



THE FIRESTOP AUTHORITY

An ISO9001:2008 Company

Sample Through Floor T Rating 2 hour

Date

12/13/2018

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Systems

1 CAJ1614

Max 4" steel or iron pipe or max 4" steel conduit. 2-1/2 & 3 Hr T rating with glass fiber duct wrap.

2 FA1171

Max 10" Steel or Iron pipe, max 4" copper pipe or tube, max 6" conduit, max 4" EMT, max 1" flexible steel conduit. W Rating (Class 1), Equal F & T Ratings. UNIFRAX: Fyrewrap Elite 1.5 Duct Insulation.

3 CAJ1562

Max 10" Steel or Iron pipe, max 4" copper pipe or tube, max 6" conduit, max 4" EMT, max 1" flexible metal conduit. W Rating (Class 1). 3 HR. Equal F & T Ratings

4 FA1093

Max 10" Steel or Iron pipe, max 4" copper pipe or tube, max 6" conduit, max 4" EMT, max 1" flexible steel conduit. W Rating (Class 1), Equal F & T Ratings. FireMaster FastWrap+, FireMaster FastWrap XL, or Pyroscat Duct Wrap XL.

5 CAJ8131

Multiple metal pipes, conduits, or plastic pipes (closed) or RNC/OFR/ENT, and cables. Optional steel sleeve. 8" hole. Caulk & backing.

6 CAJ8114

Multiple metal/non-metallic conduits, cable trays, cables, or busways. SpecSeal T Collar. 1920 sq. in. opening. Mortar.

Product Data Sheets

1 LC Endothermic Sealant

2 LCI Intumescent Sealant

3 SIL Silicone Sealant

4 SSS Intumescent Sealant

5 BLU Wrap Strip

6 BLU2 Wrap Strip

7 RED Wrap Strip

8 RED2 Wrap Strip

9 SSP Putty

10 SSM Mortar

Approval Information

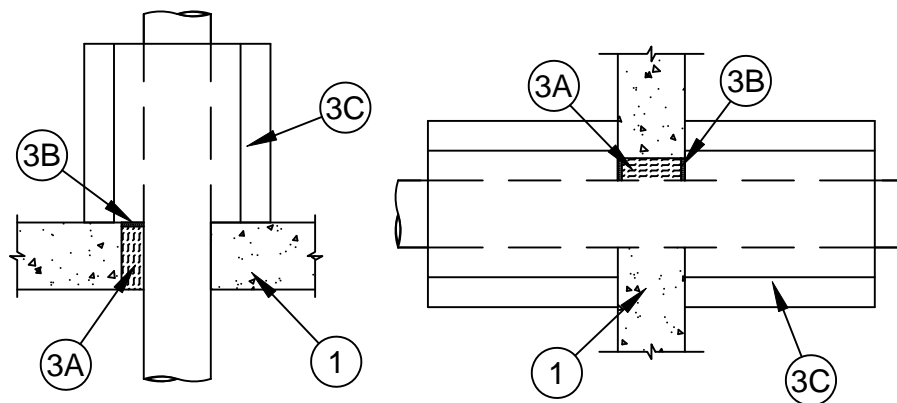
Certificates of Compliance

1 STI General Certificate of Conformance

System No. C-AJ-1614



ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating - 3 Hr	F Rating - 3 Hr
T Ratings - 2-1/2 and 3 Hr (See Item 1)	FT Ratings - 2-1/2 and 3 Hr (See Item 1)
L Rating At Ambient - Less Than 1 CFM/sq ft	FH Rating - 3 Hr
L Rating At 400 F - Less Than 1 CFM/sq ft	FTH Ratings - 2-1/2 and 3 Hr (See Item 1)
W Rating - Class 1 (See Item 3B)	L Rating At Ambient - Less Than 1 CFM/sq ft
	L Rating At 400 F - Less Than 1 CFM/sq ft



- 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 **Concrete Blocks***. Max diam of opening is 6 in. (152 mm).

The T Rating is 2-1/2 hr for floors and 3 hr for walls.

See **Concrete Blocks** (CAZT) category for names of manufacturers.

- Through Penetrant** - One metallic pipe or conduit to be installed either concentrically or eccentrically within the firestop system. The annular space between the through penetrant and the periphery of opening shall be min 0 in. (point contact) to a max of 1-1/2 in. (38 mm). Through penetrant to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipe or conduit may be used:
 - Steel Pipe** - Nom 4 in. (102 mm) diam (or smaller) Schedule 40 (or heavier) steel pipe.
 - Iron Pipe** - Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.
 - Steel Conduit** - Nom 4 in. (102 mm) diam (or smaller) rigid steel conduit.
- Firestop System** - The details of the firestop system shall be as follows:
 - Packing Material** - Min 4 pcf (64 kg/m³) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to extend through entire thickness of concrete floor or wall except for recess at top surface of floor or both surfaces of the wall to accommodate the required thickness of fill material.
 - Fill, Void or Cavity Materials* - Sealant or Putty** - Min 1/2 in. (13 mm) thickness of sealant or putty applied within the annulus, flush with top surface of floor or both surfaces of the wall. At point contact, apply min 1/4 in. (6 mm) bead at penetrant/concrete interface on top surface of floor or both surfaces of the wall.

