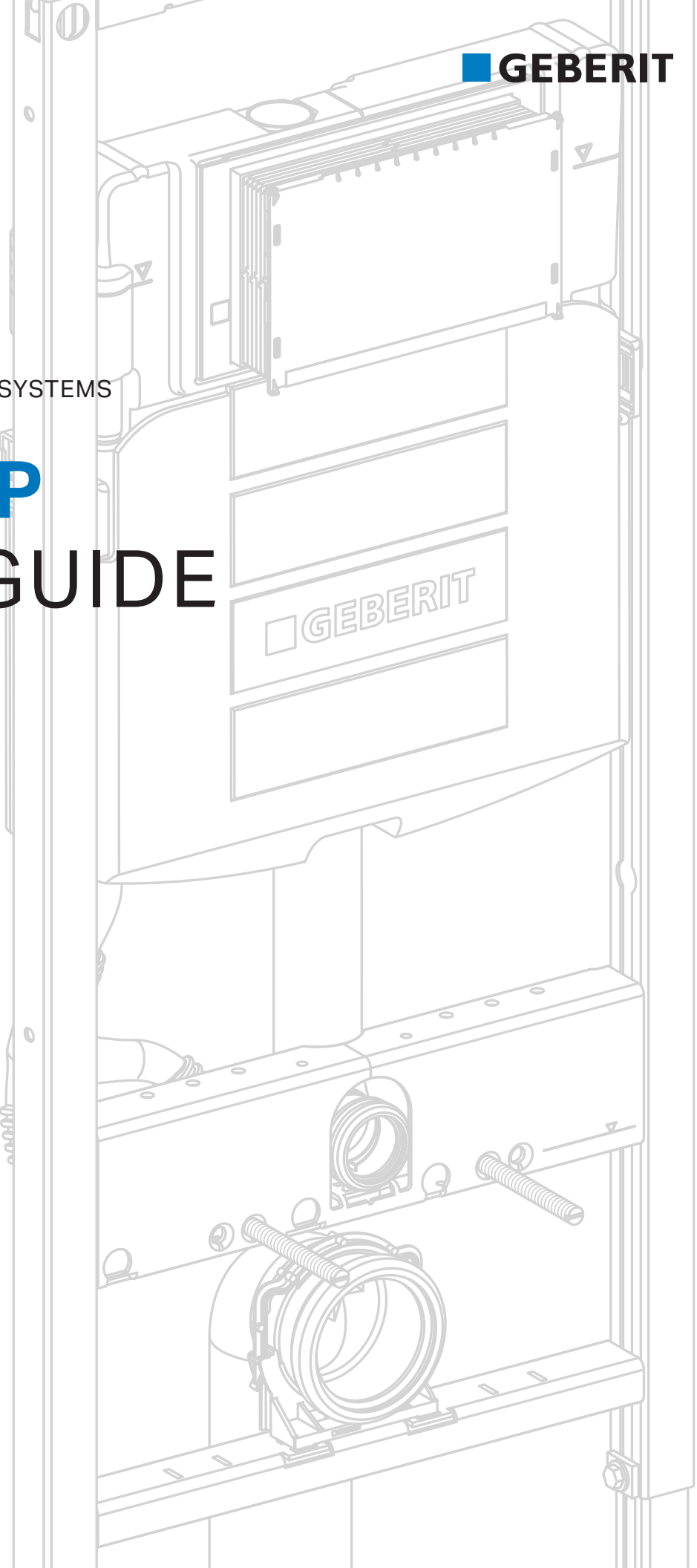
GEBERIT

IN-WALL FLUSH TOILET TANK SYSTEMS
FOR WALL-HUNG TOILETS

FIRESTOP
DESIGN GUIDE



KNOW
HOW
INSTALLED

CONTENTS

FIRESTOP DESIGN GUIDE

This firestop design guide is provided for Geberit Sigma, Omega and Alpha concealed tank with or without Duofix carrier frame in combination with wall-hung or floor-mounted toilets. The design guide has been provided to assist architects, engineers, and contractors in designing, specifying, procuring, and constructing firestop systems for use with this water closet system.

RESPONSIBLE PARTIES

The design professional of record is responsible for code compliance, and for preparing drawings and a performance specification for the firestopping systems (e.g., 07 84 13).

