

**System No. C-AJ-1226**

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 3 Hr	F Rating — 3 Hr
T Rating — 0 Hr	FT Rating — 0 Hr
L Rating At Ambient — Less Than 1 CFM/sq ft	FH Rating — 3 Hr
L Rating At 400 F — 4 CFM/sq ft	FTH Rating — 0 Hr
	L Rating At Ambient — Less Than 1 CFM/sq ft
	L Rating At 400 F — 4 CFM/sq ft

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/m<sup>3</sup>) concrete. Wall may also be constructed of any UL Classified Concrete Blocks\*. Max diam of opening is 32 in. (813 mm).

2. Metallic Sleeve — (Optional) Nom 32 in. (813 mm) diam (or smaller) Schedule 40 (or heavier) steel sleeve cast or grouted into floor or wall assembly, flush with floor or wall surfaces or extending a max of 3 in. (76 mm) above floor or beyond both surfaces of wall.

2A. Sheet Metal Sleeve — (Optional) Max 6 in. (152 mm) diam, min 26 ga galv steel provided with a 26 ga galv steel square flange spot welded to the sleeve at approx mid-height, or flush with bottom of sleeve in floors, and sized to be a min of 2 in. (51 mm) larger than the sleeve diam. The sleeve is to be cast in place and may extend a max of 4 in. (102 mm) below the bottom of the deck and a max of 1 in. (25 mm) above the top surface of the concrete floor.

2B. Sheet Metal Sleeve — (Optional) Max 12 in. (305 mm) diam, min 24 ga galv steel provided with a 24 ga galv steel square flange spot welded to the sleeve at approx mid-height, or flush with bottom of sleeve in floors, and sized to be a min of 2 in. (51 mm) larger than the sleeve diam. The sleeve is to be cast in place and may extend a max of 4 in. (102 mm) below the bottom of the deck and a max of 1 in. (25 mm) above the top surface of the concrete floor.

3. Through-Penetrant — One metallic pipe, tube or conduit to be installed either concentrically or eccentrically within the firestop system. The annular space between penetrant and periphery of opening shall be min 0 in. (point contact) to max 1-7/8 in. (48 mm). Penetrant may be installed with continuous point contact. Penetrant to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic penetrants may be used:

A. Steel Pipe — Nom 30 in. (762 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.

B. Iron Pipe — Nom 30 in. (762 mm) diam (or smaller) cast or ductile iron pipe.

C. Copper Pipe — Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe.

D. Copper Tubing — Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tubing.

E. Conduit — Nom 6 in. (152 mm) diam (or smaller) steel conduit.

F. Conduit — Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing (EMT).

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Hilti Firestop Systems

Page: 1 of 2

**System No. C-AJ-1226**

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/m<sup>3</sup>) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or sleeve or from both surfaces of wall or sleeve as required to accommodate the required thickness of fill material.

B. Fill, Void or Cavity Material\* — Sealant — Min 1/4 in. (6 mm) thickness of fill material applied within the annulus, flush with top surface of floor or sleeve or with both surfaces of wall or sleeve. At the point or continuous contact locations between penetrant and concrete or floor, a min 1/4 in. (6 mm) diam bead of fill material shall be applied at the concrete or sleeve pipe penetrant interface on the top surface of floor and on both surfaces of wall.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-One Sealant or 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

Page: 2 of 2

**System No. C-AJ-1513**

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating - 2 Hr	F Rating - 2 Hr
T Rating - 0 Hr	FT Rating - 0 Hr
	FH Rating - 2 Hr
	FTH Rating - 0 Hr

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/m<sup>3</sup>) concrete floor. Min 5 in. (127 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m<sup>3</sup>) concrete wall. Wall may also be constructed of any UL Classified Concrete Blocks\*. Max size of opening is 8 in. (203 mm) by 30 in. (763 mm). See Concrete Blocks (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. Through Penetrants — One or more metallic penetrants to be installed either concentrically or eccentrically within the firestop system. The total number of penetrants is dependent on the size of the opening and sizes of penetrants. The annular space between the penetrants and periphery of opening shall be min 0 in. (point contact). The annular space between nom 2 in. (51 mm) diam (and smaller) penetrants shall be a min 0 in. (point contact). The annular space between penetrants greater than nom 2 in. (51 mm) diam shall be a min. 1/2 in. (13 mm). A max annular space in the system shall be 12 in. (305 mm). Penetrants to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of penetrants may be used:

A. Conduit — Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing or rigid steel conduit

B. Through Penetrating Product\* — Flexible Metal Piping — The following types of steel flexible metal gas piping may be used:

1.) Nom 2 in. (51 mm) diam (or smaller) steel flexible metal gas piping. Plastic covering on piping may or may not be removed on both sides of floor or wall assembly.

