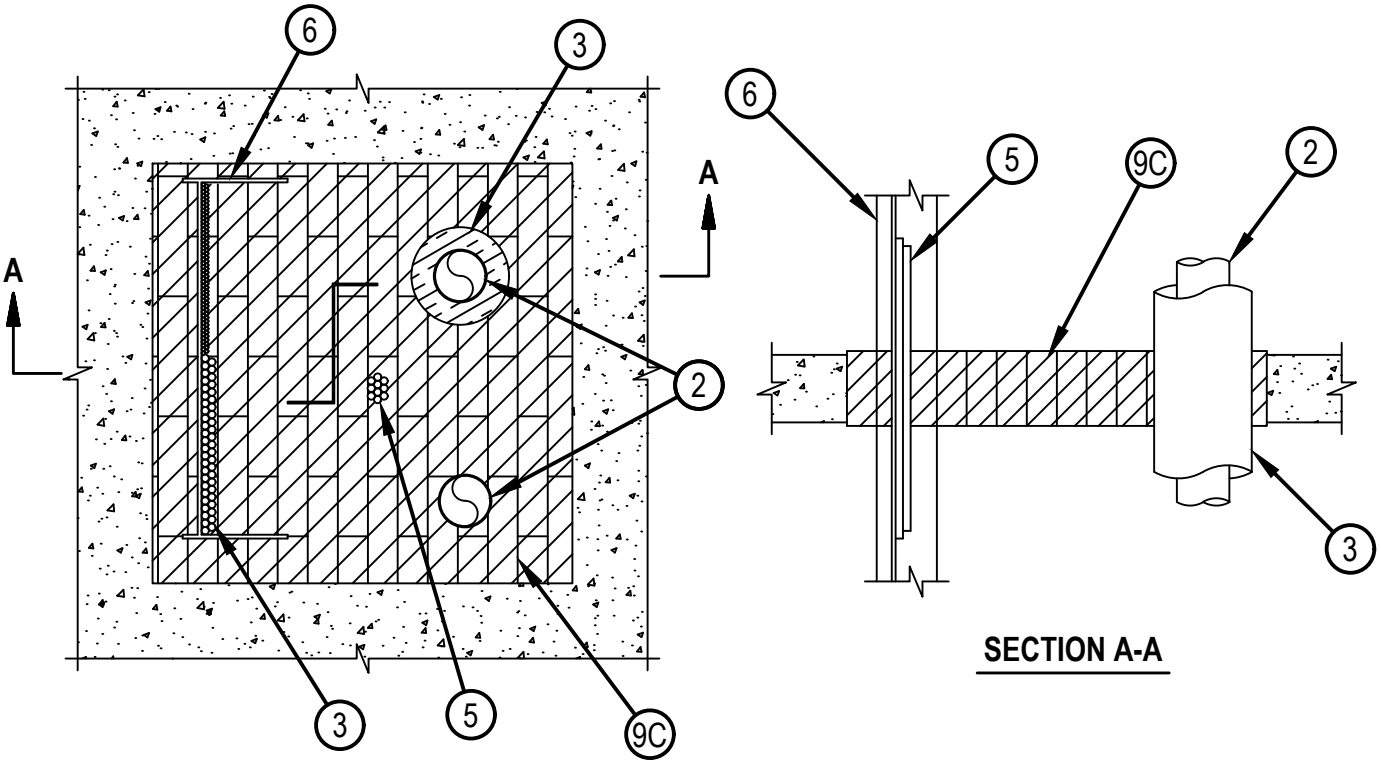
System No. C-AJ-8207

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

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 2 and 3 Hr (See Items 3, 4, 7, 9E)	F Ratings — 2 and 3 Hr (See Items 3, 4, 7, 9E)
T Rating — 0 Hr	FT Rating — 0 Hr
	FH Rating — 2 and 3 Hr (See Items 3, 4, 7, 9E)
	FTH Rating — 0 Hr



SECTION A-A

System tested with a pressure differential of 2.5 Pa between the exposed and the unexposed surfaces with the higher pressure on the exposed side.

