

**System No. W-L-7018**

ANSI/UL1479 (ASTM E814)	CANULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 1/2 Hr	FT Rating — 1-1/2 Hr
	FH Rating — 2 Hr
	FTH Rating — 1-1/2 Hr

**SECTION A-A**

1. Wall Assembly — The 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:  
 A. Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide and spaced max 24 in. (610 mm) OC.  
 B. Gypsum Board\* — Two layers of nom 5/8 in. (16 mm) thick gypsum wallboard as specified in the individual Wall and Partition Design No. Max diam of opening is 9 in. (229 mm).  
 2. Metallic Sleeve — Cylindrical sleeve fabricated from min 0.016 in. (0.40 mm) thick (No. 28 gauge) galv steel sheet steel and having a min 2 in. (51 mm) lap along the longitudinal seam. Length of sleeve to be 18 in. (457 mm) less than thickness of wall. Sleeve to be installed by rolling the sheet metal to a diam smaller than the through opening, inserting the coil through the openings and releasing the coil to let uncoil against the circular cutouts in the gypsum wallboard layers.

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3. Steel Duct — Nom 6 in. (152 mm) diam (or smaller) No. 28 gauge (or heavier) galv steel duct to be installed concentrically within the firestop system. Duct to be rigidly supported on both sides of the wall assembly.  
 4. Pipe Covering — Nom 1 in. (25 mm) thick hollow cylindrical heavy density (3.5 pcf or 56 kg/m<sup>3</sup>) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with but tape supplied with the product. The annular space between the insulated pipe and the steel sleeve shall be min 0 in. (point contact) to max 1 in. (25 mm).  
 See Pipe Equipment Covering — Materials — (BRGU) Category in the Building Materials Directory for names of manufacturers. Any pipe covering 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.  
 5. Fill, Void or Cavity Material\* — Sealant — Min 1-1/4 in. (32 mm) depth of sealant applied within the annulus, flush with each surface of the wall assembly. At the point contact location between insulated pipe and wall, a min 1/2 in. (13 mm) diam bead of sealant shall be applied on both surfaces of wall, lapping 1/4 in. (6 mm) beyond the periphery of the opening.  
 HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant

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

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**System No. F-C-7057**

ANSI/UL1479 (ASTM E814)	CANULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Rating — 1 Hr	FT Rating — 1 Hr
	FH Rating — 1 Hr
	FTH Rating — 1 Hr