OMEGA FLEX INC

2.) Nom 1 in. (25 mm) diam (or smaller) steel flexible metal gas piping. Plastic covering on piping may or may not be removed on both sides of floor or wall assembly.

GASTITE, DIV OF TITEFLEX

3.) Nom 2 in. (51 mm) diam (or smaller) steel flexible metal gas piping. Plastic covering on piping may or may not be removed on both sides of floor or wall assembly.

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3. Firestop System — The firestop system shall consist of the following:

A. Packing Material — Min 4 in. (102 mm) thickness of 4 pcf (64 kg/m<sup>3</sup>) mineral wool batt insulation tightly packed into the opening as a permanent form. Packing material to be recessed from top surface of floor or both surfaces of wall to accommodate the required thickness of fill material.

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 both surfaces of the wall.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or 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

Page: 2 of 2

**System No. C-AJ-2167**

F Rating — 2 Hr	T Rating — 0 Hr
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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/m<sup>3</sup>) concrete. Wall may also be constructed of any UL Classified Concrete Blocks\*. Floor may also be constructed of any min 6 in. (152 mm) thick UL Classified hollow core concrete blocks (CAZT) in the Fire Resistance Directory for names of manufacturers. See Concrete Blocks (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. Through Penetrants — One or more metallic pipe to be installed concentrically or eccentrically within the firestop system. Annular space between penetrant and periphery of opening shall be min 0 in. (point contact) and max 5/8 in. (16 mm). Pipe to be rigidly supported on both sides of floor-ceiling assembly. The following types and sizes of nonmetallic pipes may be used:

A. Polyvinyl Chloride (PVC) Pipe — Nom 2 in. (51 mm) diam (or smaller) Schedule 40 solid or cellular core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.

B. Chlorinated Polyvinyl Chloride (CPVC) Pipe — Nom 2 in. (51 mm) diam (or smaller) SDR13.5 CPVC pipe for use in closed (process or supply) piping systems.

C. Void or Cavity Material\* — Sealant — Min 2 in. (51 mm) thickness of fill material applied within the annulus, flush with bottom surface of floor or with both surfaces of wall. At point contact location, min 1/2 in. (13 mm) diam bead of sealant applied at pipe/concrete interface on bottom surface of floor or both surfaces of wall.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or 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

Page: 2 of 2

**System No. C-AJ-2109**

F Ratings — 2 and 3 Hr (See Item 3)
T Ratings — 0, 2 and 3 Hr (See Items 2 and 3)
W Rating - Class 1 (See Items 2, 3 and 4)
L Rating at Ambient — Less Than 1 CFM/sq ft (See Item 4)
L Rating at 400 F — Less Than 1 CFM/sq ft (See Item 4)

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/m<sup>3</sup>) concrete. Wall may also be constructed of any UL Classified Concrete Blocks\*. Max diam of opening is 12 in. (305 mm). See Concrete Blocks (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. Steel Sleeve — (Optional) - Nom 12 in. (305 mm) diam (or smaller) Schedule 40 (or heavier) steel pipe cast or grouted into floor or wall assembly, flush with floor or wall surfaces a max of 3 in. (76 mm) above the floor. If the steel sleeve extends above the floor, the T Rating of the firestop system is 0 Hr and a min 1/2 in. (13 mm) annular space is required between the through penetrant (Item 3) and the periphery of the opening. The W Rating does not apply when the steel sleeve is used.

