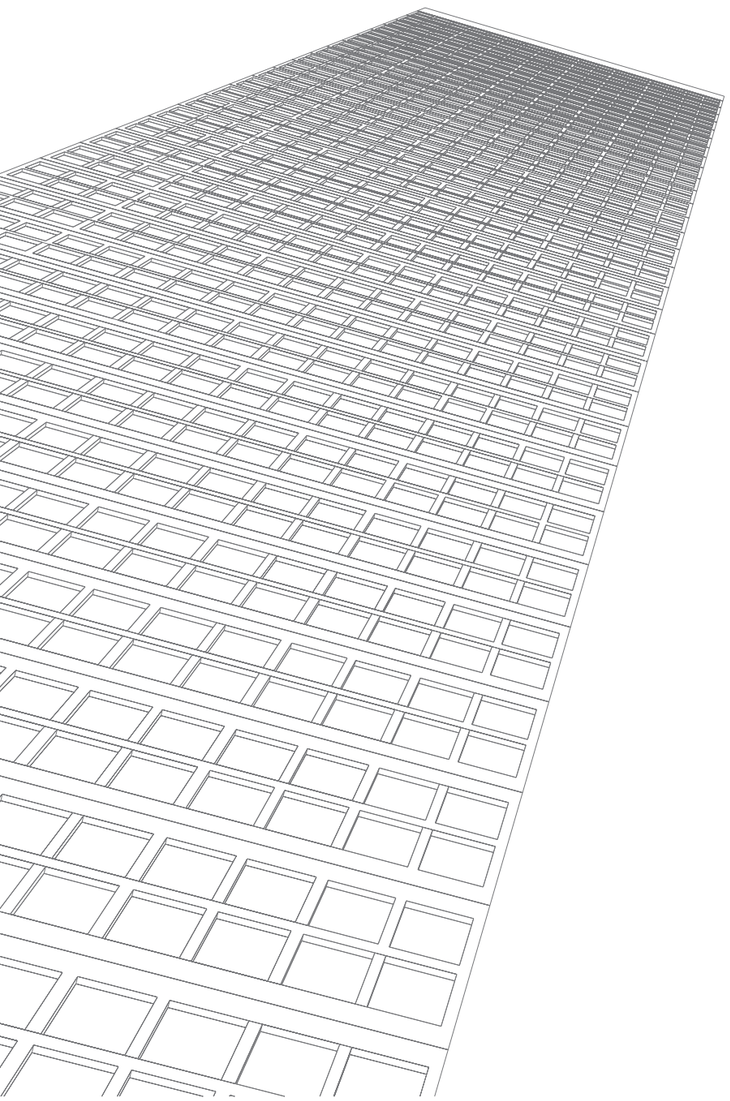
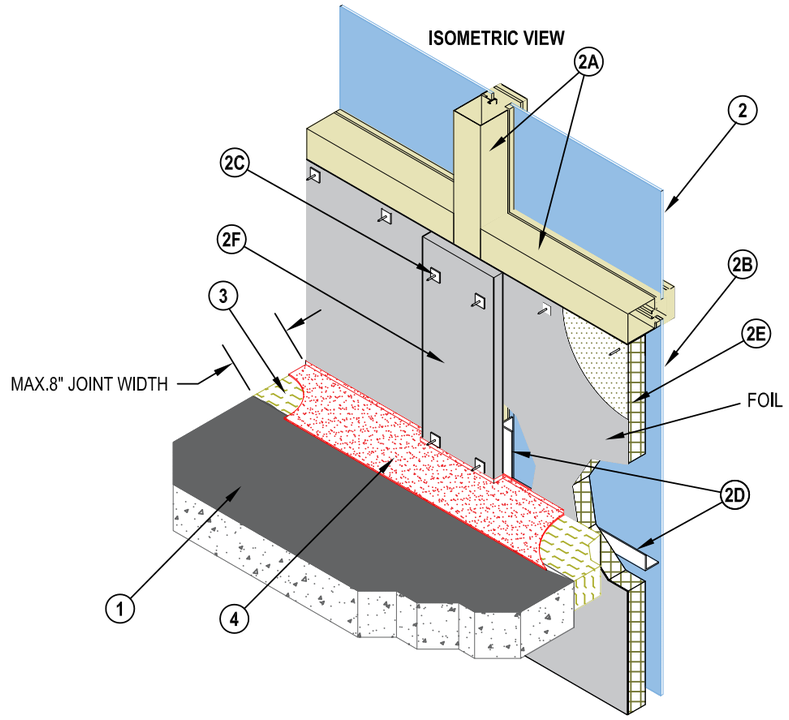
CONTENT AND OVERVIEW OF THIS SECTION



5 FIRESTOP SYSTEMS & TYPICALS
A. TYPICALS

TYPICAL FIRESTOP DETAIL FOR PERIMETER JOINT
F-RATING = 1-HR. OR 2-HR. OR 3-HR.
MOVEMENT CAPABILITIES - 10% - 15% COMPRESSION OR EXTENSION



ITEM NO.	ITEM DESCRIPTION
1	CONCRETE FLOOR ASSEMBLY (1-HR. OR 2-HR. OR 3-HR. FIRE-RATING).
2	CURTAIN WALL ASSEMBLY (NON-FIRE RATED).
2A	ALUMINUM FRAMING : HORIZONTAL TRANSOMS & VERTICAL MULLIONS.
2B	SPANDREL PANEL : GLASS OR ALUMINUM OR STONE PANEL.
2C	STEEL IMPALING PINS.
2D	REINFORCING STEEL ANGLE.
2E	CURTAIN WALL MINERAL WOOL INSULATION *.
2F	VERTICAL MULLION MINERAL WOOL COVER *.
3	COMPRESSED MINERAL WOOL AS BACKING MATERIAL *.
4	HILTI CFS-SP WB FIRESTOP JOINT SPRAY OR CFS-SP SIL SILICONE JOINT SPRAY *

* **LISTED WITH UL OR INTERTEK .**

Notes:

- The application limitations on this detail are for guidance purpose only. For further details, refer to Hilti Firestop specialist.

- The application including firestop system has been tested as per ASTM-E 2307 Standard.

- All installations shall be carried out in accordance with Hilti's installation instructions, by competent and experienced installers using Hilti branded products.

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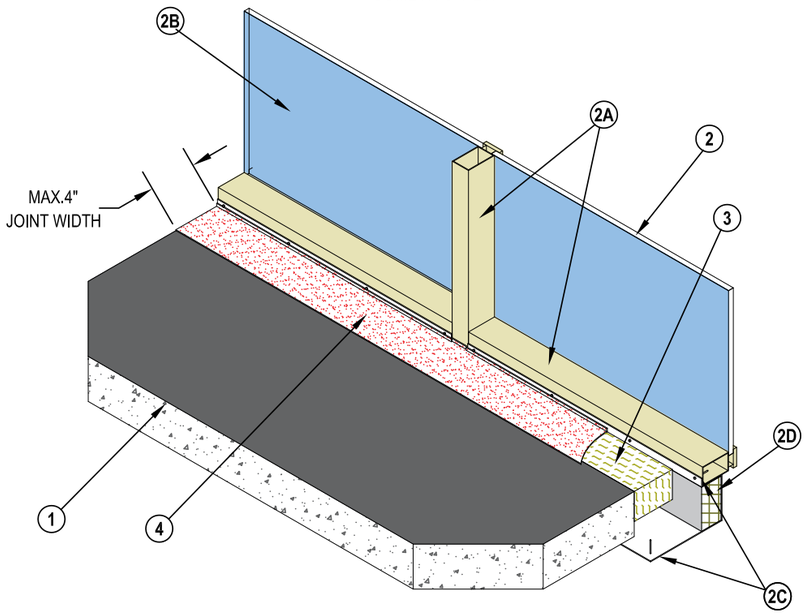
TYPICAL FIRESTOP DETAIL FOR PERIMETER JOINT
F-RATING = 2-HR.
MOVEMENT CAPABILITIES - STATIC SYSTEM

ISOMETRIC VIEW



ITEM NO.	ITEM DESCRIPTION
1	CONCRETE FLOOR ASSEMBLY (2-HR. FIRE-RATING).
2	CURTAIN WALL ASSEMBLY (NON-FIRE RATED).
2A	ALUMINUM FRAMING : HORIZONTAL TRANSOMS & VERTICAL MULLIONS.
2B	GLASS PANEL.
2C	GALVANIZED SHEET METAL PAN: MIN. 18 GA GALVANIZED STEEL SECTION FIXED TO THE ALUMINUM FRAMING AND TO THE CONCRETE FLOOR.
2D	CURTAIN WALL MINERAL WOOL INSULATION *.
3	COMPRESSED MINERAL WOOL AS BACKING MATERIAL *.
4	HILTI CFS-SP WB FIRESTOP JOINT SPRAY OR CFS-SP SIL SILICONE JOINT SPRAY *

*** LISTED WITH UL OR INTERTEK.**

Notes:

- The application limitations on this detail are for guidance purpose only. For further details, refer to Hilti Firestop specialist.

- The application including firestop system has been tested as per ASTM-E 2307 Standard.

- All installations shall be carried out in accordance with Hilti's installation instructions, by competent and experienced installers using Hilti branded products.

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FIRESTOP SYSTEMS & TYPICALS
B. SYSTEMS

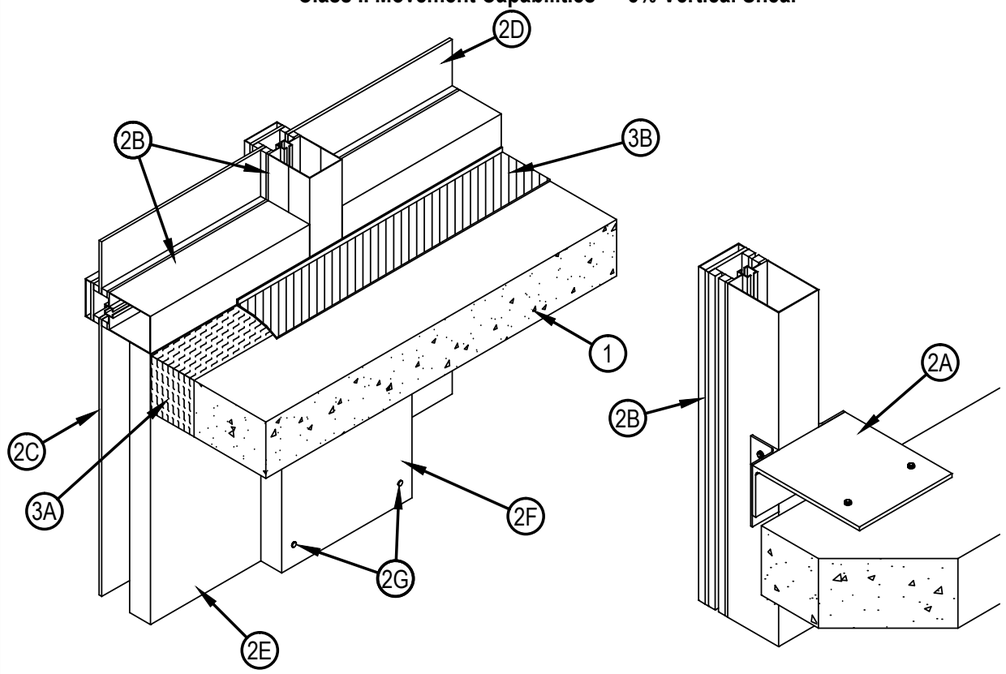
Overview of selected perimeter fire barrier systems

CWD 1015

System No. CW-D-1015

F Rating — 2 Hr
T Rating — 1/2 Hr
Linear Opening Width — 4 In. Max
L Rating At Ambient — Less Than 1 CFM/sq ft
L Rating At 400 F — Less Than 1 CFM/sq ft
Class II Movement Capabilities — 5% Vertical Shear

Classified by
Underwriters Laboratories, Inc.
to ASTM E2307



1. Floor Assembly — Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) structural concrete.
2. Curtain Wall Assembly — The curtain wall assembly shall incorporate the following construction features:
   A. Mullion Mounting Brackets — Min 3 in. (76 mm) by 3 in. (76 mm) by 1/4 in. steel angles attached through the mullion on each side with min 3/8 in. (10 mm) diam steel bolts with steel nuts and washers. The brackets are attached to a min 8 in. (203 mm) by 3-1/4 in. (83 mm) by 1/2 in. (13 mm) thick steel angles with a min 4 in. (51 mm) long with min 1/2 in. (13 mm) diam steel bolts with steel nuts and washers. The 8 in. (203 mm) by 3-1/4 in. (83 mm) angle is secured to the top of floor with two min 1/2 in. (13 mm) diam steel masonry anchors in conjunction with steel washers.
   A1. Mullion Mounting Brackets — As an alternate to Item 2A, min 8 in. (203 mm) wide by 3/4 in. (19 mm) thick extruded aluminum Halfen mounting brackets with one nom 2 in. (51 mm) high leg for support and attachment of mullion and with one leg at least 6 in. (152 mm) longer than width of linear opening between floor assembly and mullion. Mounting bracket attached to top of floor with two min 1/2 in. (13 mm) diam steel masonry anchors in conjunction with washer plates supplied with mounting bracket.