**SECTION A-A**

1. Floor-Ceiling Assembly — The 1 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The general construction details of the floor-ceiling assembly are summarized below.  
 A. Flooring System — Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture\* as specified in the individual Floor-Ceiling Design. Max area of floor opening is 150 in 2 (0.098 m<sup>2</sup>) with a max 1.5 in. (38 mm) annular space between duct and framing members.  
 B. Wood Joists — Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members\* with bridging as required and with ends firestopped. Additional framing members installed to form a square enclosure around the perimeter of the opening in the floor and ceiling.  
 C. Furring Channels — (Where Required - Not Shown) — Resilient galv steel furring installed perpendicular to wood joists between opening board and wood joists as specified in the individual Floor-Ceiling Design. Furring channels spaced max 24 in. (610 mm) OC. If furring channels are used within the assembly, additional furring channels to be installed along the periphery of the opening.  
 D. Gypsum Board\* — Nom 4 ft (1.2 m) wide by 5/8 in. (16 mm) thick as specified in the individual Floor-Ceiling Design. Max area of ceiling opening is 150 in 2 (0.098 m<sup>2</sup>) with a max 1.5 in. (38 mm) annular space between duct and framing members.  
 2. Steel Air Duct — Max 7 in. (178 mm) diam by min 0.0157 in. (No. 30 gauge or 0.40 mm) thick galv steel air duct to be centered within the opening. Max one steel air duct to be installed within opening. Steel duct to be rigidly supported on top side of floor-ceiling assembly.  
 2A. Steel Air Duct — Max 10 by 4 in. (254 by 102 mm) rectangular by min 0.022 in. (No. 26 gauge or 0.56 mm) thick galv steel air duct to be centered within the firestop system. Max one steel air duct to be installed within opening. Steel duct to be rigidly supported on top side of floor-ceiling assembly.  
 3. Firestop System — The firestop system shall consist of the following:  
 A. Packing Material — Min 9-7/8 in. (251 mm) thickness of unfaced duct wrap material compressed min 25 percent into opening as a permanent form between the insulated steel duct and the periphery of the opening. Packing material to be installed flush with bottom surface of ceiling and recessed from top surface of floor to accommodate the required thickness of fill material.  
 B. Fill, Void or Cavity Material\* — Sealant — Min 3/4 in. (19 mm) thickness of fill material applied within annulus on top surface of floor. SPECIFIED TECHNOLOGIES INC. — SpecSeal Series SSS Sealant or SpecSeal LCI Sealant. EGS NELSON FIRESTOP — ES1399 Sealant. HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant. TREMCO INC. — Fyre-Sil Sealant. DAP PRODUCTS INC. — DAP Fire Stop Fire-Rated Silicone Sealant. 3M COMPANY 3M FIRE PROTECTION PRODUCTS — FB-1000 NS Sealant. NUCO INC. — Seal Seal GG-200.  
 C. Duct Wrap Material\* — Nom 1/2 in. (13 mm) thick, 8 pcf (128 kg/m<sup>3</sup>) or nom 1-1/2 in. (38 mm) thick, 6 pcf (96 kg/m<sup>3</sup>) with foil-scrim facers. The steel duct shall be wrapped with one layer of duct wrap installed in accordance with Ventilation Assembly No. V-32. The duct wrap is secured with min No. 18 Gauge (0.040 in. or 1 mm) galvanized steel wire formed into a loop on one end, with the other end passed through the loop, pulled hand tight and bent over. The wires spaced a max 12 in. (305 mm) OC. See Ventilation Duct Assemblies in Vol. 2 of the Fire Resistance Directory. The annular space between the insulated steel duct and the periphery of the opening shall be a nom 1-1/2 in. (38 mm). A min 1/2 in. high collar consisting of an additional layer of 1/2 in. (13 mm) thick, 6 pcf (96 kg/m<sup>3</sup>) or nom 1-1/2 in. (38 mm) thick, 6 pcf (96 kg/m<sup>3</sup>) duct wrap, installed over the duct wrap flush with the top surface of the floor and extending upward. All seams and edges shall be sealed with min 3 in. (76 mm) wide pressure sensitive aluminum foil tape. UNIFRAX L L C — FyreWrap® DPS or FyreWrap® Elite 1.5

\* 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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2B. Cables — Max 4 pair No. 18 AWG (or smaller) thermostat cable with PVC insulation and jacket.  
 2C. Pipe Covering — The following pipe covering shall be used with the metallic pipes (Types 2A, 2B and 2D only) having a nom diam greater than 1/2 in. (12.7 mm):  
 A. Tube Insulation - Plastical — Nom 1 in. (25 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing.  
 See Plastical (QM22) category in the Plastical 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-VA may be used.  
 3. Firestop System — The details of the firestop system shall be as follows:  
 A. Fill, Void or Cavity Material\* — Sealant — Min 5/8 in. (16 mm) thickness of fill material applied within annulus, flush with both surfaces of wall assembly. Fill material used into grooved penetrations to max extent possible within opening.  
 HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant  
 B. Fill, Void or Cavity Material\* — Wrap Strip — Nom 3/16 in. (5 mm) thick by 1-3/4 in. (44 mm) wide intumescent wrap strip. Wrap strip is continuously wrapped around the collar circumference of bundled penetrations two times with ends butted and held in place with tape. Wrap strip installed flush with both surfaces of wall assembly.  
 HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. — CP948-E-W251-3/4" Wrap Strip  
 C. Steel Collar — Steel collar fabricated from coils of product min 0.016 in. (0.41 mm) thick (No. 28 gauge) galv steel available from fill material manufacturer. Collar shall be min 1-3/4 in. (44 mm) deep with 1 in. (25 mm) wide by 2 in. (51 mm) long anchor tabs on 1-3/4 in. (44 mm) centers for securement to both surfaces of wall. In addition, collars contain preformed retainer tabs 1/2 in. (13 mm) wide by 3/16 in. (5 mm) long, located opposite the anchor tabs. Collar shall be tightly wrapped over the wrap strip, overlapping min 1 in. (25 mm) at seam and compressed with a min 12 in. (305 mm) wide by 0.028 in. (0.71 mm) thick stainless steel band at collar mid-height. Every other anchor tab of collar secured to surface of wall with min 1-1/2 in. (38 mm) long drywall or laminate screws with min 3/4 in. (19 mm) steel washers.