SPECIFIED TECHNOLOGIES INC - SpecSeal Series SSS Sealant, SpecSeal LCI Sealant, SpecSeal LC150 Sealant, SpecSeal Putty, Pensil 300 Sealant, SpecSeal Series SIL300 Sealant, Pensil 300 S/L Sealant (floors only) or SpecSeal Series SIL300SL Sealant (floors only)

W Rating applies only when Pensil 300, SpecSeal Series SIL300, Pensil 300 S/L or SpecSeal Series SIL300SL Sealant is used



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C. **Batts and Blankets*** - Nom 2 in. (51 mm) thick nom 1 pcf (16 kg/m³) density glass fiber duct wrap with foil-scrim-kraft facing. Two min 12 in. (305 mm) lengths of duct wrap tightly wrapped around the penetrant and tightly butted to the top surface of the floor or to both sides of the wall and secured with foil-scrim tape. In walls, duct wrap additionally secured with No. 18 gauge steel tie wire. All longitudinal seams of duct wrap are to be sealed with foil-scrim tape.

See **Batts and Blankets** (BKNV) category in the Building Materials Directory for names of manufacturers. Any batts and blankets 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.

* 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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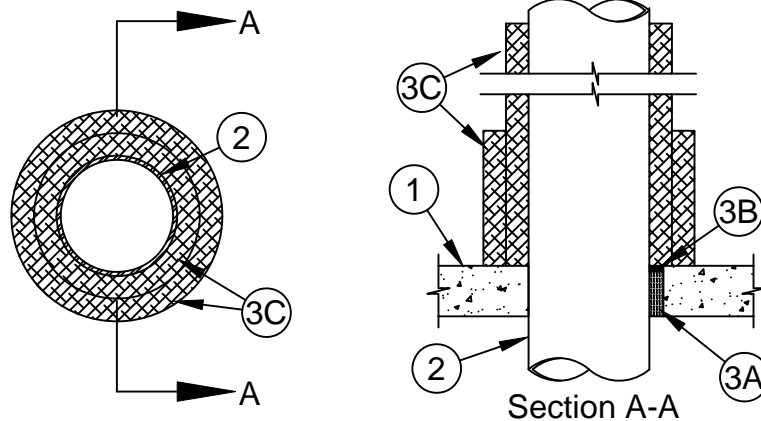


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System No. F-A-1171



ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating - 2 Hr	F Rating - 2 Hr
T Ratings - 1-1/2, 1-3/4 and 2 Hr (See Item 2)	FT Ratings - 1-1/2, 1-3/4 and 2 Hr (See Item 2)
L Rating At Ambient - Less Than 1 CFM/sq ft	FH Rating - 2 Hr
L Rating At 400 F - Less Than 1 CFM/sq ft	FTH Ratings - 1-1/2, 1-3/4 and 2 Hr (See Item 2)
W Rating - Class 1 (See Item 3B)	L Rating At Ambient - Less Than 5.1 L/s/m ²
	L Rating At 204 C- Less Than 5.1 L/s/m ²



- Floor Assembly** - Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete. As an alternate, any min 2 hr fire rated D700, D800 or D900 Series Floor-Ceiling Design in the UL Fire Resistance Directory having a min 2-1/2 in. (64 mm) thickness of lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete topping over the steel deck may be used. Floor may also be constructed of any min 6 in. (152 mm) thick hollow core UL Classified **Precast Concrete Units***. Max diam of opening 12 in. (305 mm). Max diam of opening in floor constructed of hollow-core precast concrete units is 7 in. (178 mm).

See **Precast Concrete Units** (CFTV) category in the Fire Resistance Directory for names of manufacturers.

- Through-Penetrant** - One metallic pipe, conduit or tubing installed concentrically or eccentrically within opening. Annular space between penetrant and periphery of opening shall be min of 0 in. (0 mm, point contact) to max 2 in. (51 mm). Penetrant to be rigidly supported on both sides of floor assembly. The following types and sizes of penetrants may be used:
 - Steel Pipe** - Nom 10 in. (254 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
 - Iron Pipe** - Nom 10 in. (254 mm) diam (or smaller) cast or ductile iron pipe.
 - Copper Tubing** - Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tubing.
 - Copper Pipe** - Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
 - Conduit** - Nom 6 in. (152 mm) diam (or smaller) steel conduit, nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing (EMT), or nom 1 in. (25 mm) diam (or smaller) flexible steel conduit.

The T, FT and FTH Ratings are 2 Hr when Item 2A, 2B or 2E is used or when max 2 in. (51 mm) diam copper tubing (Item 2C) or copper pipe (Item 2D) is used. The T, FT and FTH Ratings are 1-1/2 hr when copper tubing or copper pipe (Item 2C or 2D) larger than nom 2 in. (51 mm) diam is used in floors having a min concrete thickness which is less than 4-1/2 in. (114 mm). The T, FT and FTH Ratings are 1-3/4 Hr when copper tubing or copper pipe (Item 2C or 2D) larger than nom 2 in. (51 mm) diam is used in floors having a min 4-1/2 in. (114 mm) concrete thickness.