Hilti Firestop Systems

CWD 1015

System No. CW-D-1015

B. Framing — The two-piece rectangular tubing mullions (vertical members) and transoms (horizontal members) shall be min 2-1/2 in. (64 mm) wide by 7-1/2 in. (191 mm) deep and shall be formed from min 0.100 in. (2.5 mm) thick aluminum. Mullions spaced max 60 in. (1.52 m) OC and secured to mullion mounting brackets (Item 2A) at each floor level. Interior face of mullions to be max 4 in. (102 mm) from edge of floor assembly. Transoms to be spaced min 24 in. (610 mm) OC. The minimum height from the top of the floor to the bottom of the vision panel sill is 0 in. The maximum height from the top of the floor to the bottom of horizontal transom is 3 in. (76 mm).

C. Spandrel Panels — The spandrel panels shall consist of one of the following types:
   a. Glass Panels — Nom 1/4 in. (6 mm) thick opaque heat-strengthened glass. Each panel secured in position with aluminum pressure plates in conjunction with glazing gaskets and steel screws.
   b. Aluminum Panels — Nom 1/8 in. (3 mm) thick aluminum panels with 1/4 in. (6 mm) thick edges. Each panel secured in position with aluminum pressure plates in conjunction with gaskets and steel screws.
   c. Stone Panels — Nom 1-3/16 in. (46 mm) thick polished granite spandrel panels with 1 in. (25 mm) thick gauged edges. Each panel secured in position with aluminum pressure plates in conjunction with gaskets and steel screws.

D. Vision Panels — Nom 1/4 in. (6 mm) thick transparent heat-strengthened glass or nom 1 in. (25 mm) thick insulated glass units with two layers of nom 1/4 in. (6 mm) thick transparent heat-strengthened glass separated by a 1/2 in. (25 mm) air space. Each panel secured in position with aluminum pressure plates in conjunction with glazing gaskets and steel screws.

E. Curtain Wall Insulation* — Min. 2 in. (51 mm) thick mineral wool batt insulation faced on one side with aluminum foil/scrim vapor retarder. Impasse® Horizontal Hangers are installed in the insulation batt 6 in. (152 mm) from each mullion end and spaced max 16 in. (406 mm) OC across at the window sil transom. One Impasse® Vertical Hanger is installed along both vertical mullion sides of the insulation batt at 6 in. (152 mm) up from the bottom of the insulation batt. Insulation batt is then installed in spandrel area flush with the interior surface of the framing with no vertical or horizontal seams. Impasse® Horizontal Hangers are screw attached to top horizontal transom, Impasse® Vertical Hangers are screw attached to vertical mullions using min No. 10 by min. 1/2 in. (13 mm) self-drilling/self-taping screws. No attachment to the lower horizontal transom is required.
   THERMAFIBER INC — FIRESPAN® 90

F. Mullion Covers - Curtain Wall Insulation* — Nom 2 in. (51 mm) thick mineral wool batt insulation faced on one side with aluminum foil/scrim vapor retarder, supplied in min 24 by 48 in. (610 by 1219 mm) boards. Min. 12 in. (305 mm) wide strips to be centered over mullions secured to curtain wall insulation (Item 2E) with a min. of four Spiral Anchors (Item 2G) spaced a max 12 in. (305mm) OC. Mullion covers to tightly abut the bottom of the forming material (Item 3A).
   THERMAFIBER INC — FIRESPAN® 90

G. Light Gauge Framing* - Spiral Anchor — Galv steel wire spiral anchors used to secure the curtain wall insulation (Item 2F and 2G). Nom length of spiral anchors to be 3-3/4 in. (95 mm), spaced max 12 in. (305 mm) OC.
   THERMAFIBER INC — Spiral Anchor

3. Safing System — Max separation between edge of floor assembly and face of framing members (at time of installation) is 4 in. (102 mm). The safing system is designed to accommodate vertical shear movement up to a max of 5 percent of its installed width. The safing system shall incorporate the following construction features:
   A. Forming Material* — Nom 4 pcf (64 kg/m3) density mineral wool batt insulation. Batt sections cut to a 4 in. (102 mm) width and stacked to a thickness which is min 25 percent greater than the width of the linear gap between the curtain wall insulation and the edge of the concrete floor slab. The forming material is compressed and inserted cut-edge-first into linear gap such that its top surface is flush with the top surface of the floor assembly. A max of one tightly-butted seam is permitted between mullions. Additional piece of forming material to be friction-fit into gap between batt sections above mullion mounting clip at each mullion location.
   THERMAFIBER INC — SAF
   B. Fill, Void or Cavity Material* — Min 1/8 in. (3 mm) wet thickness (min 1/16 in. (1.5 mm) dry thickness) of fill material spray-applied over top of forming material and lapping min 1/2 in. (13 mm) onto the top surface of the floor and onto the curtain wall insulation (Item 2E) and mullion covers (Item 2F). When CFS-SP SIL is used, min wet (and dry) thickness of spray is 2 mm.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CFS-SP WB Firestop Joint Spray and CP 672 FC Firestop Joint Spray, CFS-SP SIL Firestop Silicone Joint Spray

*Bearing the UL Classification Mark

Hilti Firestop Systems

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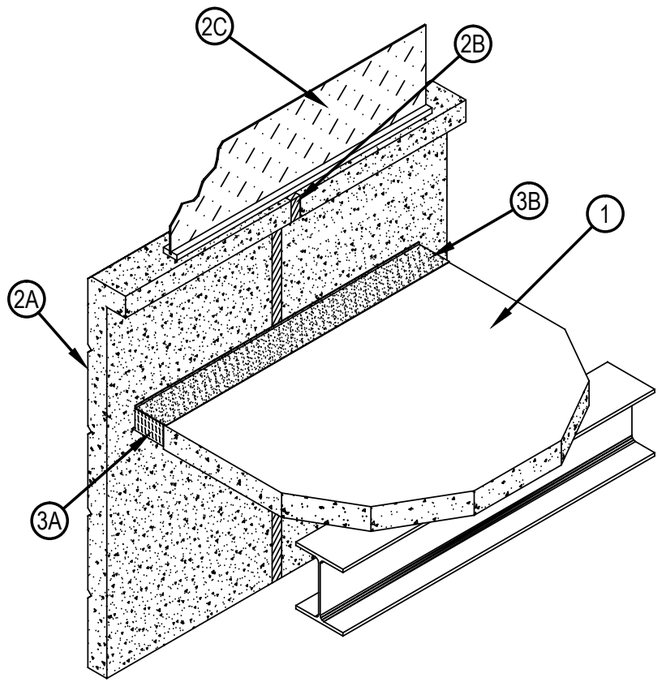
May 30, 2014

CLASSIFIED
Classified by
Underwriters Laboratories, Inc.
to ASTM E2307

System No. CW-D-1018

F Rating — 3 Hr
T Rating — 1/4 Hr
Linear Opening Width - 3 In. Max
Class II Movement Capabilities - 5% Vertical Shear (See Item 3)

CWD 1018



1. Floor Assembly — Min 5 in. (127 mm) thick steel-reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) structural concrete. Floor assembly to be supported at perimeter edges by spandrel beams having a Restrained or Unrestrained Beam Rating of 3 hr.

System No. CW-D-1018

CWD 1018

2. Curtain Wall Assembly — The curtain wall assembly shall incorporate the following construction features:
   A. Spandrel Panels — Min 36 in. (914 mm) high by min 4 in. (102 mm) thick steel-reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) structural concrete spandrel panels. Wall may also consist of min 4 in. (102 mm) thick steel-reinforced lightweight or normal weight concrete tilt-up panels with a min 36 in. (914 mm) vertical separation between window openings. Panels provided with steel dead load anchors welded to steel reinforcing bars embedded in the concrete for attachment to the steel columns and spandrel beams. Panels also provided with steel lateral anchors or braces. The dead load anchors which are located in the linear gap between the concrete floor slab and the spandrel panel or tilt-up panel are to be spaced max 72 in. (1829 mm) OC. The top of the dead load anchor is to be recessed min 1/2 in. (13 mm) from top surface of floor.
   B. Joint System — (Not Shown) — Vertical joints between spandrel panels or tilt-up panels to be protected using Joint System No. WW-S-0042.
   C. Framed Window — Metal framed window with nom 1/4 in. (6 mm) thick heat-strengthened glass. Sill of window to be min 6 in. (152 mm) above top of floor.
3. Safing System — Max separation between edge of floor assembly and concrete spandrel or tilt-up panel is 3 in. (76 mm). The safing system is designed to accommodate vertical shear movement of up to 5 percent of its installed width. The safing system shall incorporate the following construction features:
   A. Forming Material* — Nom 4 pcf (64 kg/m3) density mineral wool batt safing material to be installed between the concrete spandrel or tilt-up panel and the edge of the concrete floor slab. Safing material to be cut to a min 4-3/4 in. (121 mm) width and stacked to a thickness which is at least 25 percent greater than the width of the linear gap between the concrete spandrel or tilt-up panel and the edge of the concrete floor slab. The safing material is compressed and inserted cut-edge-first into the linear gap such that its top surface is flush with the top surface of the floor assembly. A max of one tightly-butted seam is permitted between dead load anchors. An additional min 1/2 in. (13 mm) thick piece of mineral wool batt safing material to be installed to cover top surface of each dead load anchor.
   THERMAFIBER INC — SAF
   B. Fill, Void or Cavity Material* — Min 1/8 in. (3.2 mm) wet thickness (1/16 in. or 1.6 mm dry) of fill material spray-applied over top of forming material and lapping min 1 in. (25 mm) onto the top surface of the concrete floor and onto the concrete spandrel panel or tilt-up panel. When CFS-SP SIL is used, min wet (and dry) thickness of spray is 2 mm.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 672 FC Firestop Joint Spray, CFS-SP SIL Firestop Silicone Joint Spray or CFS-SP WB Firestop Joint Spray