The contractor(s) will be responsible for selecting and installing firestop systems that meet the contract documents and all installation requirements specified by the firestop system manufacturer.

The building owner will be responsible for retaining a registered special inspection agency to perform in-progress and special inspections of fire rated walls and firestop system installations to obtain sign-off from the Authority Having Jurisdiction.

The Authority Having Jurisdiction has the authority to review and approve or reject firestop systems.

LIMITS OF APPLICATION

The firestop design guidance has been developed for the following applications:

- New construction projects in New York City*
- Primary occupancy classification of buildings is typically Group R-1 (hotel) or Group R-2 (apartment)
- Penetrations will be membrane-type penetrations through 1-hour, or 2-hour fire resistance rated walls. This guide does not apply to through-penetrations.
- Walls will be steel frame or timber frame walls with gypsum panels. A typical 1-hour wall would be metal stud with 1-layer of Type X, 5/8" (16mm) gypsum on both sides. A typical 2-hour wall would be metal stud with 2- layers of Type X, 5/8" (16mm) gypsum on both sides. Shaft walls may substitute 1" shaft liner panel in lieu of 5/8" (16mm) gypsum panel.
- Walls will not be concrete, masonry, or mass timber construction.

MANUFACTURERS

The following firestop system manufacturers may be used, subject to meeting the applicable code requirements and project specifications.

- 3M Company
- Hilti Corporation
- Specified Technologies Inc.

The following gypsum panel manufacturers may be used or equal, subject to meeting the applicable code requirements and project specifications.

- American Gypsum Company LLC
- CertainTeed Gypsum Inc
- Continental Building Products Operation Company LLC
- Georgia-Pacific Gypsum LLC
- National Gypsum Company
- PABCO Gypsum
- United States Gypsum Company

*NOTE REGARDING COMPLIANCE

The firestop design guidance in this document is based on the requirements of new construction projects in New York City. The principles contained herein are broadly applicable, however, and may be adapted to construction in other states and localities. The architect, contractor, and building owner should consult the Authority Having Jurisdiction in their area for specific code compliance requirements and information regarding inspection and approval of firestop system installations. (In New York City, see Section 110 of the New York City Building Code for inspection and sign-off requirements.) Further information regarding the codes and standards referenced for the completion of this guide is provided below:

CODES & STANDARDS

The firestop design guidance has been developed for the 2014 New York City Building Code and its reference standards, as follows:

- 2014 New York City Building Code
- ASTM E 119 Standard Test Methods for Fire Tests of Building Construction and Materials
- ASTM E 814 Standard Test Method for Fire Tests of Penetration Firestop Systems
- UL 263 Standard for Safety of Fire Tests of Building Construction Materials
- UL 1479 Standard for Fire Tests of Through-Penetration Firestops

CODE REQUIREMENTS

Section 713.3.2 of the 2014 New York City Building Code (BC) applies to all these penetrations. All penetrations are to be protected by an approved penetration fire stop system installed as tested in accordance with ASTM E 814 or UL 1479, with a minimum positive pressure differential of 0.01 inch (2.49 Pa) of water and shall have an F rating of not less than the required fire-resistance rating of the wall penetrated.

PENETRATION
FIRESTOP SYSTEMS

PENETRATION TYPES

The design guide covers the following penetration types (as shown in Figure 1):

- Inspection opening (A) – See Page 5.
- Freshwater pipe (B) – See Page 6.
- Wastewater pipe (C) – See Page 7-8.
- Threaded rod (D) – See Page 9.
- Bidet seat water and power openings (E) – See Page 10.

Note that while this design guide uses Sigma 12cm (2x6) concealed tank as example, there are several product variations within the Geberit Sigma, Omega and Alpha concealed tank product family such that specific dimensions and component locations may vary. The firestop systems in this design guide should generally be appropriate for these dimensional variations provided that the maximum dimensions of the penetrating item (e.g., pipe diameter) and its material type (e.g., HDPE, metal, etc.) are permitted by the listed firestop system. This guide is not intended as an exhaustive list of fire stop solutions for Geberit concealed tanks in all jurisdictions.