1. Floor or Wall Assembly — Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) concrete. Wall may also be constructed of any UL Classified solid or filled Concrete Blocks*. Max area of opening is 18 sq ft (1.67 m2) with a max dim of 6 ft (1.6 m).

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

2. Metallic Penetrants — One or more metallic pipes, conduits or tubes to be installed within the opening. Min 1 in. (25 mm) annular space between metallic penetrants. Min annular space between metallic penetrants and periphery of opening is 0 in. (point contact) . Min annular space between metallic penetrants and any other penetrants is 4 in. (102 mm). Penetrants rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:
   A. Steel Pipe — Nom 8 in. (203 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. Iron Pipe — Nom 8 in. (203 mm) diam (or smaller) cast or ductile iron pipe.
   C. Conduit — Nom 6 in. (152 mm) diam (or smaller) rigid steel conduit, nom 4 in. (102 mm) diam (or smaller) electrical metallic tubing (EMT).
   D. Copper Pipe or Tube — Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe or Type M (or heavier) copper tube.

3. Pipe Insulation — (Optional) - The following types of pipe insulations may be installed on one or more of the metallic pipes or tubing. When insulation is used, annular space between penetrants and periphery of opening is min 1 in. (25 mm). Annular space between insulated penetrants is min 3 in. (76 mm). Annular space to any other adjacent penetrants is min 4 in. (102 mm). The F and FH Ratings of the firestop system are limited to 2 hr when any type of pipe insulation is used.

A. Pipe and Equipment Covering Materials* — Nom 1-1/2 in. (38 mm) or 2 in. (51 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m3) glass fiber units jacketed on the outside with an all service jacket may be installed on metal pipes or tubes. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product

See Pipe and Equipment Covering Materials (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

B. Pipe Covering Materials* — Nom 1-1/2 or 2 in. (38 or 51 mm) thick unfaced mineral fiber pipe insulation having a min density of 3.5 pcf (56 kg/m3) and sized to the outside diam of the pipe or tube. Pipe insulation secured with min 18 SWG steel wire spaced max 12 in. (305 mm) OC.

INDUSTRIAL INSULATION GROUP L L C — High Temperature Pipe Insulation 1200, High Temperature Pipe Insulation BWT and High Temperature Pipe Insulation Thermaloc

C. Sheathing Material* — Use in conjunction with Item 3B. Foil-scrim-kraft or all service jacket material shall be wrapped around the outer circumference of the pipe insulation (Item 3B) with the kraft side exposed. Longitudinal and transverse joints sealed with metal fasteners or butt tape.

See Sheathing Materials (BVDV) category in the Building Materials Directory for names of manufacturers. Any sheathing material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

D. Tube Insulation - Plastics## — Nom 1 in. (25 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing may be installed on max 2 in. (51 mm) diam metallic pipes or tubes. Nom 3/4 in. (19 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing may be installed on metallic pipes or tubes up to max 4 in. (102 mm) diam.

See Plastics (QMFZ2) category in the Plastics Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation meeting the above specifications and having a UL 94 Flammability Classification of 94-5VA may be used.

E. Pipe Covering Materials*— Cellular Glass Insulation — Nom 1-1/2, 2 or 3 in. (38, 51 or 76 mm) thick cellular glass units sized to the outside diam of the pipe or tube and supplied in nom 24 in. (610 mm) long half sections or nom 18 in. (457 mm) long segments. Pipe insulation installed on pipe in accordance with the manufacturer's instructions.

PITTSBURGH CORNING CORP — FOAMGLAS

F. Metal Jacket — Used in conjunction with Item 3E. Min 12 in. (305 mm) long jacket formed of min 0.010 in. (0.254 mm) thick steel or aluminum sheet cut to wrap tightly around the pipe insulation with a min 2 in. (51 mm) lap. Jacket secured with min 1/2 in. (13 mm) wide stainless steel hose clamps or bands located within 2 in. (51 mm) of each end of the jacket and spaced a max of 10 in. (254 mm) OC. Jacket to be installed with abutting surface of fire block on top of floor or both surfaces of wall.

G. Pipe and Equipment Covering Materials* — Max 2 in. (51 mm) thick hollow cylindrical calcium silicate (min 10 pcf or 160 kg/m3) sized to the outside diam of the pipe or tube. Pipe insulation secured with min 18 SWG steel wire spaced max 12 in. (305 mm) OC.