*Bearing the UL Classification Mark

Hilti Firestop Systems

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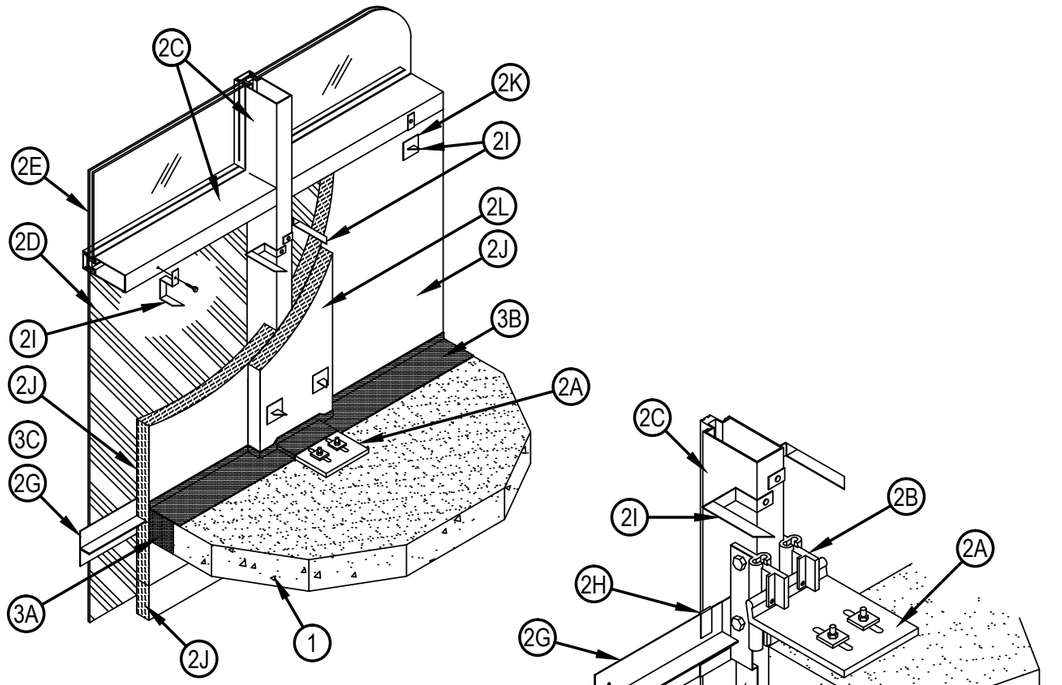
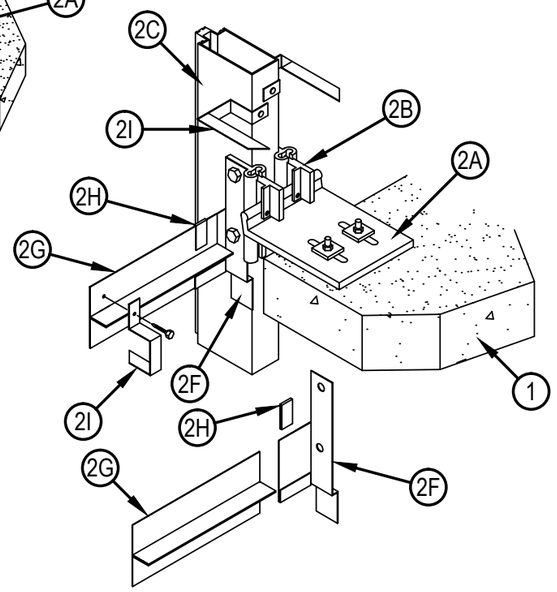
CWD 2046

System No. CW-D-2046

F Rating — 2 Hr
T Rating — 1/4 Hr
Integrity Rating — 2 Hr
Insulation Rating — 1/4 Hr
Linear Opening Width — 4 In. Max
Class II Movement Capabilities - 5% Vertical Shear (See Item 3)

Classified by
Underwriters Laboratories, Inc.
to ASTM E2307





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Hilti Firestop Systems

CWD 2046

System No. CW-D-2046

1. Floor Assembly — Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) structural concrete.
2. Curtain Wall Assembly — The curtain wall assembly shall incorporate the following construction features:
   A. Mullion Anchor Plates — Nom 7 in. (178 mm) wide by 9-1/4 in. (235 mm) long by 5/8 in. (16 mm) thick extruded aluminum plates with a nominal 1-3/4 in. (44 mm) high raised lip along one end to engage hooked ends of mullion mounting clips (Item 2B). Plates anchored to top surface of floor at each mullion location with steel wedge anchor bolts in conjunction with extruded aluminum washers.
   B. Mullion Mounting Clips — Nominal 3 in. (76 mm) wide by 7 in. (178 mm) high extruded aluminum anchor slides with tapped holes and with separate extruded aluminum hooks designed to engage the raised lip of the anchor plate (Item 2A). Anchor slides bolted to each side of mullion at each floor with 1/2 in. (13 mm) diam stainless steel screws with locking washers. Anchor hooks secured to anchor slides with steel jacking screws and secured to raised lip of anchor plate with steel set screw.
   C. Framing — The one-piece or split rectangular tubing mullions (vertical members) and transoms (horizontal members) shall be min 2-1/2 in. wide by 6 in. deep and shall be formed from min 0.125 in. (3.2 mm) thick aluminum. Mullions spaced max 60 in. (1524 mm) OC and secured to mullion anchor plates (Item 2A) with mounting clips (Item 2B) at each floor level. Interior face of mullions to be max 4 in. (102 mm) from edge of floor assembly. Transoms to be spaced min 69 in. (1753 mm) OC. The minimum height from the top of the floor to the bottom of the vision panel sill is 33 in. (838 mm).
   D. Spandrel Panels — The spandrel panels shall consist of one of the following types:
      a. Glass Panels — Nom 1/4 in. (6 mm) thick opaque heat-strengthened glass. Each panel secured in position with aluminum pressure plates in conjunction with glazing gaskets and steel screws.
      b. Aluminum Panels — Nom 1/8 in. (3 mm) thick aluminum panels with 1/4 in. (6 mm) thick edges. Each panel secured in position with aluminum pressure plates in conjunction with gaskets and steel screws.
      c. Stone Panels — Nom 1-3/16 in. (46 mm) thick polished granite spandrel panels with 1 in. (25 mm) thick gauged edges. Each panel secured in position with aluminum pressure plates in conjunction with gaskets and steel screws.
   E. Vision Panels — Nom 1 in. (25 mm) thick insulated glass units with two layers of nom 1/4 in. (6 mm) thick transparent heat-strengthened glass separated by a 1/2 in. (13 mm) air space. Each panel installed on silicone rubber setting blocks and secured in position with aluminum pressure plates in conjunction with glazing gaskets and steel screws.
   F. Light Gauge Framing* - T-Bar Support Brackets — Nom 2 in. (51 mm) wide brackets formed from galv steel and designed to bridge extruded aluminum anchor slides of mullion mounting clips (Item 2B). Each T Bar support bracket provided with nominal 3 in. (76 mm) wide by 3 in. (76 mm) high leg with a nominal 3/4 in. (19 mm) hemmed edge to receive the bottom edge of the T-Bar (Item 2G). T Bar support bracket secured to each side of mullion using the same bolts used to attach the anchor slides of the mullion mounting clips. The hemmed edge of the T Bar support bracket is to be located 3-1/2 in. (89 mm) below the top surface of the floor slab such that, when installed, the stem of the T Bar (Item 2G) will be located 2 in. below the top plane of the floor slab. Angle of T Bar support bracket to be recessed from interior face of framing as necessary to accommodate the thickness of the curtain wall insulation (Item 2J).
      THERMAFIBER INC
   G. Light Gauge Framing* - T-Bar — Nom 3 in. (76 mm) wide by 1-1/2 in. (38 mm) high tee section formed from galv steel. T Bar installed between mullions at each floor level to restrain curtain wall insulation (Item 2J) against outward movement when forming material (Item 3A) is installed. The T Bar shall be installed with a clearance of 1/2 to 3/4 in. (13 to 19 mm) at each end. The bottom edge of the T Bar shall rest in and be supported by the hemmed edge of the T Bar support bracket (Item 2F) at each end. The top edge of the T Bar shall be locked in place with a locking clip (Item 2H) at one end and by a min No. 10 by 1/2 in. (13 mm) long self-drilling, self-tapping steel screw at the opposite end. Each T Bar shall be located with its stem at an elevation 2 in. (51 mm) below the top plane of the floor.
      THERMAFIBER INC
   H. Light Gauge Framing* - T-Bar Locking Clip — Nom 1 by 1-1/4 in. (25 to 32 mm) clips formed from galv steel and designed to lock top of T Bar (Item 2G) to T Bar support brackets (Item 2F).
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Hilti Firestop Systems

CWD 2046

System No. CW-D-2046

I. Light Gauge Framing* - Vertical and Horizontal Hangers — Vertical and horizontal hangers formed from 1 in. (25 mm) wide galv steel strips, supplied in two configurations with length as needed to accommodate thickness of curtain wall insulation (Item 2J) and mullion cover (Item 2L). Vertical hangers (with 90 deg twist) screw-attached to interior face of mullions with No. 10 by min 1/2 in. (13 mm) long self-drilling, self-tapping steel screws. Vertical hangers on mullions to be located near each corner of each piece of curtain wall insulation except for the nominal 7 to 9 in. (178 to 229 mm) high piece of curtain wall insulation located immediately beneath the stem of the T Bar. The 7 to 9 in. (178 to 229 mm) high piece of curtain wall insulation immediately beneath the stem of the T Bar requires only one vertical hanger near its\' midheight at each end. Horizontal hangers (without twist) screw-attached to T Bar (Item 2G) and to transom at top of spandrel panel (sill of vision panel) with No. 10 by min 1/2 in. (13 mm) long self-drilling, self-tapping steel screws. Horizontal hangers on T Bar to be located within 6 in. (152 mm) of mullion at each end and spaced max 16 in. (406 mm) OC. Horizontal hanger on transom at top of spandrel panel to be located at center of transom. No hangers are to be used on the transom at the bottom of spandrel panel (lintel of vision panel).
THERMAFIBER INC

J. Curtain Wall Insulation* — Min 2 in. (51 mm) thick mineral wool batt insulation faced on one side with aluminum foil/scrim vapor retarder, supplied in min 36 in. (914 mm) wide batts. Insulation batts to be installed with no vertical seams. A horizontal seam is to be located 7 to 9 in. (178 to 229 mm) below the stem of the T Bar in each spandrel area and is to be sealed with aluminum foil tape. In the spandrel area beneath the stem of the T Bar, insulation panels tightly-fitted between vertical mullions and between the stem of the T Bar (Item 2G) and the transom, flush with the interior surface of framing. Insulation panels impaled on vertical and horizontal hangers (Item 2I) and secured in place with nom 2 by 2 in. (51 by 51 mm) steel locking washers (Item 2K).
THERMAFIBER INC — Firespan 90

K. Light Gauge Framing* - Locking Washers — Nom 2 by 2 in. (51 by 51 mm) clips formed from galv steel and designed to secure curtain wall insulation and mullion covers on vertical and horizontal hangers (Item 2I).
THERMAFIBER INC

L. Mullion Covers - Curtain Wall Insulation* — Nom 2 in. (51 mm) thick mineral wool batt insulation faced on one side with aluminum foil/scrim vapor retarder, supplied in min 24 by 48 in. (610 by 1219 mm) boards. Nom 12 in. (305 mm) wide strips to be centered over mullions and impaled on the same vertical hangers used to secure the spandrel panel insulation and secured in place with nom 2 by 2 in. (51 by 51 mm) locking washers (Item 2K). Mullion covers to abut the forming material (Item 3A) above and below the floor.
THERMAFIBER INC — Firespan 90