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3. **Firestop System** - The details of the firestop system shall be as follows:

- A. **Packing Material** - Min 4 pcf (64 kg/m³) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to extend through entire thickness of concrete floor except for recess at top surface of floor to accommodate the required thickness of fill material.
- B. **Fill, Void or Cavity Materials* - Sealant or Putty** - Min 1/2 in. (13 mm) thickness of caulk or putty applied within the annulus, flush with top surface of floor. At point contact, apply min 1/4 in. (6 mm) bead at penetrant/concrete interface on top surface of floor.

SPECIFIED TECHNOLOGIES INC - SpecSeal 100, 101, 102, 105, 120 or 129 Sealant, SpecSeal LCI Sealant, SpecSeal LC150 Sealant, SpecSeal LE600 Sealant, SpecSeal Putty, Pensil 300 Sealant or SpecSeal Series SIL300 Sealant for floors or walls and Pensil 300 SL Sealant or SpecSeal Series SIL300SL Sealant for floors only.

W Rating applies only when Pensil 300, SpecSeal Series SIL300, Pensil 300 S/L or SpecSeal Series SIL300SL Sealants are used with solid penetrant (not flexible steel conduit).

- C. **Duct Wrap Material*** - Min 1-1/2 in. (38 mm) thick duct wrap tightly wrapped around penetrant to extend 36 in. (914 mm) above floor. An additional layer of min 1-1/2 in. (38 mm) thick duct wrap tightly wrapped around the first layer of duct wrap to extend 12 in. (305 mm) above floor. All longitudinal seams of both layers of duct wrap are sealed with foil tape.

UNIFRAX I L L C - FyreWrap Elite 1.5 Duct Insulation

***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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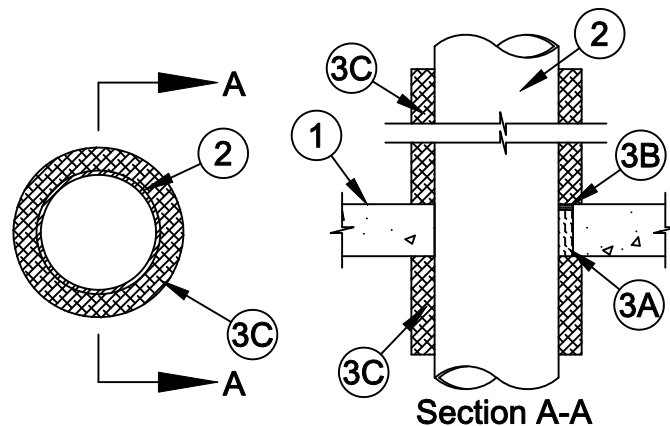


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System No. C-AJ-1562



ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating - 3 Hr	F Rating - 3 Hr
T Rating - 3 Hr	FT Rating - 3 Hr
L Rating At Ambient - Less Than 1 CFM/sq ft	FH Rating - 3 Hr
L Rating At 400 F - Less Than 1 CFM/sq ft	FTH Rating - 3 Hr
W Rating - Class 1 (See Item 3B)	L Rating At Ambient - Less Than 1 CFM/sq ft
	L Rating At 400 F - Less Than 1 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/m³) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks***. Floor may also be constructed of any UL Classified **Precast Concrete Units***. Max diam of opening 12 in. (305 mm). Max diam of opening in floor constructed of hollow-core precast concrete units is 7 in. (178 mm).
See **Concrete Blocks (CAZT)** and **Precast Concrete Units (CFTV)** categories in Fire Resistance Directory for names of manufacturers.
2. **Through-Penetrant** - One metallic pipe, conduit or tubing installed concentrically or eccentrically within opening. Annular space between penetrant and periphery of opening shall be min 0 in. (0 mm, point contact) to max 2 in. (51 mm). Penetrant to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of penetrants may be used:
 - A. **Steel Pipe** - Nom 10 in. (254 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
 - B. **Iron Pipe** - Nom 10 in. (254 mm) diam (or smaller) cast or ductile iron pipe.
 - C. **Copper Tubing** - Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tubing.
 - D. **Copper Pipe** - Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
 - E. **Conduit** - Nom 6 in. (152 mm) diam (or smaller) steel conduit, nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing (EMT), or nom 1 in. (25 mm) diam (or smaller) flexible steel conduit.
3. **Firestop System** - The details of the firestop system shall be as follows:
 - A. **Packing Material** - Min 4 in. (102 mm) thickness of min 4 pcf (64 kg/m³) mineral wool batt insulation firmly packed into opening as a permanent form. In floors constructed of precast concrete units, packing material to be flush with bottom of floor. Packing material to be recessed from top surface of floor or from both surfaces of wall to accommodate the required thickness of fill material.



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B. **Fill, Void or Cavity Materials* - Sealant or Putty** - Min 1/2 in. (13 mm) thickness of sealant or putty applied within the annulus, flush with top surface of floor or with both surfaces of wall. At point contact, apply min 1/4 in. (6 mm) bead at penetrant/concrete interface on top surface of floor or both surfaces of wall.