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# Bearing the UL Recognized Component Marking

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1 FIRE PENETRATION DETAIL — 5" or 6" DUCTS  
M6.04 DETAIL

2 FLOOR CEILING PENETRATION  
M6.04 DETAIL

**System No. W-L-8110**

ANSI/UL1479 (ASTM E814)	CANULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Rating — 0 Hr	FT Rating — 0 Hr
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Rating — 0 Hr

**SECTION A-A**

1. Wall Assembly — The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner described within the individual U300, U400, V400 or W400 Series Wall or Partition Designs in the UL Fire Resistance Directory and shall incorporate the following construction features:  
 A. Studs — Wall framing shall consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced max 16 in. (406 mm) OC. Steel studs to be min 3-1/2 in. (89 mm) wide and spaced max 24 in. (610 mm) OC.  
 B. Gypsum Board\* — Nom 5/8 in. (16 mm) thick gypsum board as specified in the individual Wall and Partition Design. Max diam of opening is 5 in. (127 mm).  
 The hourly F, FH Rating of the firestop system is dependent upon the hourly rating of the wall in which it is installed.  
 2. Air Conditioning (AC) Line Sets — AC line set consists of max two pipes or tubes (Item 2A) and a thermostat cable (Item 2C). The AC line sets shall be rigidly supported on both sides of the wall assembly.  
 A. Metallic Penetrants — A max of two pipes or tubes to be installed in each AC line set. The following types and sizes of through penetrants may be used:  
 1. Steel Pipe — Nom 3/4 in. (19 mm) diam (or smaller) Schedule 5 (or heavier) steel pipe.  
 2. Iron Pipe — Nom 3/4 in. (19 mm) diam (or smaller) cast or ductile iron pipe.  
 3. Copper Pipe — Nom 3/4 in. (19 mm) diam (or smaller) Regular (or heavier) copper pipe.  
 4. Copper Tube — Nom 3/4 in. (19 mm) diam (or smaller) Type L (or heavier) copper tube.  
 B. Tube Insulation - Plastical — Nom 1 in. (25 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing. The tube insulation may be installed on one max 3/4 in. (19 mm) diam pipe or tube in each AC line set. The space between the insulated and uninsulated pipes or tubes within each AC line set shall be 0 in. (point contact).  
 See Plastical (QM22) category in the Plastical Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation meeting the above specifications and having a UL 94 Flammability Classification of 94VA may be used.  
 C. Cable — One 4 pair No. 18 AWG (or smaller) thermostat cable with polyvinyl chloride (PVC) insulation and jacket materials may be installed with each AC line set.

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3. Firestop Device\* — Firestop device consists of a corrugated steel tube with flanges and gasketing material. Device slid into wall such that ends project an equal distance from the approximate centerline of the wall assembly. Device flanges are spun clockwise onto device threads, over gasketing material butting tightly to both sides of wall. The annular space between the device and the periphery of the opening shall be min 0 in. (point contact) to max 1 in. (25 mm).  
 HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. — CFS-SL SK 4" Firestop Sleeve  
 4. Fill, Void or Cavity Material\* - Plug — Nom 4 in. (102 mm) plug sized for the firestop device (Item 3) friction fit within the sleeve flush with the end of the sleeve on both sides of the wall assembly. Plug cut to fit around the line set and installed tightly within the sleeve.  
 HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. — CFS-PL Firestop Plug

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**System No. W-L-8081**

ANSI/UL1479 (ASTM E814)	CANULC S115
F Rating — 1 and 2 Hr (See Item 1)	F Rating — 1 and 2 Hr (See Item 1)
T Rating — 0 and 1 Hr (See Item 1)	FT Rating — 0 and 1 Hr (See Item 1)
	FH Rating — 1 and 2 Hr (See Item 1)
	FTH Rating — 0 and 1 Hr (See Item 1)