See Pipe and Equipment Covering Materials (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

4. Nonmetallic Penetrants — (Not Shown) - One or more nonmetallic pipes or conduits to be installed within the opening. Min annular space between nonmetallic penetrants to be 3 in. (76 mm). Min annular space between nonmetallic penetrants and any other penetrants to be 4 in. (102 mm). Min annular space between penetrants and periphery of opening is 1 in (25mm). Penetrants rigidly supported on both sides of floor or wall assembly. The following types and sizes of nonmetallic pipes or conduits may be used. The F and FH Ratings of the firestop system are limited to 2 hr when nonmetallic penetrants are used.
   A. Polyvinyl Chloride (PVC) Pipe — Nom 2 in. (51 mm) diam (or smaller) solid or cellular core Schedule 40 PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems. Canadian certification applies to closed pipes only.
   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. Rigid Nonmetallic Conduit+ — Nom 2 in. (51 mm) diam (or smaller) Schedule 40 PVC conduit installed in accordance with the National Electrical Code (NFPA 70).
5. Cables — One or more nom 4 in. (102 mm) diam (or smaller) tight bundle of cables. Min annular space between cable bundles is 4 in. (102 mm). Min annular space between cable bundle and all other penetrants is 4 in. (102 mm). Min annular space between cable bundle and periphery of opening is 1 in. (25 mm) Cable bundle rigidly supported on both sides of floor or wall assembly. The following types and sizes of cables may be used:
   A. Max 500 kcmil single copper connector power cable with thermoplastic insulation and polyvinyl chloride (PVC) jacket.
   B. Max 300 pair No. 24 AWG copper conductor telecommunication cables with PVC insulation and jacket material.
   C. Max 7/C copper conductor No. 12 AWG multiconductor power and control cables with PVC or cross-linked polyethylene (XLPE) insulation and PVC jacket.
   D. Multiple fiber optical communication cables jacketed with PVC and having a max outside diam of 1/2 in.
   E. Max 3/C copper conductor No. 12 AWG with bare aluminum ground, PVC insulated steel Metal-Clad cable.
   F. Max 2/C No. 10 AWG with PVC insulation and jacket.
   G. Max 3/C No. 8 AWG aluminum clad cable with cross-linked polyethylene (XLPE) insulation and PVC jacket.
6. Cable Tray — Max 24 in. (762 mm) wide by max 4 in. (152 mm) deep or max 18 in. (457 mm) wide by max 6 in. (152 mm) deep open ladder cable tray with channel-shaped side rails formed from min 0.060 in. (1.5 mm) thick (No. 16 MSG) galv steel or min 0.060 in. (1.5 mm) thick aluminum with rungs spaced max 9 in. (227 mm) OC. A max of two cable trays may be installed within the opening with a min separation of 5 in. (127 mm) between trays. The min space between the cable tray and the periphery of the opening is 0 in. (point contact). Cable trays to be rigidly supported on both sides of the floor or wall assembly. Aggregate cross-sectional area of cables in cable tray not to exceed 40 percent of the cross-sectional area of the cable tray based on a max 3 in. (76 mm) cable loading depth within tray. Any combination of the cable types specified in Item 5 may be used.
7. Busway+ — (Not Shown) - Nom 23 in. (584 mm) wide (or smaller) by 4-1/2 in. (114 mm) deep "I" shaped aluminum or steel enclosure containing factory-mounted copper bars rated for 600 V, 5000 A or aluminum bars rated for 600 V, 4000 A. A max two busways to be installed within the opening. The annular space between the busway and the periphery of the opening shall be a min 1/2 in. (13 mm) to a max 5-3/4 in. (146 mm). Busways spaced min 6 in. (152 mm) from all other penetrants. Busway to be rigidly supported on both sides of floor or wall assembly. The busway shall bear the UL Listing Mark and shall be installed in accordance with all provisions of the National Electrical Code, NFPA 70. The F and FH Ratings of the firestop system are limited to 2 hr when this penetrant is used.
8. Optical Fiber Raceway (OFR)+ — (Not Shown) - Nom 2 in. (51 mm) diam (or smaller) OFR formed of either polyvinyl chloride (PVC) or polyvinylidene fluoride (PVDF) installed in accordance with the National Electrical Code (NFPA 70).