SPECIFIED TECHNOLOGIES INC - SpecSeal Series SSS Sealant, SpecSeal LCI Sealant, SpecSeal Putty, Pensil 300 Sealant, or SpecSeal Series SIL300 Sealant for floors or walls, and Pensil 300 SL Sealant or SpecSeal Series SIL300SL Sealant for floors only.

W Rating applies only when Pensil 300, Pensil 300 SL, SpecSeal Series SIL300 or SpecSeal Series SIL300 SL Sealants are used with solid penetrant (not flexible steel conduit).

C. **Duct Wrap Material*** - Nom 2 in. (51 mm) thick duct wrap tightly wrapped around penetrant to extend 12 in. (305 mm) below floor and 36 in. (914 mm) above floor or 36 in. (914 mm) beyond both surfaces of wall. Longitudinal seams sealed with foil tape. Duct wrap secured with No. 16 AWG steel tie wire spaced 2 in. from each end of duct wrap section. Steel tie wire not required on top surface of floor.

THERMAL CERAMICS INC - FireMaster FastWrap XL, or Pyroscat Duct Wrap XL.

* 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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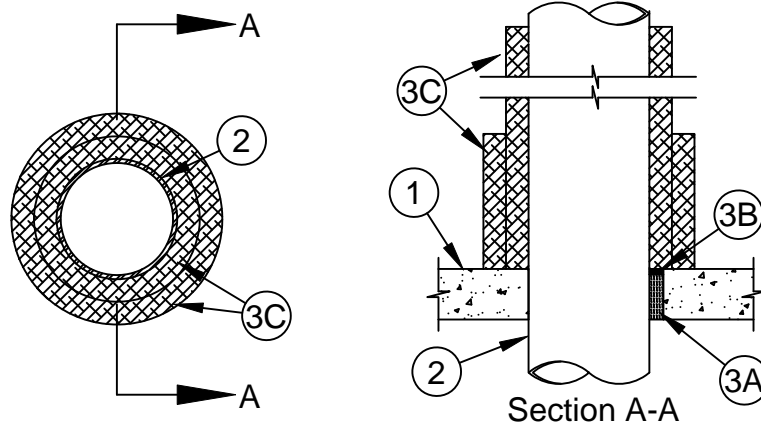


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System No. F-A-1093



ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating - 2 Hr	F Rating - 2 Hr
T Ratings - 1-1/2, 1-3/4 and 2 Hr (See Item 2)	FT Ratings - 1-1/2, 1-3/4 and 2 Hr (See Item 2)
L Rating At Ambient - Less Than 1 CFM/sq ft	FH Rating - 2 Hr
L Rating At 400 F - Less Than 1 CFM/sq ft	FTH Ratings - 1-1/2, 1-3/4 and 2 Hr (See Item 2)
W Rating - Class 1 (See Item 3B)	L Rating At Ambient Less Than 5.1 L/s/m ²
	L Rating At 204 C Less Than 5.1 L/s/m ²



1. **Floor Assembly** - Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete. As an alternate, any min 2 hr fire rated D700, D800 or D900 Series Floor-Ceiling Design in the UL Fire Resistance Directory having a min 2-1/2 in. (64 mm) thickness of lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete topping over the steel deck may be used. Floor may also be constructed of any min 6 in. (152 mm) thick hollow core UL Classified **Precast Concrete Units***. Max diam of opening 12 in. (305 mm). Max diam of opening in floor constructed of hollow-core precast concrete units is 7 in. (178 mm).
See **Precast Concrete Units** (CFTV) category in Fire Resistance Directory for names of manufacturers.
2. **Through-Penetrant** - One metallic pipe, conduit or tubing installed concentrically or eccentrically within opening. Annular space between penetrant and periphery of opening shall be min of 0 in. (0 mm, point contact) to max 2 in. (51 mm). Penetrant to be rigidly supported on both sides of floor assembly. The following types and sizes of penetrants may be used:
 - A. **Steel Pipe** - Nom 10 in. (254 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
 - B. **Iron Pipe** - Nom 10 in. (254 mm) diam (or smaller) cast or ductile iron pipe.
 - C. **Copper Tubing** - Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tubing.
 - D. **Copper Pipe** - Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
 - E. **Conduit** - Nom 6 in. (152 mm) diam (or smaller) steel conduit, nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing (EMT), or nom 1 in. (25 mm) diam (or smaller) flexible steel conduit.

The T, FT and FTH Ratings are 2 Hr when Item 2A, 2B or 2E is used or when max 2 in. (51 mm) diam copper tubing (Item 2C) or copper pipe (Item 2D) is used. The T, FT and FTH Ratings are 1-1/2 hr when copper tubing or copper pipe (Item 2C or 2D) larger than nom 2 in. (51 mm) diam is used in floors having a min concrete thickness which is less than 4-1/2 in. (114 mm). The T, FT and FTH Ratings are 1-3/4 Hr when copper tubing or copper pipe (Item 2C or 2D) larger than nom 2 in. (51 mm) diam is used in floors having a min 4-1/2 in. (114 mm) concrete thickness.