M. Light Gauge Framing* - Spiral Anchor — (Not Shown) - As an alternate to the vertical hangers (Item 2I), galv steel wire spiral anchors may be used to secure the framing covers (Item 2L) to the curtain wall insulation (Item 2J) on each side of the mullion. Nom length of spiral anchors to be equal to thickness of curtain wall insulation plus thickness of framing cover. Spiral anchors driven through mullion covers and into curtain wall insulation and spaced max 12 in. (305 mm) OC.
THERMAFIBER INC

3. Safing System — Max separation between the edge of the floor and the face of the framing members (at time of installation) is 4 in. (102 mm). The safing system is designed to accommodate vertical shear movement up to a max of 5 percent of its installed width. The safing system shall incorporate the following construction features:

A. Forming Material* — Nom 4 pcf (64 kg/m3) density mineral wool batt insulation. Batt sections cut to a min 4-1/2 in. (114 mm) width and stacked to a thickness which is min 25 percent greater than the width of linear gap between the curtain wall insulation and the edge of the concrete floor slab to attain a min 20 percent compression in the thickness direction. The forming material is compressed and inserted cut-edge-first into the linear gap such that its top surface is flush with the top surface of the floor assembly. Forming material to extend completely beneath mullion mounting plate (Item 2A). A max of two tightly-butted seams are permitted in the forming material between mullions.
THERMAFIBER INC — Type SAF

B. Fill, Void or Cavity Material* — Min 1/8 in. (3.2 mm) wet thickness (min 1/16 in. or 1.6 mm dry thickness) of fill material spray-applied over top of forming material and lapping min 1/2 in. (13 mm) onto the top surface of the floor and onto the curtain wall insulation, mullion anchor plate (Item 2A) and framing covers. When CFS-SP SIL is used, min wet (and dry) thickness of spray is 2 mm.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 672 FC Firestop Joint Spray, CFS-SP SIL Firestop Silicone Joint Spray or CFS-SP WB Firestop Joint Spray

*Bearing the UL Classification Mark

Hilti Firestop Systems

CEJ 307 P

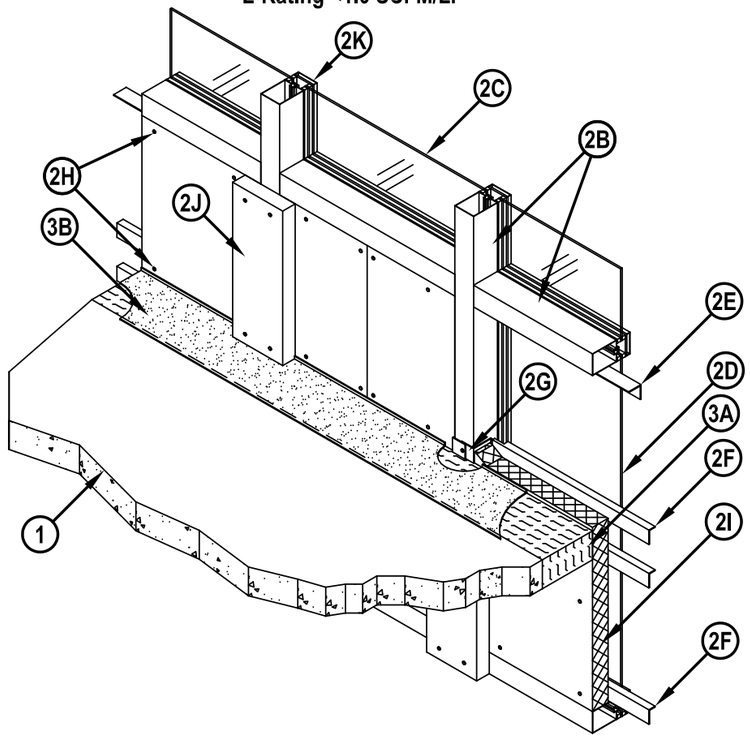
Design No. CEJ 307 P (HI/BP 180-01)

PERIMETER FIRE BARRIER SYSTEM

Hilti, Inc.
ASTM E 2307
Table 1

	FIRESTOP JOINT SPRAY CFS-SP WB	SILICONE JOINT SPRAY CFS-SP SIL
F-RATING	3-HR.	3-HR.
T-RATING	1 3/4-HR.	1 3/4-HR.
APPLICATION THICKNESS	1/8" WET FILM (1/16" DRY)	2mm (0.079") WET FILM
CYCLING (%) HORIZONTAL VERTICAL SEE NOTE 1	± 11.25 ± 5	± 7.5 ± 5

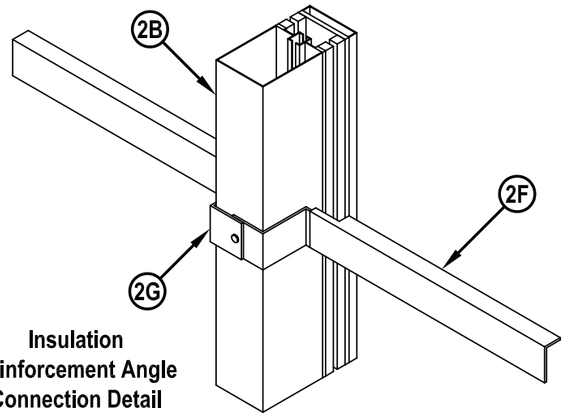
L-Rating <1.0 SCFM/LF



Hilti Firestop Systems

Design No. CEJ 307 P (HI/BP 180-01)

CEJ 307 P



Insulation Reinforcement Angle Connection Detail

1. CONCRETE FLOOR ASSEMBLY: Two-hour rated concrete floor assembly made from either lightweight or normal weight concrete with a density of 100-150 pcf, with a min. thickness of 4-1/2 in. at the joint face. Overall slab thickness may vary to accommodate various blockout depths (longitudinal recesses) formed in the concrete, to house the architectural cover plate. The blockout width may also vary without restriction.
2. CURTAIN WALL ASSEMBLY: The curtain wall assembly shall incorporate the following construction features:
   A. Mounting Attachment: (Not shown) Attachment of the curtain wall framing to the structural framing shall be according to the curtain wall manufacturer's instructions to allow vertical shear movement only. When required, the mounting attachments to the floor slab shall be connected to the joint face of the floor slab, according to the curtain wall manufacturer's instructions. Max. distance between mounting attachments shall be 10 feet. One optional method is to use min. 8 in. wide by 3/4 in. thick extruded aluminum Halfen mullion mounting brackets with one nom. 2 in. high leg for support and attachment to the mullion and with one leg at least 6 in. longer than nominal joint width. Attach the mounting bracket to the top of the floor with two min. 1/2 in. dia. steel masonry anchors in conjunction with washer plates supplied with the mounting brackets.
   B. Aluminum Framing: Rectangular aluminum tubing mullions and transoms, sized according to the curtain wall system manufacturer's guidelines. Min. overall dimensions of the extruded framing sections are 0.100 in. thick aluminum with a min. 5-1/4 in. depth and a min. of 2-1/2 in. width. Mullion and Transom covers are added to the external side of the framing, giving the framing system a total depth of min. 6-3/4 in. Mullions are to be spaced a min. 56-1/2 in. on center (oc) and transoms are to be spaced a min. 49 in. oc For the spandrel region, the lower transom must be placed a min. of 21 in. below the concrete floor (as measured from the underside of the floor to the top side of the transom) and the upper transom must be placed a min. of 21-1/2 in. above the floor (as measured from the top surface of the floor to the underside of the transom) while maintaining the min. 46-1/2 in. spandrel panel height. One optional fastening method is to space the mullions as noted herein and secure the mullion mounting anchors (Item 2A) at each floor level in conjunction with extruded aluminum clips bolted to the sides of the mullions and designed to engage the vertical leg of the Halfen mullion mounting bracket in conjunction with an extruded aluminum hook/leveling connector.
   C. Vision Glass Panels: Glass panels shall be sized and attached to curtain wall framing according to the curtain wall system manufacturer's guidelines. Use a min. 1/4 in. thick, clear heat-strengthened (HS) glass or tempered glass with a max. width and height less than the aluminum framing o.c. spacing, which allows the glass to be secured between the notched shoulder of the aluminum framing and pressure bar. Panels are secured with a thermal break (rubber extrusion), pressure bar (aluminum extrusion), min. 1/4-20 x 5/8 in. long screws, and a snap face (aluminum extrusion).

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CEJ 307 P

D. Spandrel Panels: Either glass or aluminum spandrel panels may be applied to the spandrel exterior: If Glass Spandrel Panels: Glass panels shall be sized and installed to curtain wall framing according to the curtain wall system manufacturer's guidelines. Use a min. 1/4 in. thick clear, heat-strengthened (HS) glass or tempered glass with a max. width and height less than the aluminum framing o.c. spacing, which allows the glass to be secured between the notched shoulder of the aluminum framing and pressure bar. Panels are secured with a thermal break (rubber extrusion), pressure bar (aluminum extrusion), min. 1/4-20 x 5/8 in. long screws, and a snap face (aluminum extrusion). Aluminum Spandrel Panels: Aluminum panels used in the spandrel shall be sized and attached to curtain wall framing according to the curtain wall system manufacturer's guidelines. Use a min. 1/8 in. sheet aluminum panel.

E. Insulation Retainer Angle: Secure a minimum 2 in. x 2 in. 20 GA galvanized steel angle to the underside of the top spandrel transom extending the full length of the transom between each vertical framing member. Position so that the curtain wall insulation (2I), when placed flush against the back surface of the angle, is flush with the internal surface of the vertical framing members. Secure the angle to the transom with min. 1 in. No. 10 self-tapping sheet metal screws spaced a maximum 12 in. o.c.

F. Insulation Reinforcement Angle: Place min. 1 in. x 2 in. 20 GA galvanized steel angle horizontally in the spandrel area to reinforce the curtain wall insulation (2I). The 2 in. leg is placed flush against the exterior surface of the curtain wall insulation and the 1 in. dimension is positioned at the top of the 2 in. leg, perpendicular to and outward from the insulation as illustrated. Place a minimum of 3 angles in each spandrel cavity between vertical framing members. Two angles are required to be spaced a max. 6 in. o.c. in the perimeter fire barrier region, with the top angle centered 1 in. above the floor. Outside of the perimeter fire barrier region, the spacing of these reinforcement angles is a max. 18 in oc On both ends of each angle, cut the 1 in. leg of the angle 2 in. from the end and fold down to form a slot that is slid onto the flange of the Z-Clip (2G).

G. Z Clips: Position min. 2 in. wide Z-Clips having 2 in. long web and flange dimensions, constructed of min. 18 GA. galvanized steel, onto the mullion at the required elevation locations of the Insulation Reinforcement Angles (2F). Two Z-Clips are to be positioned at each location so that one clip extends on each side of the mullion, placed tightly against the mullion. The Z-clips are secured to the interior face of the mullion with a single 1 in. No. 10 self-tapping sheet metal screw placed at the center of the Z-Clips.

H. Insulation Retaining Screws: In the field of the curtain wall insulation between framing covers (2J) attach curtain wall insulation (2I) to the insulation retainer angle (2E) and insulation reinforcement angle (2F) with min. 3 in. long No. 8 bugle head self-tapping screws fitted with min. 1-1/2 in. diameter steel clinch shields or self-locking washer clips. These are spaced a max. 12-3/4 in. oc and a max. 4 in. on each side of vertical seams. Where the framing covers (2J) overlap onto the curtain wall insulation (2I) secure framing covers (2J) and curtain wall insulation (2I) to the insulation retainer angle (2E) and insulation reinforcement angle (2F) with min. 5 in. long No. 10 bugle head self-tapping screws and min. 1-1/2 in. diameter steel clinch shields or self-locking washer clips in accordance with details in 2J.

