertically, extending from corner of steel box to edge of wrap material. Circular openings made in wrap material to accommodate pipes, tubes or conduits sized max 1/2 in. (13 mm) larger than the outside diameter of the pipe, tube, or conduit. Alternately, where penetrant spacing doesn't allow, wrap may be cut around two or more penetrants not to exceed 1/2 in. (13 mm) annular space between wrap and penetrants. Wrap material folded to maintain contact with back and four sides of steel box. At the corners of the box, wrap material is trimmed at top and bottom so that it is flush with the wrap on the sides and corners are sealed with aluminum foil or FSK tape. As an option, the overhanging material can be folded onto the sides and secured with aluminum foil or FSK tape. As an option, prior to application of wrap material, a bead of construction adhesive may be applied to the back and side of steel box at edge.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP-ES Endo Shield
4. Fill, Void or Cavity Materials* — Putty or Sealant —Min 1/2 in. (13 mm) thickness of sealant or putty applied into ends of pipes, tubes or conduits that terminate inside box. Additional putty or sealant to fill circular cutouts made to accommodate pipes, tubes or conduits.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 618 Putty, FS-ONE MAX Intumescent Sealant
5. Fill, Void or Cavity Materials* — Sealant —Min 1/4 in. (6 mm) bead of sealant applied over exposed edge of CFP-ES Endo Shield prior to installing mounting flange of steel box (Item 2).
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 606 Sealant, FS-ONE MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

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Hilti Firestop Systems

Hilti Corporation Design Number HI/AF 120-01 Applied Fireproofing Hilti CPF-ES Endo-Shield ASTM E1725 Ratings:

HI/AF 120-01

Min. 1 in. Tubing, 3 Layers of Hilti Endo-Shield: 1 Hour
Min. 1 in. Tubing, 5 Layers of Hilti Endo-Shield: 2-1/2 Hour
Min. 4 in. Tubing, 4 Layers of Hilti Endo-Shield: 2 Hour

The elbow longitudinal seam for Layer 3 is located at the middle radius of the elbow, rotated 90 degrees from the longitudinal seam of Layer 2. The elbow longitudinal seam for Layer 4 is located at the middle radius of the elbow, rotated 180 degrees from the longitudinal seam of Layer 3. The elbow longitudinal seam for Layer 5 is located at the long radius of the elbow.

OPTIONAL JOINT ALIGNMENT AND TREATMENT (METHOD 1) - Alternatively, the radial seams of Layer 1 and subsequent layers can be aligned. When the radial seams are aligned, apply Hilti CP 606 or FS-ONE MAX Firestop Sealant (Item 2) over the entire edge of the of Hilti Endo-Shield prior to installing the adjacent section.

METHOD 2 - CONTINUOUSLY WRAPPED

Hilti Endo-Shield may be continuously wrapped around the tubing. Using min. ½ in. wide filament tape, aluminum foil tape, or FSK tape, attach leading edge of Hilti Endo-Shield onto the tubing (Item 3) and wrap continuously. Prior to installing the adjacent continuously wrapped section, apply 1/8 in. thick of CP 606 or FS-ONE MAX Firestop Sealant (Item 2) over the entire edge of the Hilti Endo-Shield. A 2 in. overlap of longitudinal seam shall be included for each layer required. For example, a 4 layer system requires an 8 in. overlap on final layer. Apply 3 in. wide aluminum foil tape or FSK tape over the full length of the longitudinal seam.

For elbow sections, follow details for Method 1, Layer 1, and Layer 2, and subsequent layers.

The outer layer for Method 1 and 2 is secured with min. 18 GA steel tie wire or 1/2 in. wide stainless steel banding located 1 in. from each radial seam. Space the steel tie wire 6 in. on center (oc) between the seams or the 1/2 in. wide stainless steel banding 12 in. oc. At the elbows, space the steel wire 2 in. oc or the stainless steel banding 2 in. oc, both at the short interior radius.

OPTIONAL JOINT ALIGNMENT AND TREATMENT (METHOD 1 AND 2) - As an alternative to applying sealant at radial seams and seams between the gore end segment and adjoining straight section, an additional 6 in. wide section of Hilti Endo-Shield may be centered over the radial seam of the final layer overlapping 2 in. at the longitudinal seam. Apply 3 in. wide aluminum foil or FSK tape over the longitudinal seam of the 6 in. wide section of Hilti Endo-Shield. Further secure section with min. 18 GA steel wire or ½ in. wide stainless steel banding located 1 in. from each edge.

2. **CERTIFIED MANUFACTURER:** Hilti Corporation

   CERTIFIED PRODUCT: Sealant

   CERTIFIED MODEL: CP 606 or FS-ONE MAX Firestop Sealant

   Install CP 606 or FS-ONE MAX Firestop Sealant at seams of elbow gore segments and for any gap greater than 1/8 in. at a butted seam. Use only Hilti CP 606 Sealant bearing an UL Certified Mark and only FS-ONE MAX Firestop Sealant bearing an Intertek Certified Label.

3. **TUBING:** Use min. 1 in. diameter electrical metal tubing (EMT), intermediate metal conduit (IMC), or rigid metal conduit (RMC).

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Hilti Firestop Systems

Notes:

1. *Refer to section 07 84 00 of the specifications. For Quality Control requirements, refer to the Quality Control portion of the specification.*
2. *Details shown are typical details. If field conditions do not match requirements of typical details, approved alternate details shall be utilized. Field conditions and dimensions need to be verified for compliance with the details, including but not limited to the following:*
   * *Minimum and maximum Width of Joints*
   * *Type and thickness of fire-rated construction. The minimum assembly rating of the firestop assembly shall meet or exceed the highest rating of the adjacent construction.*
3. *If alternate details matching the field conditions are not available, manufacturer's engineering judgment drawings are acceptable. Drawings shall follow the International Firestop Council (IFC) Guidelines for Evaluating Firestop Systems Engineering Judgments.*
4. *References:*
   * *Underwriter's Laboratories Fire Resistance Directory, Volume 2*
   * *NFPA 101 Life Safety Code*
   * *All governing local and regional building codes*
5. *Firestop System installation must meet requirements of ASTM E-814 (UL 1479) tested assemblies that provide a fire rating equal to that of construction being penetrated.*
6. *All rated through-penetrations shall be prominently labeled with the following information:*
   * *ATTENTION: Fire Rated Assembly*
   * *UL System #*
   * *Product(s) used*
   * *Hourly Rating (F-Rating)*
   * *Installation Date*

<Notes to designer (delete this note after reading)>

1. Any modification to these details could result in an application/system not meeting the UL or Intertek Classification or the intended temperature or fire ratings.
2. Details shown are up to date as of November, 2021.
3. For additional information on the details, refer to the most current "Underwriter's Laboratories Fire Resistance Directory (volume 2.)"

PROJECT NAME :
Hilti Endo-Shield Firestop Systems

ARCHITECT :

JOB NUMBER :
CFP-ES-(F)-121021

DRAWN BY :
NG

CHECKED BY :

ISSUE DATE :
12/10/2021

REVISION :

SHEET NAME :
Hilti Endo-Shield Firestop Systems

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