3. Through Penetrants — One nonmetallic pipe to be installed either concentrically or eccentrically within the firestop system. For max 6 in. (152 mm) diam pipes, the annular space between the pipe and the periphery of opening shall be min 0 in. (0 mm, point contact) to max 1/2 in. (13 mm). For nom 8 in. (203 mm) and 10 in. (254 mm) diam pipes, the annular space between the pipe and the periphery of opening shall be min 0 in. (0 mm, point contact) to max 1-1/4 in. (32 mm). If the steel sleeve extends above the floor (Item 2), a min 1/2 in. (13 mm) annular space is required between the through penetrant (Item 3) and the periphery of the opening. Pipe to be rigidly supported on both sides of floor or wall assembly. For systems with a W Rating, the max annular space is 1/2 in. (13 mm). The T Ratings are dependent on the size and/or type of pipe as shown in the table below. The following types and sizes of nonmetallic pipes may be used:

A. Polyvinyl Chloride (PVC) Pipe — Nom 10 in. (254 mm) diam (or smaller) Schedule 40 solid core or cellular core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems. For systems with a W Rating, the nom diam of pipe shall not exceed 6 in. (152 mm).

B. Chlorinated Polyvinyl Chloride (CPVC) Pipe — Nom 10 in. (254 mm) diam (or smaller) SDR13.5 CPVC pipe for use in closed (process or supply) piping systems. For systems with a W Rating, the nom diam of pipe shall not exceed 6 in. (152 mm).

C. Acrylonitrile Butadiene Styrene (ABS) Pipe — Nom 6 in. (152 mm) diam (or smaller) Schedule 40 solid core or cellular core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.

D. Flame Retardant Polypropylene (FRPP) Pipe — Nom 6 in. (152 mm) diam (or smaller) Schedule 40 solid core or cellular core FRPP pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.

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Hilti Firestop Systems

Page: 1 of 2

**System No. C-AJ-3283**

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating - 2 Hr	F Rating - 2 Hr
T Rating - 0 and 1/2 Hr (See Item 2)	FT Ratings - 0 and 1/2 Hr (See Item 2)
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 Ratings - 0 and 1/2 Hr (See Item 2)
	L Rating At Ambient - Less Than 1 CFM (See Item 2)
	L Rating At 400 F - Less Than 1 CFM (See Item 2)

4. Fill, Void or Cavity Material\* — Sealant — Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with top or bottom surface of floor or both surfaces of wall. Sealant is optional for pipes having a max diam of 6 in. (152 mm) and sleeve openings. For systems with W Rating and/or L Rating, min 1/2 in. (13 mm) thickness of CP 601S, CFS-S SIL GG, CFS-S SIL SL (1/2 in. (13 mm) or CP 604 Sealant shall be applied within the annulus, flush with top or bottom surface of floor.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant, FS-ONE MAX Intumescent Sealant, CP 601S Sealant, CFS-S SIL GG, CFS-S SIL SL (floors only) or CP 604 Sealant

4A. Packing Material (not shown) — Min 1/2 in. (13 mm) thickness of 4 pcf (64 kg/m<sup>3</sup>) mineral wool batt insulation firmly packed into annular space and recessed from the top surface of floor to accommodate the required thickness of fill material. Required only when CP 604 Sealant is used.

5. Firestop Deviator\* — Firestop Collar — Firestop collar to be installed in accordance with the accompanying installation instructions. Collar to be installed and latched around the pipe and secured to min 1/2 in. (13 mm) thick concrete or masonry on both sides of wall using the anchor hooks provided with the collar. Minimum two anchor hooks are required for nom 1-1/2 in. (38 mm) diam pipes. Minimum three anchor hooks required for nom 3 in. (76 mm) and 4 in. (102 mm) diam pipes. Minimum four anchor hooks required for nom 6 in. (152 mm) diam pipes. Minimum ten anchor hooks required for nom 8 in. (203 mm) diam pipes. Minimum twelve anchor hooks required for nom 10 in. (254 mm) diam pipes. The anchor hooks are to be secured with min 1/4 in. (6 mm) diam by min 1/4 in. (32 mm) long expansion bolts or min 0.145 in. (3.7 mm) diam by 1-1/4 in. (32 mm) long powder coated fasteners as specified in Table 1. (3) 1/4 in. (32 mm) diam by 1-1/4 in. (32 mm) long powder coated fasteners. As alternate to the anchors specified above, Hilti 1/4 in. (32 mm) diam by 1-1/4 in. (32 mm) long KWIK-LOCK 3 steel expansion anchors or Hilti X-DINI 27 P8 S15 powder actuated floor pin with integral nom 9/16 in. (15 mm) diam washer may be used.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 643N 5011 5', CP 643N 632', CP 643N 903', CP 643N 1104', CP 643 1606', CP 644 2008', CP 644 25010' Firestop Collar