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

A. Fill, Void or Cavity Material — Wrap Strip - (Not Shown) - Nom 3/16 in. (4.8 mm) thick by 1 in. (25 mm) wide intumescent wrap strip. One layer of wrap strip is individually wrapped around each nonmetallic penetrant (Item 4) with ends butted and held in place with tape. Wrap strip installed centered within blocks.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP648-E- W25/1" Wrap Strip

B. Fill, Void or Cavity Material* — (Not Shown) - As an alternate to Item 9A above, each nonmetallic penetrant (Item 4) may be coated with min 1/16 in. (1.6 mm) thick by min 4 in. (102 mm) high layer of fill material around outside diam of pipe, centered within fire blocks.

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

C. Fill, Void or Cavity Materials* — Fire blocks installed with 8 in. (203 mm) dimension passed through the opening (centered) within floor or wall opening. For 2 hr F and FH Ratings only, when max opening dimension does not exceed 36 in. (914 mm), fire blocks may be installed with 5 in (127 mm) dimension projecting through opening flush with top surface of floor or centered in wall. Fire blocks firmly packed to fill entire area of opening. When annular space exceeds 12 in. and item 9E is not used, the orientation of the firestop block shall be with the 8 in. (203 mm) or 5 in (127 mm) dimension extending in the direction of the max annular space, depending on the depth of fire block required through the opening.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CFS-BL Firestop Block

D. Fill, Void or Cavity Material* — (Not Shown) - Fill material to be forced into interstices of cables, between cables and cable tray and any voids between blocks, between blocks and penetrants, and between blocks and periphery of opening to the max extent possible in any voids on top surface of floor or both surfaces of wall.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE MAX Intumescent Sealant or CP618 Firestop Putty Stick

Note: CP 618 is not suitable for use with CPVC (Item 4B).

E. Wire Mesh — (Not Shown) - When any dimension of the through opening exceeds 36 in. (914 mm), wire mesh is required on both sides of the wall or floor opening. When max dimension of the through opening does not exceed 36 in. (914 mm), wire mesh is required on top side of floor or both sides of wall only when the annular space exceeds 24 in. (609 mm). Nom 2 in.2 (51 mm2) wire fencing fabricated from min No 16 SWG (0.060 in. or 1.5 mm) galv steel wire cut to fit the contours of the penetrating items and the opening with a min 3 in. (76 mm) lap beyond the periphery of the opening. Wire mesh secured to both sides of floor or wall by means of 1/4 in. (6 mm) diam by 1-1/2 in. (38 mm) long steel concrete screws in conjunction with 1-1/2 in. (38 mm) diam steel fender washers spaced max 6 in. (152 mm) OC. Any joints within wire mesh shall overlap 2 in. (51 mm) and be secured together by means of No. 20 SWG steel wire spaced 6 in. (152 mm) OC.

E1. Wire Mesh — (Not Shown, Alternate as an option to Item 9E) - When any dimension of the through opening exceeds 36 in. (914 mm), wire mesh is required on both sides of the wall or floor opening. When max dimension of the through opening does not exceed 36 in. (914 mm), wire mesh is required on top side of floor or both sides of wall only when the annular space exceeds 24 in. (609 mm). Nom 1 in. (25 mm) hexagonal wire fencing fabricated from No 20 SWG (0.036 in. or 0.9 mm) or heavier galv steel wire cut to fit the contours of the penetrating items and the opening with a min 3 in. (76 mm) lap beyond the periphery of the opening. Wire mesh secured to both sides of floor or wall by means of 1/4 in. (6 mm) diam by 1-1/2 in. (38 mm) long steel concrete screws in conjunction with 1-1/2 in. (38 mm) diam steel fender washers spaced max 6 in. (152 mm) OC. Any joints within wire mesh shall overlap 2 in. (51 mm) and be secured together by means of No. 20 SWG steel wire spaced 6 in. (152 mm) OC.

+ Bearing the UL Listing Mark

Bearing the UL Recognized Component Mark

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