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3. **Firestop System** - The details of the firestop system shall be as follows:

A. **Packing Material** - Min 4 pcf (64 kg/m³) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to extend through entire thickness of concrete floor except for recess at top surface of floor to accommodate the required thickness of fill material.

B. **Fill, Void or Cavity Materials* - Sealant or Putty** - Min 1/2 in. (13 mm) thickness of caulk or putty applied within the annulus, flush with top surface of floor. At point contact, apply min 1/4 in. (6 mm) bead at penetrant/concrete interface on top surface of floor.

SPECIFIED TECHNOLOGIES INC - SpecSeal 100, 101, 102, 105, 120 or 129 Sealant, SpecSeal LCI Sealant, SpecSeal LC150 Sealant, SpecSeal LE600 Sealant, SpecSeal Putty, Pensil 300 Sealant or SpecSeal Series SIL300 Sealant for floors or walls and Pensil 300 SL Sealant or SpecSeal Series SIL300SL Sealant for floors only.

W Rating applies only when Pensil 300, SpecSeal Series SIL300, Pensil 300 S/L or SpecSeal Series SIL300SL Sealants are used with solid penetrant (not flexible steel conduit).

C. **Duct Wrap Material*** - Min 1-1/2 in. (38 mm) thick duct wrap tightly wrapped around penetrant to extend 36 in. (914 mm) above floor. An additional layer of min 1-1/2 in. (38 mm) thick duct wrap tightly wrapped around the first layer of duct wrap to extend 12 in. (305 mm) above floor. All longitudinal seams of both layers of duct wrap are sealed with foil tape.

THERMAL CERAMICS INC - FireMaster FastWrap+, FireMaster FastWrap XL, or Pyroscat Duct Wrap XL.

* 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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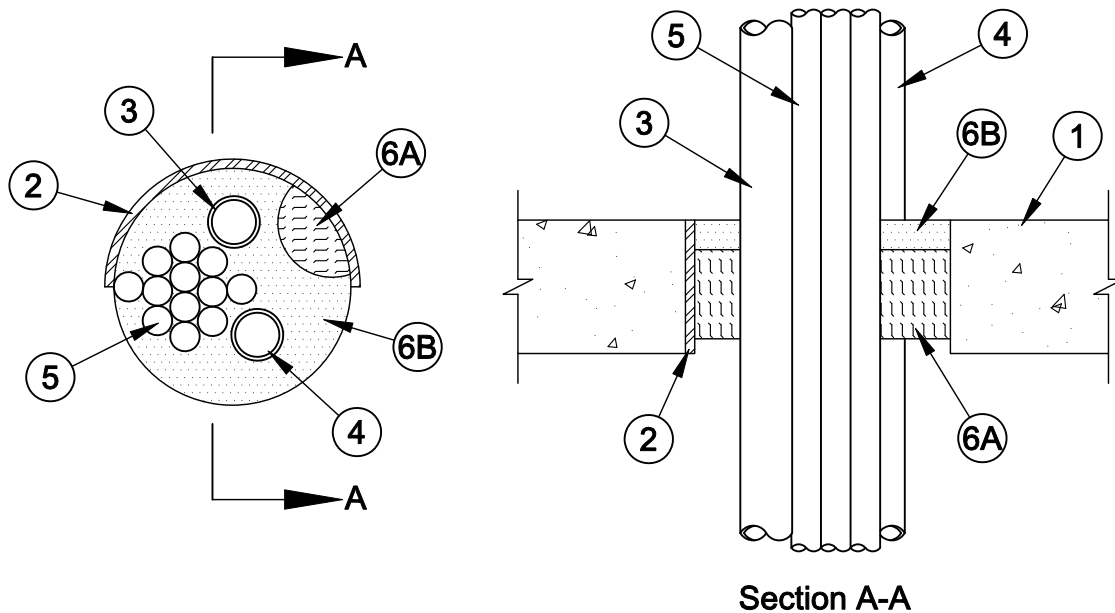


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System No. C-AJ-8131

F Rating - 2 Hr

T Ratings - 1/4, 1/2, 3/4 and 2 Hr (See Items 2, 3, 4 and 5)