\* 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

Page: 2 of 2

**System No. C-AJ-3283**

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating - 2 Hr	F Rating - 2 Hr
T Rating - 0 and 1/2 Hr (See Item 2)	FT Ratings - 0 and 1/2 Hr (See Item 2)
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 Ratings - 0 and 1/2 Hr (See Item 2)
	L Rating At Ambient - Less Than 1 CFM (See Item 2)
	L Rating At 400 F - Less Than 1 CFM (See Item 2)

1. Floor or Wall Assembly — Min 2-1/2 in. (64 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m<sup>3</sup>) concrete. Wall may also be constructed of any UL Classified Concrete Blocks\*. Opening in floor or wall to be max 3 in. (76 mm) diam for 2" device and max 5 in. (127 mm) diam for 4" device.

See Concrete Blocks (CAZT) category in the Fire Resistance Directory for names of manufacturers.

1A. Floor Assembly — (Not Shown) — As an alternate to Item 1, fire-rated unprotected concrete and steel floor assembly may be used. Floor assembly to be constructed of the materials and in the manner described in the individual D900 Series Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:

A. Concrete — Min 2-1/2 in. (64 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m<sup>3</sup>) concrete.

B. Steel Floor and Form Units — Composite or noncomposite max 3 in. (76 mm) deep fluted galv units as specified in the Individual Floor-Ceiling design. Opening in floor or wall to be max 3 in. (76 mm) diam for 2" device and max 5 in. (127 mm) diam for 4" device.

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Hilti Firestop Systems

Page: 1 of 2

**System No. C-AJ-3283**

L Rating, CFM/Sq Ft	L Rating, CFM
Ambient	400°F
400°F	Ambient
400°F	400°F

2. Cables — Within the loading area for the firestop device, the cables may represent 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 40 AWG Type RHH ground cable.

D. Max 4 pr No. 22 AWG Cat 6 computer cables.

E. Max 63 6/0 coaxial cable with fluorinated ethylene insulation and jacketing.

F. Fiber optic cable with polyvinyl chloride (PVC) or polyethylene (PE) jacket and insulation having a max diam of 1/2 in. (13 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.

J. Through Penetrating Product\* — Any Cables, Metal-Clad Cable+ or Armored Cable+ currently Classified under the Through Penetrating Products category.

See Through Penetrating Product (XHLY) category in the Fire Resistance Directory for names of manufacturers.

K. Max 3/C No 12 AWG MC Cable.

The T, FT and FTH Ratings for the firestop system are 1/2 hr except that when cable types 2J or 2K are used, the T, FT and FTH Ratings are 0 hr. See Table below for L Ratings.

3. Firestop Deviator\* — 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. The annular space between the device and the periphery of the opening shall be min 0 in. (point contact). Device provided with flanges that are spun clockwise into device threads, over gasket material butting tightly to top side of floor or both sides of wall. In floors, when FS-ONE Sealant is used and installed flush with bottom of floor, device flange shall be threaded tightly to bottom side of floor. In floors, device flange to be secured to floor with min two 1-1/4 in. (32 mm) long steel masonry screws or anchors. As an alternate to gasket material, sealant (Item 4) may be used.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 653 and CP 653 A 2" Speed Sleeve, CP 653 and CP 653 BA 4" Speed Sleeve

4. Fill, Void or Cavity Material\* — As an alternate to gasket material (see Item 3), min 1/2 in. (13 mm) thickness of fill material applied within the annulus between firestop device and periphery of opening, flush with top surface of floor or both sides of wall. As an option, when FS-ONE Sealant is used, the fill material can be installed flush with bottom of floor. For L Ratings when sealant is used, an additional 1/4 in. (6 mm) bead of fill material is applied at the device/floor or device/wall interface on top or bottom side of floor or both sides of wall assembly prior to installing flanges.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 618 Firestop Putty, FS-ONE Sealant or 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

Page: 2 of 2

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**HILTI FIRESTOP DETAILS**

**HOLIDAY INN EXPRESS & SUITES**

INTERSECTION OF HAYNES PLACE & LAMM RD.  
WILSON, NC 27789

STATUS: BIDDING

PROJ. DATE: 06-07-19

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CHECKED BY: TGC

SHEET NO. A909

SCALE: 12" = 1'-0"



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