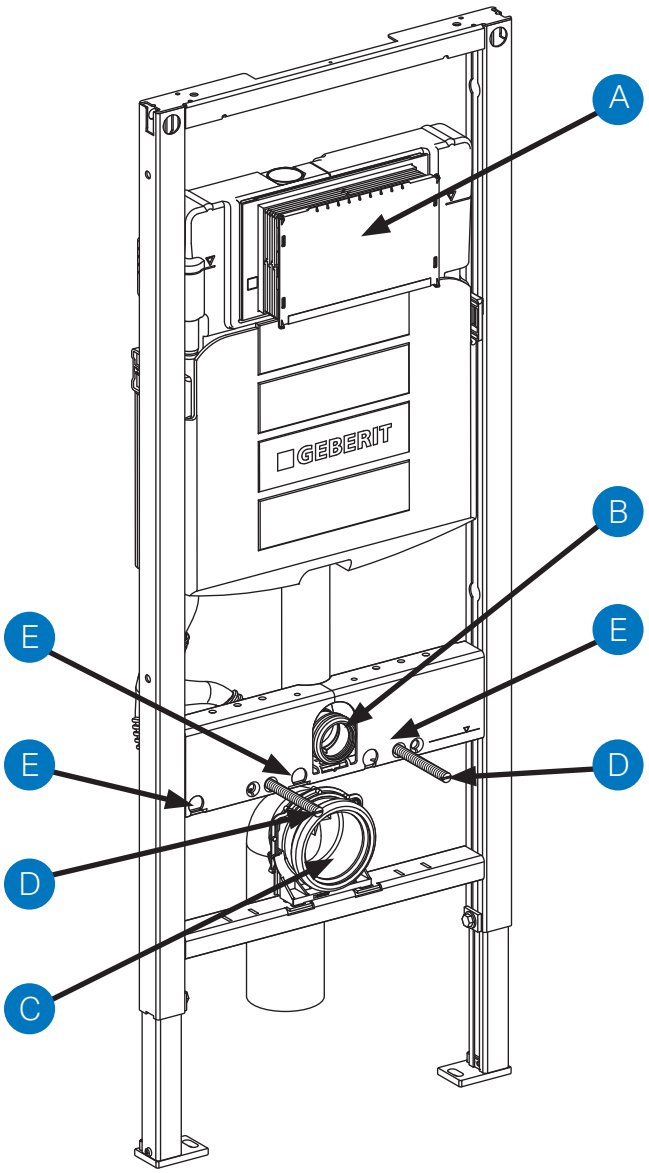


Figure 1 - Penetration firestop system locations

INSPECTION OPENING

RECTANGLE 8.5 IN X 5.3 IN (215MM X 133MM) HIGH IMPACT POLYSTYRENE

DESIGN GUIDANCE

- The inspection opening is a combustible membrane penetration. We have consulted firestop system manufacturers and are not aware of any off-the-shelf listed firestop systems that can be in front of the combustible water tank.
- The most viable and recommended solution currently is to construct a gypsum panel "box-out" behind the water tank and surrounding all penetrations through the face of the gypsum panel wall. This box-out is similar in concept to a fire-rated electrical back-box.
- An engineering judgment (EJ) for this approach has been developed by 3M Company for a 1-hr rated wall. An image of the detail is shown in Figure 2. The complete EJ can be found in Appendix A.

REQUIREMENTS

- Gypsum panels. If the wall requires a 1-hour fire rating, a minimum one (1) layer of 5/8" (16mm) thick Type X gypsum panels must be used. If the wall requires a 2-hour fire rating, a minimum two (2) layers of 5/8" (16mm) thick Type X gypsum panels must be used. Panels shall comply with applicable codes and standards (i.e. Chapter 25 of the building code, etc.) Single layers to be butt-joints, finished and fastened. Multiple layers shall be staggered at corners and at edges.
- Joints. Joints to be secured and covered with aluminum foil tape (per 3M engineering judgment), corner bead, or finished with fire caulk.
- Fasteners. Fasteners shall be as per listed assembly for the fire rated wall.
- Penetrations. There will be penetrations through the box-out for freshwater and wastewater piping, and possibly electrical wiring. These penetrations shall be protected with a listed firestop system. Several options are provided in this design guide, in subsequent sections.