I. Curtain Wall Insulation: A nom. 2 in. thick, 8pcf density mineral wool batt insulation**, faced on one side with aluminum foil scrim (vapor retarder) which faces the room interior, is installed to fill all cavities of the spandrel region between the framing. The batt is to be fitted tightly to the framing, and is secured to the Insulation Retainer Angle (2E) and Insulation Reinforcement Angle (2F) with Insulation Retaining Screws and min. 1-1/2 in. diameter steel clinch shields or self-locking washer clips. (2H). A minimum 3 in. air space is created between the insulation and panel. All meeting edges of insulation are sealed with nom. 4 in. wide pressure sensitive aluminum foil faced tape centered over the junction so that approx. 2 in. of tape covers each edge of the adjacent insulation. The 36 in. wide batts shall be installed with a maximum of 1 vertically oriented seam in each spandrel cavity, between vertical framing members, spaced a min. 18 in. from any vertical framing member, and continuous vertically without horizontal seams.

J. Framing Covers: Strips made of 2 in. thick by 8 in. wide, 8 pcf, mineral wool batt insulation, faced one side with aluminum foil scrim (vapor retarder) which faces the room interior, are centered over each vertical framing member and secured to the Insulation Retainer Angle (2E) and Insulation Reinforcement Angle (2F) with Insulation Retaining Screws spaced 1 in. from both edges of the framing cover. Framing covers do not pass through the perimeter joint treatment. They are butted to the top and bottom surfaces of the perimeter joint treatment.

K. Panel Attachment: Secure panels with a thermal break (thermal-set rubber extrusion), pressure bar (aluminum extrusion), 1/4-20 x 5/8 in. long screws, and a snap face (aluminum extrusion). The spandrel panels shall be insulated according to 2I.

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Design No. CEJ 307 P (HI/BP 180-01)

CEJ 307 P

3. PERIMETER JOINT PROTECTION: The perimeter joint (linear opening) shall not exceed an 8- in. nom. joint width (joint width at installation) and the perimeter joint treatment shall incorporate the following construction features:

A. Packing Material: Use a min. 4 in. thick, 4 pcf density, mineral wool** batt insulation installed with the fibers running parallel to the slab edge and curtain wall. The packing material shall be compressed 33% in the nominal joint width. Compress the batt insulation into the perimeter joint such that the top surface of the batt insulation is flush with the top surface of the concrete floor slab. Splices (butt joints) in the lengths of mineral wool batt insulation are to be tightly compressed together with min. compression of 0.25 in. per piece. Reference the Introduction to Fire Resistive Joint Systems Section of this Directory for more details on how to determine the cut width of the insulation to be installed in the nominal joint width, and how to determine the compressed percentage of a known insulation width installed in a known nominal joint width.

B. CERTIFIED MANUFACTURER: Hilti, Inc.
CERTIFIED PRODUCT: Joint Spray or Sealant
MODEL: Firestop Joint Spray CFS-SP WB or Silicone Joint Spray CFS-SP SIL
Fill, Void or Cavity Material: To be applied (sprayed, brushed, or trowled) to cover the exposed surface of the mineral wool installed in the perimeter joint. Apply at the thickness specified in Table 1 and overlap the material a min. 1/2 in. onto the adjacent curtain wall assembly and concrete floor slab assembly. If the spraying process is stopped and the applied liquid cures to an elastomeric film before process is restarted, then overlap the edge of the cured material at least 1/8 in. with the spray. Reference Product Section of this Directory for more details about the Listed product.
Note 1 – Before testing, the spliced test specimen was cycled 500 times at 30 cpm according to ASTM E 1399 and ICBO ES AC 30 (Jan. 1997)

(** Product Certified by Intertek Testing Services bearing a WH Mark)

This Design Listing was created using the information outlined in the Introduction to the Fire-Resistant Joint Systems Section. Please refer to that Introduction to complement the Design Listing.

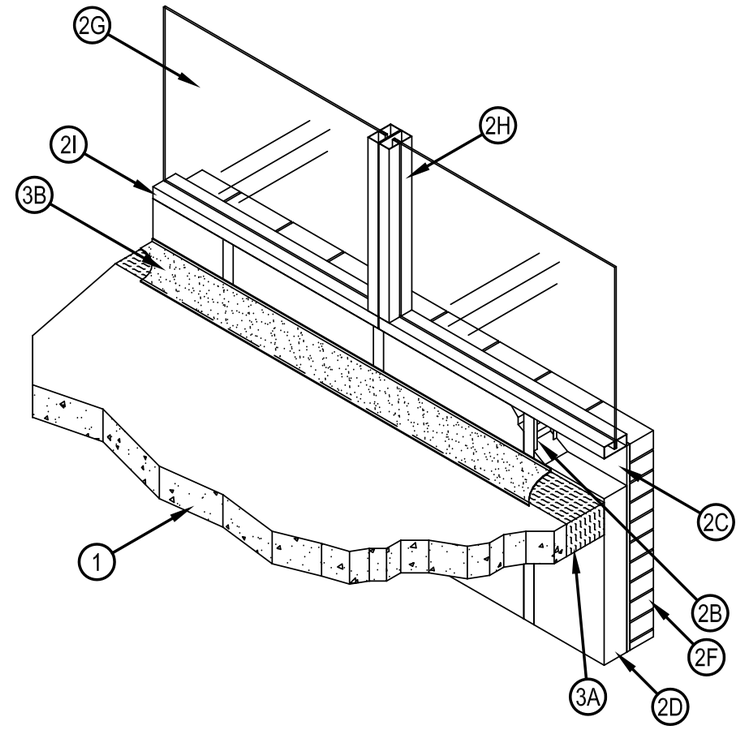
Design No. CEJ 314 P (HI/BP 165-01)

CEJ 314 P

PERIMETER FIRE BARRIER SYSTEM
Hilti, Inc.
ASTM E 2307
Table 1

	FIRESTOP JOINT SPRAY CFS-SP WB	SILICONE JOINT SPRAY CFS-SP SIL
F-RATING	2 3/4-HR.	2 3/4-HR.
T-RATING	1-HR.	1-HR.
APPLICATION THICKNESS	1/8" WET FILM (1/16" DRY)	2mm (0.079") WET FILM
CYCLING (%) HORIZONTAL VERTICAL SEE NOTE 1	± 8.3 ± 5	± 7.5 ± 5

L-Rating <1.0 SCFM/LF



1. CONCRETE FLOOR ASSEMBLY: Max. two-hour rated concrete floor assembly made from either lightweight or normal weight concrete with a density of 100-150 pcf, with a min. thickness of 4-1/2 in. at the joint face. Overall slab thickness may vary to accommodate various blockout depths (longitudinal recesses) formed in the concrete, to house the architectural cover plate. The blockout width may also vary without restriction.
2. CURTAIN WALL ASSEMBLY: The curtain wall assembly shall incorporate the following construction features:
   A. Mounting Attachment: (Not shown) Attachment of the curtain wall framing to the structural framing shall be according to the curtain wall manufacturer's instructions. When required, the mounting attachments to the floor slab shall be connected to the joint face of the floor slab, according to the curtain wall manufacturer's instructions. Max. distance between mounting attachments shall be 24 in..
   B. Steel-Stud Framing: Vertical framing members shall be a min. 3-5/8 in. by 1-5/8 in., 18 GA steel "C" studs secured in an 18 GA steel track top and bottom using #6 x 1.25 in. Bugle head SD PT screws. Vertical framing shall not exceed a spacing of 24 in. oc.
   C. Sandwiched Wall Surface: Use a min. 1/2 in. thick, 48 in. wide by 96 in. long, exterior grade gypsum wallboard (ASTM C 79), cement board, or fiberglass sheathed gypsum wallboard placed over and secured to framing with min. 1-1/4 in. long Type S drywall screws 8 in. oc.
   D. Curtain Wall Insulation: Use a nom. 24 in. wide by min. 4 in. thick min. 4 pcf faced or un-faced mineral wool** batt insulation cut to size as required. The curtain wall insulation shall completely fill the recess of the min. 3-5/8 in., by 1-5/8 in., by 18 GA steel "C" studs. If the stud cavity is deeper than 3-5/8 in., use thicker insulation to accommodate the additional depth so that the cavity is full from the front of the stud to the rear of the stud. Install curtain wall insulation in each stud cavity so that min. 6 in. of curtain wall insulation is above the surface of the perimeter joint protection and a min. of 6 in. is below the underside of the floor, while maintaining the min. 24 in. continuous vertical length of insulation in the spandrel region. The 24 in. width is fitted tightly between vertical framing members filling all studs in the spandrel region. Because the insulation is required to be continuous in both width and length, without butted joints, use of aluminum foil tape to seal between the insulation and the studs is optional. (** Listed with Intertek)
   E. Exterior Curtain Wall Insulation: (Optional - Not Shown) Expanded polystyrene foam (EPS) insulation. The EPS foam boards measure 24 in. wide by 48 in. long by 4 in. thick with a nominal density of 1 pcf. The EPS foam is attached to the sandwiched wall surface using mechanical fasteners or an adhesive in accordance with manufacturer's recommendations. Install the EPS boards in a running bond (brick-like) pattern and staggered over sandwiched wall surface (2C) joints. Apply pressure to the EPS boards to assist in the bonding process. All EPS boards must be butted together with no gaps or voids between them. Allow a min. of 12 hours before continuing the application process when using adhesive. The EPS boards must be rasped to remove all irregular seams and establish a continuous flat surface.
   F. Exterior Curtain Wall Finish: Use brick and mortar of any type. Mortar joints not to exceed 7/8 in. . Secure bricks to wall assembly using conventional acceptable masonry techniques.
   G. Glass Vision Panels: Glass vision panels shall be installed to curtain wall framing according to the curtain wall system manufacturer's guidelines. Use a min. 1/4 in. thick, clear tempered glass that is fitted to the framing, having a min width of 24 in. and a min. height of 24 in.
   H. Window Gaskets: Secure glass vision panels with a thermal break (thermal-set rubber extrusion).
   I. Window Framing: Steel framing members shall be a min. 3-5/8 in. by 1-5/8 in. 18 GA steel "U" channel or similar construction that is compatible with steel-stud framing (2B). Locate window framing at least 6 in. above the top surface of the floor assembly.
3. PERIMETER JOINT PROTECTION: The perimeter joint (linear opening) shall not exceed a 6 in. nom. Joint width (joint width at installation) and the perimeter joint treatment shall incorporate the following construction features:
   A. Packing Material: Use a min. 4 in. thick, 4 pcf density, mineral wool batt insulation** installed with the fibers running parallel to the slab edge and curtain wall. The packing material shall be compressed 25% in the nominal joint width. Compress the batt insulation into the perimeter joint such that the top surface of the batt insulation is flush with the top surface of the concrete floor slab and the insulation is compressed against the interior surface of the curtain wall insulation (2D). Splices (butt joints) in the lengths of mineral wool batt insulation are to be tightly compressed together. Reference the Introduction to Fire Resistive Joint Systems Section of this Directory for more details on how to determine the cut width of the insulation to be installed in the nominal joint width, and how to determine the compressed percentage of a known insulation width installed in a known nominal joint width. (** Listed with Intertek)

   B. CERTIFIED MANUFACTURER: Hilti, Inc.
   CERTIFIED PRODUCT: Joint Spray or Sealant
   MODEL: Firestop Joint Spray CFS-SP WB or Silicone Joint Spray CFS-SP SIL
   Fill, Void or Cavity Material: To be applied (sprayed, Brushed, or painted) to cover the exposed surface of the mineral wool installed in the perimeter joint. Apply at the thickness specified in Table 1 and overlap the material a min. 1/2 in. onto with Curtain Wall Insulation (2D) and Concrete Floor Assembly (1). If the spraying process is stopped and the applied liquid cures to an elastomeric film before process is restarted, then overlap the edge of the cured material at least 1/8 in. with the spray. Reference Product Section of this Directory for more details about the Listed product.