Section A-A

- Floor or Wall Assembly** - Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete floor or wall assembly. Floor may also be constructed of any min 6 in. (152 mm) thick hollow core UL Classified **Precast Concrete Units***. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening is 8 in. (203 mm). Max diam of opening in floor constructed of hollow-core precast concrete units is 7 in. (178 mm).
See **Concrete Blocks** (CAZT) or **Precast Concrete Units** (CFTV) categories in the Fire Resistance Directory for names of manufacturers.
- Steel Sleeve** - (Optional) - Nom 8 in. (203 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe sleeve cast or grouted into concrete flush with or extending max 2 in. (51 mm) beyond floor or wall surfaces. **When steel sleeve is used, max T Rating is 1/2 hr.**
- Metallic Penetrants** - One or more metallic pipes, conduits or tubing installed concentrically or eccentrically within the opening. Annular space between metallic penetrants and periphery of opening to be min 0 in. (point contact) to max 2 in. (51 mm). Annular space between metallic penetrants and nonmetallic penetrants or cables to be min 1/2 in. (13 mm) to max 1-1/2 in. (38 mm). Metallic pipes, conduits or tubing to be rigidly supported on both sides of floor or wall assembly. Any combination of the following types and sizes of metallic pipes, conduits or tubing may be installed within the opening:
 - Steel Pipe** - Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) steel pipe.
 - Iron Pipe** - Nom 2 in. (51 mm) diam (or smaller) cast or ductile iron pipe.
 - Conduit** - Nom 2 in. (51 mm) diam (or smaller) rigid steel conduits, electrical metallic tubing (EMT) or flexible steel conduit.**The max T Rating is 3/4 hr when Item 3 is used.**
- Nonmetallic Penetrants** - One or more nonmetallic pipes, conduits or tubing installed concentrically or eccentrically within the opening. Annular space between nonmetallic penetrants and metallic penetrants or cables to be min 1/2 in. (13 mm) to max 1-1/2 in. (38 mm). Annular space between nonmetallic penetrants and periphery of opening to be min 1/2 in. to max 2 in. Nonmetallic pipes, conduits or tubing to be rigidly supported on both sides of floor or wall assembly. Any combination of the following types and sizes of nonmetallic pipes, conduits or tubing may be installed within the opening:



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- A. **Polyvinyl Chloride (PVC) Pipe** - Nom 2 in. (51 mm) diam (or smaller) Schedule 40 PVC pipe for use in closed (process or supply) piping systems.
- B. **Chlorinate Polyvinyl Chloride (CPVC) Pipe** - Nom 2 in. (51 mm) diam (or smaller) SDR11 CPVC pipe for use in closed (process or supply) piping systems.
- C. **Rigid Nonmetallic Conduit (RNC)+** - Nom 2 in. (51 mm) diam (or smaller) Schedule 40 PVC conduit installed in accordance with the National Electrical Code (NFPA 70).
- D. **Electrical Nonmetallic Tubing (ENT)+** - Nom 2 in. (51 mm) diam (or smaller) ENT formed from PVC installed in accordance with the National Electrical Code (NFPA 70).
- E. **Optical Fiber Raceway (OFR)+** - Nom 2 in. (51 mm) diam (or smaller) optical fiber raceway ("innerduct") formed from either PVC or polyvinylidene fluoride (PVDF) installed in accordance with the National Electrical Code (NFPA 70).

The max T Rating is 2 hr when Item 4 is used.

- 5. **Cables** - Nom 4 in. (102 mm) diam (or smaller) tight bundle of cables. Cable bundle spaced min 1/2 in. (13 mm) to max 1-1/2 in. (38 mm) from metallic and nonmetallic penetrants. Cable bundle spaced 0 in. (point contact) to 2 in. (51 mm) from periphery of opening. Cable bundle to be rigidly supported on both sides of floor or wall assembly. Any combination of the following types and sizes of cables may be used:
 - A. Max 100 pair No. 24 AWG (or smaller) copper conductor with polyvinyl chloride (PVC) insulation and jacket materials.
 - B. Max 1/C No. 500 kcmil (or smaller) copper conductor cable with cross-linked polyethylene (XLPE) jacket.
 - C. Max 7/C No. 12 AWG (or smaller) copper conductor power and control cables with XLPE or PVC insulation with XLPE or PVC jacket.
 - D. Max 4/C No. 4/0 AWG (or smaller) copper or aluminum conductor SER cables with PVC insulation and jacket.
 - E. Max 3/C No. 2/0 AWG (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TEK cable.
 - F. Max 110/125 fiber optic (F.O.) cable with PVC insulation and jacket.
 - G. Max 3/C with ground No. 8 AWG (or smaller) copper conductor NM cable (Romex) with PVC insulation and jacket.
 - H. Max RG/U coaxial cable with fluorinated ethylene insulation and jacket.
 - I. Max 4 pair No. 24 AWG (or smaller) copper conductor data cable with PVC jacket and insulation.
 - J. Max 4/C with ground No. 2/0 (or smaller) aluminum or copper conductor **Metal-Clad+** or **Armored-Clad+** cable with steel or aluminum jacketing.

AFC CABLE SYSTEMS INC

When Item D is used the T Rating is 1/4 hr, otherwise the T Rating is 3/4 Hr.

- 6. **Firestop System** - The firestop system consists of the following:
 - A. **Packing Material** - Min 3 in. (76 mm) depth of min 4 pcf (64 kg/m³) density mineral wool batt insulation tightly-packed into opening. In floors, packing material recessed from top surface of floor or steel sleeve as required to accommodate the required thickness of fill material (Item 4B). In floors constructed of hollow-core precast concrete units, mineral wool packing material to extend below exposed cores in precast concrete units. In walls, packing material recessed from both surfaces of wall or from both ends of sleeve to accommodate the required thickness of fill material.
 - B. **Fill, Void or Cavity Material* - Sealant** - Min 1 in. (25 mm) thickness of fill material applied flush with top surface of floor or both surfaces of wall. At point contact locations, apply a min 3/8 in. (10 mm) diam bead of fill material at the penetrant/steel sleeve or concrete interface.