**SECTION A-A**

1. Wall Assembly — The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:  
 A. Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-1/2 in. (89 mm) wide and spaced max 24 in. (610 mm) OC.  
 B. Gypsum Board\* — Thickness, type, number of layers and fasteners as specified in the individual Wall and Partition Design. Max diam of opening is 8 in. (152 mm).  
 The hourly F, FH Ratings of the firestop system are equal to the hourly rating of the wall assembly in which it is installed. The hourly T, FT, FTB Ratings of the firestop system are 0 for 1 hr fire rated wall assemblies and 1 for 2 hr fire rated wall assemblies.  
 2. Air Conditioning (AC) Line Set — Max of three AC line sets bundled within the opening. Each line set consists of one metallic pipe, one insulated metallic pipe and one electrical cable. The aggregate cross-sectional area of the penetrants does not exceed 84 percent of the cross-sectional area of the wall opening. The annular space between the penetrants and the periphery of opening shall be min 0 in. (point contact) to max 1-1/2 in. (38 mm). Penetrants to be rigidly supported on both sides of wall assembly.  
 2A. Metallic Pipes — The following types and sizes of metallic pipes, conduits or tubing may be used:  
 A. Steel Pipe — Nom 1 in. (25 mm) diam (or smaller) Schedule 5 (or heavier) steel pipe.  
 B. Iron Pipe — Nom 1 in. (25 mm) diam (or smaller) cast or ductile iron pipe.  
 C. Conduit — Nom 1/2 in. (13 mm) diam (or smaller) steel conduit or EMT.  
 D. Copper Pipe or Tube — Nom 1 in. (25 mm) diam (or smaller) Type L (or heavier) copper tube or Regular (or heavier) copper pipe.

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**System No. W-L-8081**

2B. Cables — Max 4 pair No. 18 AWG (or smaller) thermostat cable with PVC insulation and jacket.  
 2C. Pipe Covering — The following pipe covering shall be used with the metallic pipes (Types 2A, 2B and 2D only) having a nom diam greater than 1/2 in. (12.7 mm):  
 A. Tube Insulation - Plastical — Nom 1 in. (25 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing.  
 See Plastical (QM22) category in the Plastical 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-VA may be used.  
 3. Firestop System — The details of the firestop system shall be as follows:  
 A. Fill, Void or Cavity Material\* — Sealant — Min 5/8 in. (16 mm) thickness of fill material applied within annulus, flush with both surfaces of wall assembly. Fill material used into grooved penetrations to max extent possible within opening.  
 HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant  
 B. Fill, Void or Cavity Material\* — Wrap Strip — Nom 3/16 in. (5 mm) thick by 1-3/4 in. (44 mm) wide intumescent wrap strip. Wrap strip is continuously wrapped around the collar circumference of bundled penetrations two times with ends butted and held in place with tape. Wrap strip installed flush with both surfaces of wall assembly.  
 HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. — CP948-E-W251-3/4" Wrap Strip  
 C. Steel Collar — Steel collar fabricated from coils of product min 0.016 in. (0.41 mm) thick (No. 28 gauge) galv steel available from fill material manufacturer. Collar shall be min 1-3/4 in. (44 mm) deep with 1 in. (25 mm) wide by 2 in. (51 mm) long anchor tabs on 1-3/4 in. (44 mm) centers for securement to both surfaces of wall. In addition, collars contain preformed retainer tabs 1/2 in. (13 mm) wide by 3/16 in. (5 mm) long, located opposite the anchor tabs. Collar shall be tightly wrapped over the wrap strip, overlapping min 1 in. (25 mm) at seam and compressed with a min 12 in. (305 mm) wide by 0.028 in. (0.71 mm) thick stainless steel band at collar mid-height. Every other anchor tab of collar secured to surface of wall with min 1-1/2 in. (38 mm) long drywall or laminate screws with min 3/4 in. (19 mm) steel washers.

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# Bearing the UL Recognized Component Marking

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3 SINGLE HVAC LINESET PENETRATION  
M6.04 SCALE: DETAIL

4 MULTIPLE HVAC LINESET PENETRATION  
M6.04 SCALE: DETAIL

8-25-22  
 REGISTERED PROFESSIONAL  
 ENGINEER  
 54,607  
 OREGON  
 JULY 11, 2009  
 MARK R. DENVER  
 EXPIRES: 31DEC23

CAS  
 COLUMBIA ALLED SERVICES  
 WISEN SOLUTIONS MATTER

MFI  
 Consulting Engineers  
 2007 S.E. Ash St.  
 Portland, OR 97214  
 PHN: (503) 234-0548  
 FAX: (503) 234-0677  
 WWW.MFI-ENG.COM  
 CONTACT: Mark Denver

MERIDIAN GARDENS  
 11250 SE DIVISION STREET  
 PORTLAND, OREGON 97266  
 CENTRAL CITY CONCERN

REVISION	DATE	REASON FOR ISSUE

MECHANICAL  
 DETAILS

PERMIT SET

DATE  
 08/29/2022

PROJECT NUMBER  
 203970

SHEET NUMBER  
 M6.04