**Before testing, the spliced test specimen was cycled 500 times at 30 cpm according to ASTM E 1399 and ICBO ES AC 30 (Jan. 1997).

Design No. CEJ 400 P (HI/BP 120-02)

PERIMETER FIRE BARRIER SYSTEM

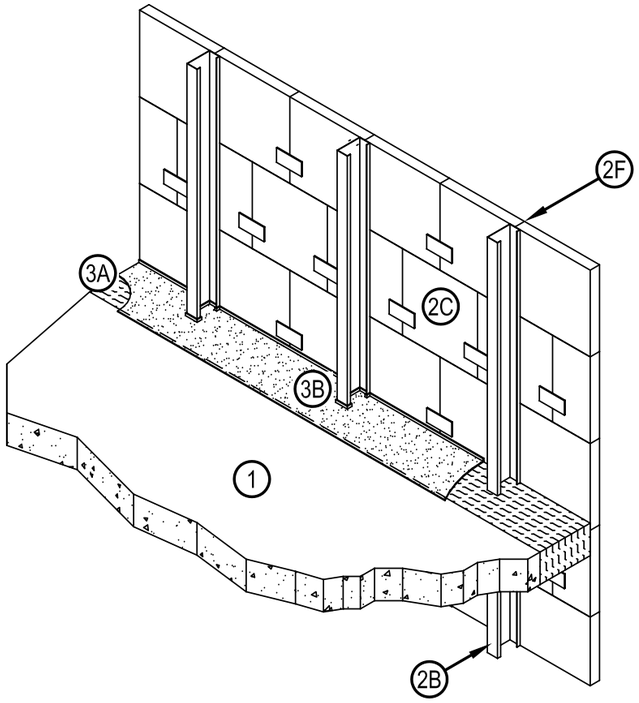
Hilti, Inc.

ASTM E 2307

Table 1

CEJ 400 P

	FIRESTOP JOINT SPRAY CFS-SP WB	SILICONE JOINT SPRAY CFS-SP SIL
F-RATING	2-HR.	2-HR.
T-RATING	0-HR. OR 45-MIN. (SEE ITEM 2C)	0-HR. OR 1-HR. (SEE ITEM 2C)
APPLICATION THICKNESS	1/8" WET FILM (1/16" DRY)	2mm (0.079") WET FILM
CYCLING (%) HORIZONTAL VERTICAL SEE NOTE 1	±9.25 NONE	±7.5 NONE



Design No. CEJ 400 P (HI/BP 120-02)

CEJ 400 P

1. CONCRETE FLOOR ASSEMBLY: Min. two-hour rated concrete floor assembly made from either lightweight or normal weight concrete with a density of 100-150 pcf, with a min. thickness of 4-1/2 in.. at the joint face. Optional – Provided the two-hour concrete floor assembly rating is not compromised, the overall slab thickness may vary to accommodate various blockout depths (longitudinal recesses) formed in the concrete, to house an optional architectural joint system. The blockout width may also vary without restriction.
2. CURTAIN WALL ASSEMBLY: The curtain wall assembly shall incorporate the following construction features:
   A. Mounting Attachment: (Not shown) Attachment of the curtain wall framing to the structural framing shall be according to the curtain wall manufacturer's instructions. When required, the mounting attachments to the floor slab shall be connected to the joint face of the floor slab, according to the curtain wall manufacturer's instructions. Max. distance between mounting attachments shall be 10 ft.
   B. Steel-Stud Framing: Vertical framing members shall be a min. 3-5/8 in. by 1-5/8 in., 18 GA steel "C" studs secured in an 18 GA steel track top and bottom using min. #6 x 1.25 in. Bugle head SD PT screws. Vertical framing shall not exceed a spacing of 56 in. on center and shall be completely covered by the GFRC panels (2c). Attachment of vertical framing shall be according to the curtain wall system manufacturer's guidelines.
   C. GFRC Panels: Glass fiber reinforced concrete panels shall be at least 1 in. thick and attached in accordance with the manufacturer's installation instructions. The system is a monolithic assembly without expansion or control joints. NOTE: T-Rating is 0-hours when min. 1 in. thick GFRC panels are used. T-Rating is 1-hour or 45 minutes when min. 2 in. thick GFRC panels are used.
   D. Impaling Pins: (Not Shown - Optional) When required by insulation manufacturer, use with insulation. The pins shall be located, sized and installed according to the curtain wall system manufacturer's guidelines.
   E. Curtain Wall Insulation: (Not Shown - Optional) Curtain wall insulation is not required. However, it can be installed above or below the perimeter joint protection. When used, secure the insulation in accordance with the manufacturer's installation instructions. Mineral wool** or glass fiber** batt insulations are acceptable.
   F. GFRC Panel Joint: Vertical and horizontal concrete panel joints created between panels can be either flush type (butt joint) or key way type (tongue and groove). Concrete panel edges must be in contact with each other. If required, the surface of the panel joints can be sealed with gaskets or sealants.
   G. Framing Covers: (Not Shown - Optional) Framing covers used over the mullions and transoms are optional. When used, the framing covers shall be located, sized and installed according to the curtain wall system manufacturer's guidelines. Framing covers do not pass through the perimeter joint treatment. They are butted to the top and bottom surfaces of the perimeter joint treatment without deforming it. Either mineral wool** or fiberglass batt insulation** may be used.
3. PERIMETER JOINT PROTECTION: The perimeter joint (linear opening) shall not exceed an 8 in. nom. joint width (joint width at installation) and the perimeter joint treatment shall incorporate the following construction features:
   A. Packing Material: Use a min. 4 in. thick, 4 pcf density, mineral wool batt insulation** installed with the fibers running parallel to the slab edge and curtain wall. The packing material shall be compressed 50% in the nominal joint width. Compress the batt insulation into the perimeter joint such that the top surface of the batt insulation is flush with the top surface of the concrete floor slab. Splices (butt joints) in the lengths of mineral wool batt insulation are to be tightly compressed together. Reference the Introduction to Fire Resistive Joint Systems Section of this Directory for more details on how to determine the cut width of the insulation to be installed in the nominal joint width, and how to determine the compressed percentage of a known insulation width installed in a known nominal joint width.
   B. CERTIFIED MANUFACTURER: Hilti, Inc.
   CERTIFIED PRODUCT: Joint Spray or Sealant
   MODEL: Firestop Joint Spray CFS-SP WB or Silicone Joint Spray CFS-SP SIL
   Fill, Void or Cavity Material: To be applied (sprayed, brushed, or painted) to cover the exposed surface of the mineral wool installed in the perimeter joint. Apply at the thickness specified in Table 1 and overlap the material a min. 1/2 in. onto the adjacent curtain wall assembly and concrete floor slab assembly. If the spraying process is stopped and the applied liquid cures to an elastomeric film before process is restarted, then overlap the edge of the cured material at least 1/8 in. with the spray. Reference Product Section of this Directory for more details about the Listed product.
   C. Support Clips: (Not Shown - Optional) Use standard Z-shaped clips that are min. 20 GA galvanized steel with the following nom. dimensions: 1 in. wide by 3 in. high with a 2 in. upper leg and 3 in. lower leg Note 1 – Before testing, the spliced test specimen was cycled 500 times at 30 cpm according to ASTM E 1399 and ICBO ES AC 30 (Jan. 1997)

(** Product Certified by Intertek Testing Services bearing a WH Mark)

Design No. CEJ 421 P (HI/BP 120-03)

PERIMETER FIRE BARRIER SYSTEM

Hilti, Inc.

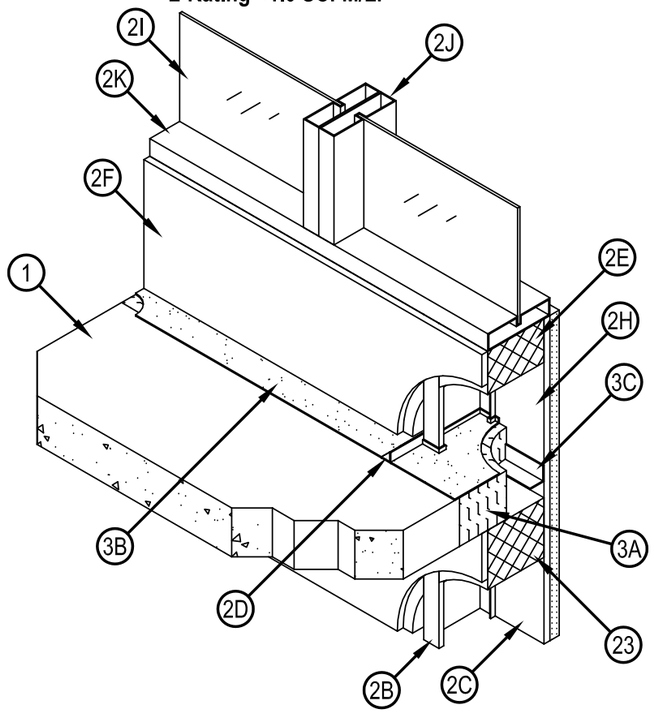
ASTM E 2307

Table 1

CEJ 421 P

	FIRESTOP JOINT SPRAY CFS-SP WB	SILICONE JOINT SPRAY CFS-SP SIL
F-RATING	2-HR.	2-HR.
T-RATING	1-HR.	1-HR.
APPLICATION THICKNESS	1/8" WET FILM (1/16" DRY)	2mm (0.079") WET FILM
CYCLING (%) HORIZONTAL VERTICAL SEE NOTE 1	NONE NONE	NONE NONE

L-Rating <1.0 SCFM/LF



Design No. CEJ 421 P (HI/BP 120-03)