SPECIFIED TECHNOLOGIES INC - SpecSeal Series SSS Sealant or SpecSeal LCI Sealant

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

+Bearing the UL Listing Mark

With metallic penetrants, cannot meet 2 hour T rating because of lack of additional insulation. Only noncombustible penetrants achieve the 2 hour T rating in this assembly



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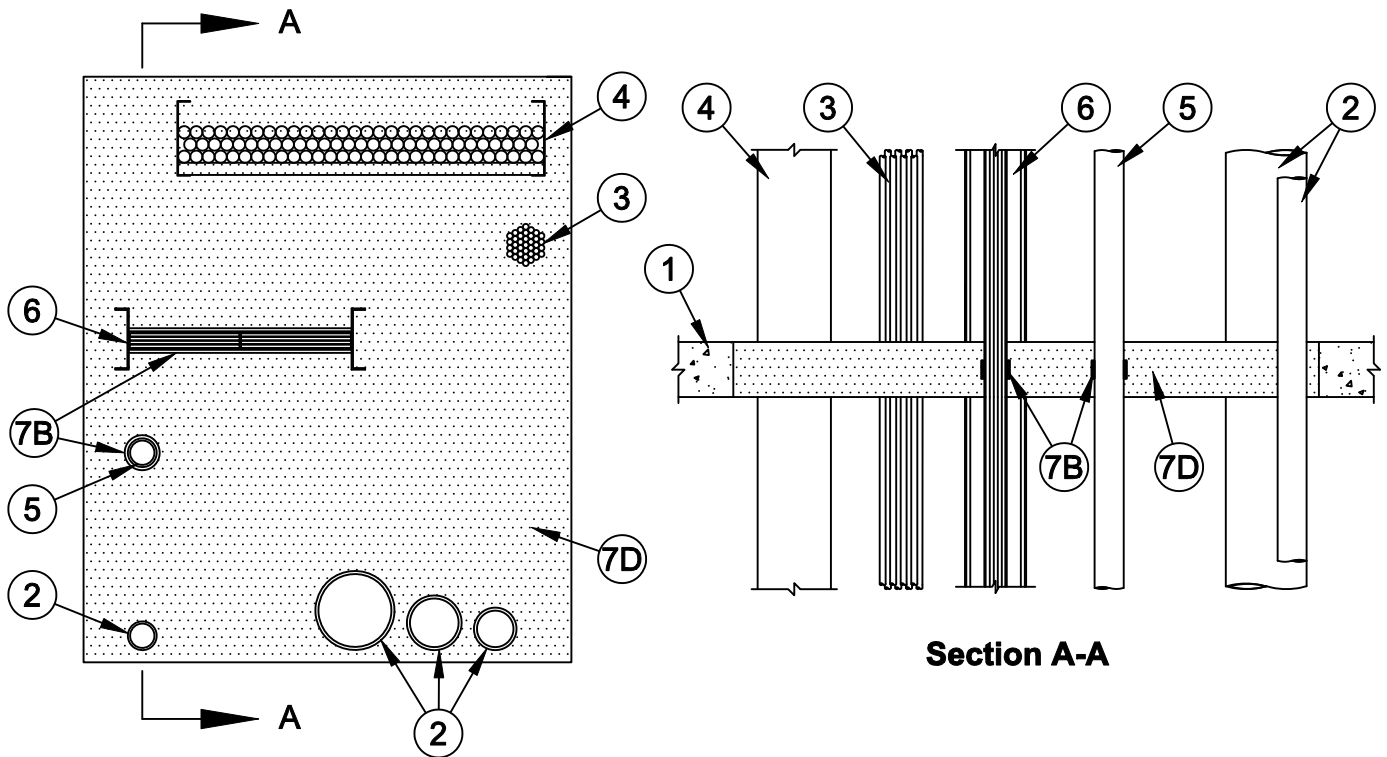


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System No. C-AJ-8114

F Rating - 2 Hr

T Ratings - 0, 1/2, and 2 Hr (See Items 2 through 6)



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 **Concrete Blocks***. Max area of opening is 1920 sq in. (1.2 m²) with a max dim of 48 in. (1.2 m).

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

2. **Metallic Conduits** - One or more nom 6 in. (152 mm) diam (or smaller) rigid steel conduits, nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing (EMT) or nom 1 in. (25 mm) diam (or smaller) flexible steel conduits installed within the opening. Min space between conduits and periphery of opening is 1 in. (25 mm). Min space between conduits is 1 in. (25 mm). Conduit to be rigidly supported on both sides of floor or wall assembly. **When metallic conduit is used, the T Rating is 1/2 hr.**
3. **Cables** - Nom 4 in. (102 mm) diam (or smaller) tight bundle of cables. Cable bundle spaced min 6 in. (152 mm) from metallic conduits. Clearance between cable bundle and periphery of opening is min 2 in. (51 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 1/C - 350 kcmil cable with polyvinyl chloride (PVC) or cross-linked polyethylene (XLPE) insulation and jacket.
 - B. Max 7/C - No. 12 AWG cable with PVC-nylon insulation and PVC jacket.
 - C. Max 200 pair No. 24 AWG copper conductor cable with PVC insulation and jacket.
 - D. Max RG/U coaxial cables with fluorinated ethylene jacket and insulation.
 - E. Multiple fiber optic cables with PVC insulation.
 - F. **Through Penetrating Products*** - Max 3/C with ground No. 12 AWG Metal-Clad Cable+.