CEJ 421 P

1. CONCRETE FLOOR ASSEMBLY: Min. two-hour rated concrete floor assembly (Item 1) made from either lightweight or normal weight concrete with a density of 100-150 pcf, with a min. thickness of 4-1/2 in. at the slab edge (joint face). Optional – Provided the two-hour concrete floor assembly (Item 1) rating is not compromised, the overall slab thickness may vary to accommodate various blockout depths (longitudinal recesses) formed in the concrete, to house an optional architectural joint system. The blockout width may also vary without restriction.
2. CURTAIN WALL ASSEMBLY: The curtain wall assembly shall incorporate the following construction features:
   A. Mounting Attachment: (Not shown) Attach the steel-stud framing to the structural framing according to the curtain wall manufacturer's instructions. When required, connect the mounting attachments to the concrete floor assembly (Item 1) at the slab edge (joint face), according to the curtain wall manufacturer's instructions. Use a max. 10 ft. distance between mounting attachments.
   B. Steel-Stud Framing: Use min. 6 in. by 1-5/8 in., 18 GA steel "C" studs as vertical framing members with a max. spacing of 24 in. on center (oc) secured in 18 GA steel tracks, top and bottom, using min. #6 x 1/2 in. pan or hex head SD PT screws. Secure the steel-stud framing to the concrete floor assembly (Item 1) with curtain wall clips (Item 2D). Alternate Method: Use multiple 16 GA steel studs positioned horizontally and secured together either by mechanical fasteners or welds to form a solid box.
   C. Sandwiched Wall Surface: Use a minimum 5/8 in. thick, 48 in. wide by 96 in. long, exterior grade fiberglass sheathed gypsum board placed over and secured to steel stud framing (Item 2B) with min. 1-1/4 in. long Type S drywall screws 12 in. on center in field and 8 in. oc at perimeter.
   D. Curtain Wall Clips: Affix min. 20 GA 1 x 1 in. steel angle using 5/8 in. long sheet metal screws to the vertical framing (Item 2B) and to the surface of the concrete floor assembly (Item 1) using min. 1/4 in. diameter by 1 in. long concrete screws, or an equivalent fastening method in accordance with the curtain wall manufacturer's installation instructions.
   E. Optional Curtain Wall Insulation: Curtain wall insulation is not required. However, it can be installed above or below the perimeter joint protection. When used, secure the insulation in accordance with the manufacturer's installation instructions. Mineral wool or glass fiber batt insulations are acceptable. Only Intertek Certified Mineral Wool Manufacturer's product meeting the above min. requirements.
   F. Optional Interior Curtain Wall Surface: An interior curtain wall surface is not required. However, it can be installed above or below the perimeter joint protection. When used, secure the interior curtain wall surface in accordance with the manufacturer's installation instructions. Gypsum board is acceptable.
   G. Optional Knee-Wall: (Not Shown) A "knee-wall" is not required. Install above the perimeter joint protection. When using a knee-wall with 6 in. steel stud construction, the 6 in. wide steel track at the bottom of the knee-wall can replace the curtain wall clips. The 6 in. steel track shall be attached to each vertical framing member (Item 2B) using 5/8 in. long sheet metal screws and to the concrete floor assembly using min. 1/4 in. diameter by 1 in. long concrete screws.
   H. Exterior Curtain Wall Finish: The exterior finish shall not create voids or openings in the sandwiched wall surface and shall extend at least 6 in. above and at least 24 in. below the surface of the concrete floor assembly. The following finishes are acceptable: (1) Exterior Insulation Finish System: Any Listed and Labeled EIFS composed of an expanded polystyrene foam (EPS) insulation, and an Exterior Curtain Wall Finish consisting of the following: A plaster, base coat and reinforcing mesh applied over the sandwiched wall surface. Precut the mesh as needed. The mesh is a woven fiberglass reinforcement fabric that is compatible with the plaster base coat and finish coat materials. Apply 1/16 to 1/8 in. thick plaster base coat to the exposed surface of the EPS foam. The EPS foam boards nominally measure 24 in. wide by 48 in. long by a max. of 4 in. thick with a nominal density of 1 pcf. The EPS foam is attached to the sandwiched wall surface using mechanical fasteners or an adhesive in accordance with manufacturer's recommendations. Install the EPS boards in a running bond (brick-like) pattern and staggered over sandwiched wall surface joints. Apply pressure to the EPS boards to assist in the bonding process. All EPS boards must be butted together with no gaps or voids between them. Allow a min. of 12 hours before continuing the application process when using adhesive. The EPS boards must be rasped to remove all irregular seams and establish a continuous flat surface. Apply the mesh over the EPS; embed the mesh into the plaster base coat using a trowel. Start at the middle and work outwards towards edges. The final thickness of the plaster base coat with the mesh embedded should be approximately 1/16 in.. Let the base coat dry completely before applying the plaster finish coat. The plaster finish coat is a gypsum based wall coating which may contain silica sand or marble aggregates. Apply the plaster finish coat using a trowel in the same manner as the plaster base coat. Other installation techniques are acceptable when detailed by the manufacturer. The EIFS system is a monolithic assembly without expansion or control joints. (2) Glass Panels: Glass panels shall be sized and installed to curtain wall framing according to the curtain wall system manufacturer's guidelines. Use a min. 1/4 in. thick, clear,

Hilti Firestop Systems

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June 20, 2014

Intertek

heat-strengthened (HS) glass or tempered glass with a max. width and height less than the framing oc spacing, which allows the glass to be secured between the notched shoulder of the framing and pressure bar. Panels are secured with a thermal break (rubber extrusion), pressure bar (extrusion), min. 1/4-20 x 5/8 in. long screws, and a snap face (extrusion) or other manner as detailed by the manufacturer. The system is a monolithic assembly without expansion or control joints. (3) Aluminum Panels: Min. 1/8 in. thick aluminum panels secured to the steel-stud framing (Item 2B) in accordance with the manufacturer's installation instructions. When framing for the aluminum panels is required, it is to be installed with the manufacturer's installation instructions. The system is a monolithic assembly without expansion or control joints. (4) Brick: Use any conventional brick and mortar type. Any brick pattern is acceptable. Mortar joints not to exceed 7/8 in. Secure bricks to wall assembly using conventional acceptable masonry construction techniques. The system is a monolithic assembly without expansion or control joints. (5) Stucco: Any Listed and Labeled stucco system is acceptable provided that the following is abided by: When EPS is used, the EPS foam boards nominally measure a maximum of 4 in. thick with a nominal density of 1 pcf. The stucco manufacturer confirms the stucco is compatible with the sandwiched wall surface. The system is a monolithic assembly without expansion or control joints. (6) Stone: Use any conventional stone panel and mortar type measuring at least 1 in. thick. Any stone pattern is acceptable. Mortar joints not to exceed 7/8 in.. Secure stones to wall assembly using conventional acceptable masonry construction techniques. The system is a monolithic assembly without expansion or control joints. (7) Siding: Any Listed and Labeled siding system is acceptable provided that the following is abided by: The siding shall be classified as non-combustible. The system is a monolithic assembly without expansion or control joints. (8) GFRC Panels: Glass fiber reinforced concrete panels shall be at least 1 in. thick and attached in accordance with the manufacturer's installation instructions. The system is a monolithic assembly without expansion or control joints.

I. Optional Vision Glass Panels: Glass panels shall be sized and installed to curtain wall framing according to the curtain wall system manufacturer's guidelines. Use a min. 1/4 in. thick, clear, heat-strengthened (HS) glass or tempered glass with a max. width and height less than the aluminum framing oc spacing, which allows the glass to be secured between the notched shoulder of the aluminum framing and pressure bar. Panels are secured with a thermal break (rubber extrusion), pressure bar (aluminum extrusion), min. 1/4-20 x 5/8 in. long screws, and a snap face (aluminum extrusion).

J. Optional Window Gaskets: When required by the manufacturer, secure glass vision panels with a thermal break (thermal-set rubber extrusion).

K. Optional Window Framing: Framing material shall be non-combustible. Locate window framing at least 6 in. above the top surface of the floor assembly.

3. PERIMETER JOINT PROTECTION: The perimeter joint (linear opening) shall not exceed a 9 in. nom. joint width (joint width at installation) between the interior face of the sandwiched wall surface and the vertical face of the concrete floor assembly. The perimeter joint treatment shall incorporate the following construction features:

A. Packing Material: Use a min. 4 in. thick, 4 pcf density, mineral wool batt insulation. Install the top surface of the packing material flush with the top surface of the concrete floor assembly (Item 1). Only Intertek Certified Mineral Wool Manufacturer's product meeting the above min. requirements. Compress the lengths of packing material together at least 1/2 in. at splices (butt joints). Install packing material (Item 3A) using one of the following methods:

Method 1 – Two-step installation process. (1) Install pieces of packing material (Item 3A) between the vertical framing members (Item 2B). Cut and install the packing material (Item 3A) with the fibers running horizontally (perpendicular) to the slab edge (joint face). Cut the pieces of packing material (Item 3A) at least 1/4 in. longer than the distance between the vertical framing members (Item 2B) and 1/8 in. greater than the width of the steel-stud framing. (Cut packing material (Item 3A) 24-1/4 in. long for a max. 24 in. spacing between vertical framing members (Item 2B). Cut packing material (Item 3A) 6-1/8 in. wide for 6 in., 18 GA steel "C" studs.) Allow no voids between vertical framing members (Item 2B) or between sandwiched wall surface and packing material (Item 3A). (2) Install pieces of packing material (Item 3A) in the max. 3 in. nominal joint width (joint width at installation) between the interior face of the steel stud framing (Item 2B) and the vertical face of the concrete floor assembly (Item 1). Cut and install the packing material (Item 3A) with the fibers running vertically (parallel) to the slab edge (joint face). Cut packing material (Item 3A) 3-3/4 in. wide for a max.3 in. nominal joint width. Compress the packing material (Item 3A) min. 20% and install in nominal joint width.

Method 2 – Two-step installation process. (1) Install pieces of packing material (Item 3A) between the vertical framing members (Item 2B). Cut and install the packing material (Item 3A) with the fibers running vertically (parallel) to the slab edge (joint face). Cut the pieces of packing material (Item 3A) at least 1/4 in. longer than the distance between the vertical framing members (Item 2B). (Cut packing material (Item 3A) 24-1/4 in. long for a max. 24 in. spacing between vertical framing members (Item 2B).) Cut packing material (Item 3A) 9 in. wide for 6 in., 18 GA steel "C" studs. Install the packing material (Item 3A) (min. compression 33%). Allow no voids between vertical framing members (Item 2B) or between sandwiched wall surface and packing material (Item 3A). (2) Install pieces of packing material (Item 3A) in the max. 3 in. nominal joint width (joint width at installation) between the interior face of the steel stud framing (Item 2B) and the vertical face of the concrete floor assembly (Item 1). Cut and install the packing material (Item 3A) with the fibers running vertically (parallel) to the slab edge (joint face). Cut packing material (Item 3A) 4-1/2 in. wide for a max. 3 in. nominal joint width. Compress the packing material (Item 3A) min. 33% and install in nominal joint width.

B.CERTIFIED MANUFACTURER: Hilti, Inc.
CERTIFIED PRODUCT: Joint Spray or Sealant
MODEL: Firestop Joint Spray CFS-SP WB or Silicone Joint Spray CFS-SP SIL
Fill, Void or Cavity Material: Spray apply over exposed surface of the packing material (Item 3A). Apply at the thickness specified in Table 1 and overlap the material a min. 1/2 in. onto the adjacent curtain wall assembly and concrete floor slab assembly. When the spraying process is stopped and the applied liquid cures to an elastomeric film before application process is restarted, then overlap the edge of the cured material at least 1/8 in. with the spray.

C. Reinforcing Angle: Required for packing material (Item 3A) installed using Method 1 when mineral wool batt insulation in Optional Curtain Wall Insulation (Item 2E) or gypsum board in Optional Interior Curtain Wall Surface (Item 2F) is not present. Mount a min. 20GA, 1-1/2 in. x 1-1/2 in. galvanized steel angle to the vertical framing members (Item 2B) using min.#6 x 1.25 in. Bugle head SD PT screws. Notch the ends of each piece so that the vertical leg contacts to the 1-5/8 in. face of the vertical framing members (Item 2B) in contact with the sandwiched wall surface (Item 2C). Position the reinforcing angle so that the horizontal leg extends into a continuous 1-1/2 in. deep slit located longitudinally in the mid height of the packing material (Item 3A).

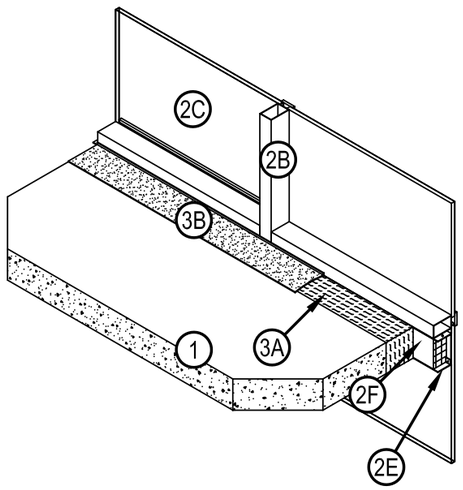
Design No. HI/BPF 120-11

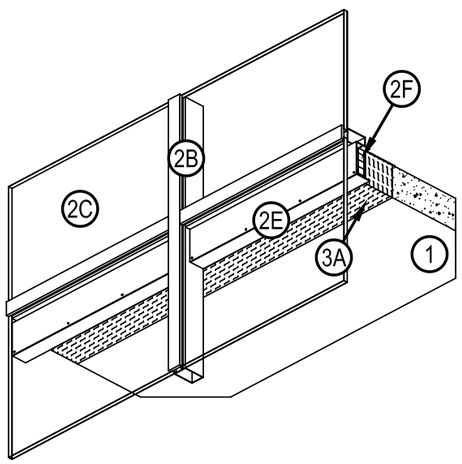
PERIMETER FIRE BARRIERS
Firestop Joint Spray CFS-SP WB
ASTM E 2307
Table 1.

HI/BPF 120-11

	Firestop Joint Spray CFS-SP WB	Silicone Joint Spray CFS-SP SIL
F-Rating	2 Hour	2 Hour
T-Rating	45 Minute	45 Minute
Application Thickness	1/8 in. wet film (1/16 in. dry)	2 mm (0.08 in.) wet film
Cycling (%)		
Horizontal	±12.5%	±12.5%
Vertical	±12.5%	±12.5%

UL 2079
L-Rating <1.0 SCFM/LF





Design No. HI/BPF 120-11

HI/BPF 120-11

1. CONCRETE FLOOR ASSEMBLY: 2 hour rated concrete floor assembly made from either lightweight or normal weight concrete with a density of 100 to 150 pcf, having a min. thickness of 6 in. at the joint face. When a longitudinal recess (blockout) is required to contain an architectural joint system, increase concrete floor assembly thickness to maintain a min. thickness of 6 in. and accommodate depth of blockout formed in the concrete; blockout width unrestricted.
2. CURTAIN WALL ASSEMBLY: The curtain wall assembly shall incorporate the following construction features:
   A. Mounting Attachment (Not shown): Attach aluminum framing (Item 2B) to the structural framing according to the curtain wall manufacturer's instructions. Connect the mounting attachments to the joint face of the concrete floor assembly (Item 1) according to the curtain wall manufacturer's instructions.
   B. Aluminum Framing: Use hollow rectangular aluminum extruded tubing with min. overall dimensions of 0.100 in. thick, 4 in. high and 2-1/2 in. wide. Locate mullions (vertical aluminum framing) min. 60 in. oc. Locate the transom (horizontal aluminum framing) such that the bottom surface of the transom is at the same height as the top surface of the floor assembly.
   C. Glass Panels: Sized and installed into aluminum framing (Item 2B) in accordance with the curtain wall manufacturer's instructions. Use min. 1/4 in. thick, clear, heat strengthened (HS) or tempered glass with a max. width and height less than the aluminum framing (Item 2B) oc spacing. OC spacing shall allow glass to be secured to the aluminum framing (Item 2B) between the notched shoulders. Secure glass panels with a thermal break (rubber extrusion), pressure bar (aluminum extrusion), min. 1/4-20 by 5/8 in. long screws, and a snap face (aluminum extrusion).
   D. Aluminum Anchor Brackets (Not shown): Use min. 1/2 in. thick aluminum anchor brackets to serve as part of the mounting attachment (Item 2A) rigidly secured to the aluminum framing (Item 2B) and the concrete floor assembly (Item 1).
   E. Galvanized Sheet Metal Pan: Attach 18 GA galvanized steel composed of two L-shaped sections to the aluminum framing with No. 10 self-drilling sheet metal screws at 12 in. oc. The first galvanized steel angle that is attached to the aluminum framing shall be formed such that it has a 3 in. leg and a 6 in. leg. The 3 in. leg is attached to the aluminum framing with No. 10 self-drilling sheet metal screws spaced 12 in. oc. The second, 1 in. × 3 in. angle is attached to the first with the 1 in. leg secured to the 6 in. leg of the first angle with No. 10 self-drilling sheet metal screws spaced 12 in. oc to create a cavity that is 3 in. deep and 6 in. tall underneath the aluminum member to house the curtain wall insulation (Item 2F). The 3 in. portion of the 3 in. × 1 in. angle is to be sized such that a 6 in. leg can be bent and formed into a vertical leg at the ends to secure the angle to the vertical framing members on each side with No. 10 self-drilling sheet metal screws (two installed at the top and two at the bottom). Install a bead of Hilti CFS-S SIL GG Firestop Silicone on the underside of the horizontal member prior to installation of the 3 in. × 6 in. 18 GA steel angle.
   F. Curtain Wall Insulation: Fill the cavity of the metal pan (Item 2E) with nominal 3 in. thick, min. 6 in. tall, 8 pcf density, mineral wool batt insulation. Tightly fit, compress at least 1/8 in. in all directions. Use only Intertek certified products meeting the above min. requirements.
3. PERIMETER JOINT PROTECTION: Do not exceed a 4 in. nominal joint width (joint width at installation). Incorporate the following construction features for the perimeter joint protection (also known as perimeter fire barrier system):
   A. Packing Material: Use only mineral wool bearing an Intertek certified product label and meeting the following min. requirements. Use min. 6 in. tall, 4-pcf density, mineral wool batt insulation and cut packing material width to achieve 25% compression when installed in the nominal joint width and use no more than two adjacent strips. Install insulation with the fibers running parallel to the edge of concrete floor assembly (Item 1) and curtain wall assembly (Item 2A). Tightly compress together splices (butt joints) in the lengths of packing material by using min. 1/4 in. compression per piece of packing material. Locate the top surface of the packing material flush with the top surface of the concrete floor assembly (Item 1).
   B. CERTIFIED MANUFACTURER: Hilti Corporation
   CERTIFIED PRODUCT: Firestop Joint Spray CFS-SP WB or Silicone Joint Spray CFS-SP SIL
   Fill, Void, or Cavity Material: Apply over the packing material (Item 3A) as discussed below.
   Apply at the thickness specified in Table 1 and overlap the material 1/2 in. onto the adjacent curtain wall assembly and concrete floor slab assembly. When the spraying process is stopped and the applied liquid cures to an elastomeric film before application is restarted, overlap the edge of the cured material at least 1/8 in. with the spray. Reference Product Section of the Intertek Directory for more details on the Listed product.

Hilti Firestop Systems

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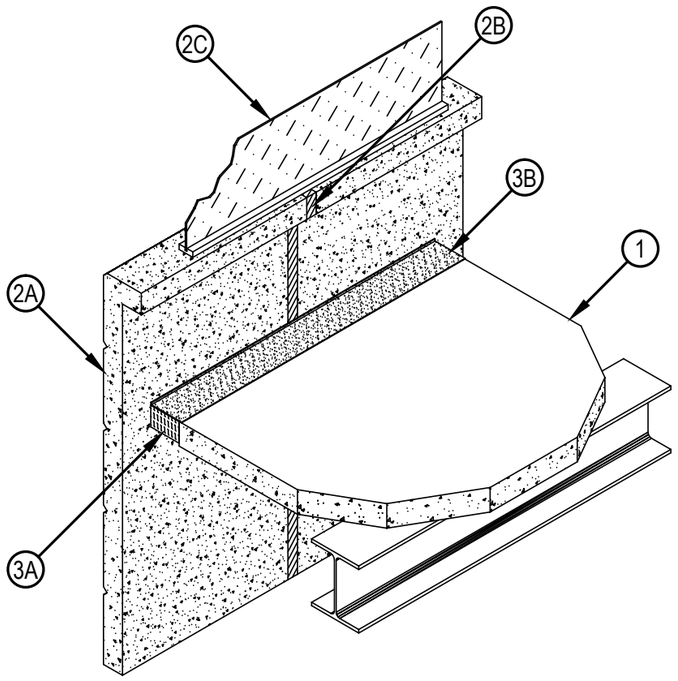
June 09, 2017

CLASSIFIED
Classified by
Underwriters Laboratories, Inc.
to ASTM E2307

System No. CW-D-1001

F Rating — 2 Hr
T Rating — 1/4 Hr
Linear Opening Width - 6 In. Max
Class II Movement Capabilities - 5% Vertical Shear (See Item 3)

CWD 1001



1. Floor Assembly — Min 4-1/2 in. (114 mm) thick steel-reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) structural concrete. Floor assembly to be supported at perimeter edges by spandrel beams having a Restrained or Unrestrained Beam Rating of 2 hr.
2. Curtain Wall Assembly — The curtain wall assembly shall incorporate the following construction features:
   A. Spandrel Panels — Min 36 in. (914 mm) high by min 4 in. (102 mm) thick steel-reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) structural concrete spandrel panels. Wall may also consist of min 4 in. (102 mm) thick steel-reinforced lightweight or normal weight concrete tilt-up panels with a min 36 in. (914 mm) vertical separation between window openings. Panels provided with steel dead load anchors welded to steel reinforcing bars embedded in the concrete for attachment to the steel columns and spandrel beams. Panels also provided with steel lateral anchors or braces. The dead load anchors which are located in the linear gap between the concrete floor slab and the spandrel panel or tilt-up panel are to be spaced max 72 in. (1829 mm) OC. The top of the dead load anchor is to be recessed min 1/2 in. (13 mm) from top surface of floor
   B. Joint System — (Not Shown) - Vertical joints between spandrel panels or tilt-up panels to be protected using Joint System No. WW-S-0042
   C. Framed Window — Metal framed window with nom 1/4 in. (6 mm) thick heat-strengthened glass. Sill of window to be min 6 in. (152 mm) above top of floor.

Hilti Firestop Systems

System No. CW-D-1001

CWD 1001

3. Safing System — Max separation between edge of floor assembly and concrete spandrel or tilt-up panel is 6 in. (152 mm). The safing system is designed to accommodate vertical shear movement of up to 5 percent of its installed width. The safing system shall incorporate the following construction features:
   A. Forming Material* — Nom 4 in. (102 mm) thick mineral wool batt safing material to be installed between the concrete spandrel or tilt-up panel and the edge of the concrete floor slab. Safing material to be cut to a min 4-1/2 in. (114 mm) width and stacked to a thickness which is at least 25 percent greater than the width of the linear gap between the concrete spandrel or tilt-up panel and the edge of the concrete floor slab. The safing material is compressed and inserted cut-edge-first into the linear gap such that its top surface is flush with the top surface of the floor assembly. A max of one tightly-butted seam is permitted between dead load anchors. An additional min 1/2 in. (13 mm) thick piece of mineral wool batt safing material to be installed to cover top surface of each dead load anchor.
   THERMAFIBER INC — SAF
   B. Fill, Void or Cavity Material* — Min 1/8 in. (3.2 mm) wet thickness (1/16 in. or 1.6 mm dry) of fill material spray-applied over top of forming material and lapping min 1 in. (25 mm) onto the top surface of the concrete floor and onto the concrete spandrel panel or tilt-up panel. When CFS-SP SIL is used, min wet (and dry) thickness of spray is 2 mm.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 672 FC Firestop Joint Spray, CFS-SP SIL Firestop Silicone Joint Spray or CFS-SP WB Firestop Joint Spray

*Bearing the UL Classification Mark

Hilti Firestop Systems

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