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When cables are used, the T Rating is 0 hr.



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4. **Cable Tray** - Max 30 in. (762 mm) wide by 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 GA) galv steel or min 0.060 in. (1.5 mm) thick aluminum with rungs spaced max 9 in. (227 mm) OC. A max of three cable trays may be installed within the opening with a min separation of 6 in. (152 mm) between cable trays and with a min separation distance of 6 in. (152 mm) from metallic conduits. The min space between the cable tray and the periphery of the opening is 2 in. (51 mm). Cable trays rigidly supported on both sides of 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 the tray. Any combination of the cable types specified in Item 3 may be used. **When cable tray is used, the T Rating is 0 hr.**
5. **Nonmetallic Conduits** - One or more nonmetallic conduits spaced min 1 in. (25 mm) apart and 1 in. from periphery of opening. Min clearance between nonmetallic conduits and metallic conduits is 6 in. (152 mm). Penetrants rigidly supported on both sides of floor or wall assembly. Any of the following types and sizes may be used.
- A. **Rigid Nonmetallic Conduit+** - Nom 2 in. (51 mm) diam (or smaller) PVC conduit installed in accordance with Article 347 of the National Electrical Code (NFPA 70).
- B. **Optical Fiber Raceway (OFR)+** - Nom 2 in. (51 mm) diam (or smaller) OFR formed of either polyvinyl chloride (PVC) or polyvinylidene fluoride (PVDF) installed in accordance with Article 770 of the National Electrical Code (NFPA 70).
See **Optical Fiber Raceway (QAZM)** category in the Electrical Constructions Materials Directory for names of manufacturers.
When nonmetallic conduit is used, the T Rating is 0 hr.
6. **Busway+** - Nom 19 in. (483 mm) wide (or smaller) by 5 in. (127 mm) deep "I" shaped aluminum enclosure containing factory-mounted copper bars rated for 600 V, 5000 A or aluminum bars rated for 600 V, 4000 A. A max of two busways may be installed within the opening. The min space between the busway and the periphery of the opening is 2 in. 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 Article 364 of the National Electrical Code, NFPA 70. **When busway is used, the T Rating is 0 hr.**
7. **Firestop System** - The firestop system consists of the following items:
- A. **Fill, Void or Cavity Material* - Putty or Sealant - (Not Shown)** - Fill material forced into grouped cable interstices to max extent possible.
SPECIFIED TECHNOLOGIES INC - SpecSeal Putty or SpecSeal 100, 101, 105, 120 or 129 Sealant
- B. **Fill, Void or Cavity Material* - Wrap Strip** - Nom 1/8 in. (3.2 mm) thick by 1-1/2 in. (38 mm) wide (RED2), nom 1/4 in. (6 mm) thick by 1-1/2 in. (38 mm) wide (RED), 3/16 in. (4.8 mm) by 2 in. (51 mm) wide (BLU) or 1/8 in. (3.2 mm) by 2 in. (51 mm) wide (BLU2) intumescent strips faced on both sides with a plastic film.. One layer of wrap strip installed in web sections of busway and wrapped around outer circumference of nonmetallic conduit. Wrap strip ends butted and held in place with aluminum foil tape. In floors, the bottom edge of wrap strip shall be recessed 1-1/2 in. from the bottom surface of the floor. In walls having a thickness of 5 in. or less, the wrap strip shall be centered at mid-depth of wall assembly. In walls having a thickness of greater than 5 in., the wrap strip shall be installed on both sides of the wall such that the exposed edge of wrap strip is recessed 1-1/4 in. from each side of wall.
SPECIFIED TECHNOLOGIES INC - SpecSeal BLU or BLU2 Wrap Strip or SpecSeal RED or RED2 Wrap Strip
- C. **Forms - (Not Shown)** - Used as a form to prevent leakage of fill material. Forms to be rigid sheet material cut to fit the contours of the penetrants and positioned on the bottom surface of floor or both sides of wall to accommodate the required thickness of fill material. Forms to be removed after fill material has cured.
- D. **Fill, Void or Cavity Material* - Mortar** - Min 3-1/2 in. (89 mm) thickness of fill material applied within annulus. Mortar to be mixed with water in accordance with the installation instructions provided with the product. When cable tray or cables are used, min thickness of mortar is 4-1/2 in. (114 mm).
SPECIFIED TECHNOLOGIES INC - SpecSeal Mortar
- * Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.
- #Bearing the UL Recognized Components Mark
+Bearing the UL Listing Mark



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