REFERENCE DETAILS AND FIRESTOP SYSTEMS

The following reference details and firestop systems are provided as examples for this firestop application:

- Gypsum panel box-out – See Appendix A for details.
- Gypsum panel box-out single sided wall detail – See Appendix B for details.
- Gypsum panel box-out corner joint detail – See Appendix C for details.

For a specific project it is recommended that the project team obtain an engineering judgment from a gypsum panel manufacturer and firestop manufacturer for the project-specific application.

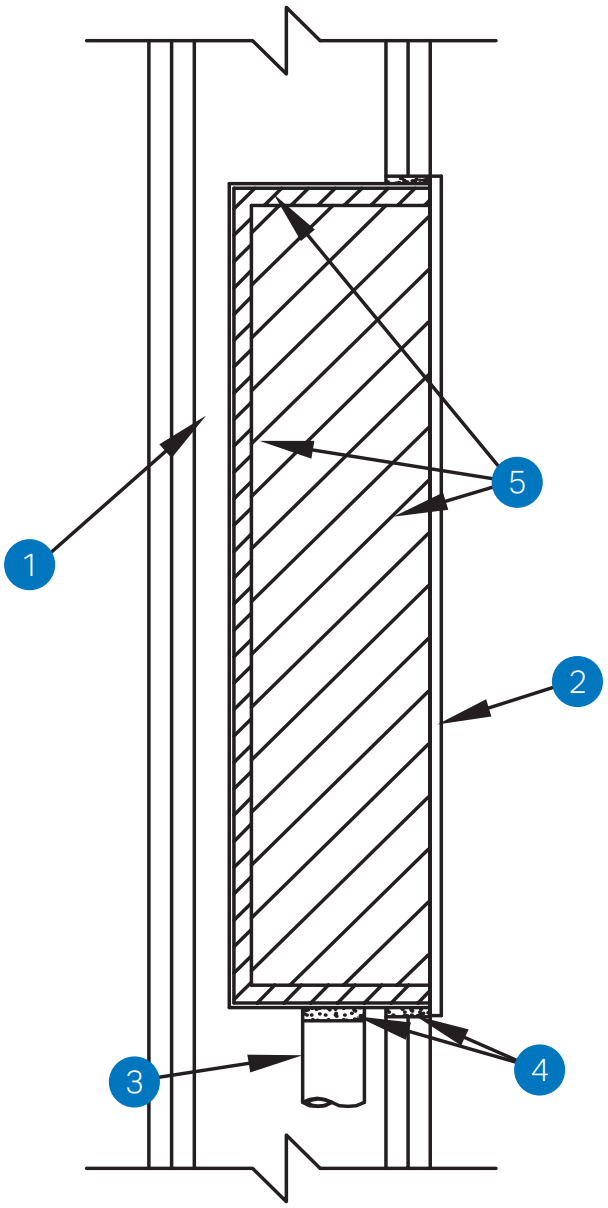


Figure 2 – Engineering Judgment for gypsum panel box around fixture and water tank.

1. Gypsum wallboard assembly.
2. Penetrating item per appropriate version of corresponding EJ.
3. Conduit.
4. Firestop sealant as outlined in appropriate version of corresponding EJ.
5. Interam E-54-A MAT, 425 aluminum foil tape.

FRESH WATER PIPE

DIA. 1.8 IN (45MM) X 0.08 IN (2MM) WALL PPC (POLYPROPYLENE CARBONATE)

DESIGN GUIDANCE

- Non-metallic or combustible pipes are typically protected with a firestop system that uses intumescent materials to fill the wall penetration. These require a larger annular space around the pipe or a system can be fitted on the surface of the wall.
- For example, for the STI System No. W-L-2585 system, the intumescent material is ¾ inch thick for a 2- inch (51mm) pipe penetration and will provide 1- or 2-hour fire and smoke rating, see Figure 3. The system must be rigidly supported.
- The other option is a pre-assembled pipe collar, which consists of an open metal collar, pre-fitted with intumescent material on the inside, for example PFP 204, or STI System No. W-L-2237. These must be fitted on the outer face of the gypsum panel. One advantage is that this system does not require a large annular space around the penetration. One disadvantage is that it is not feasible where fixtures need to be flush to the wall surface, as is the case with a water closet. The project team will need to review and confirm that there is adequate space to accommodate this product type, if used.

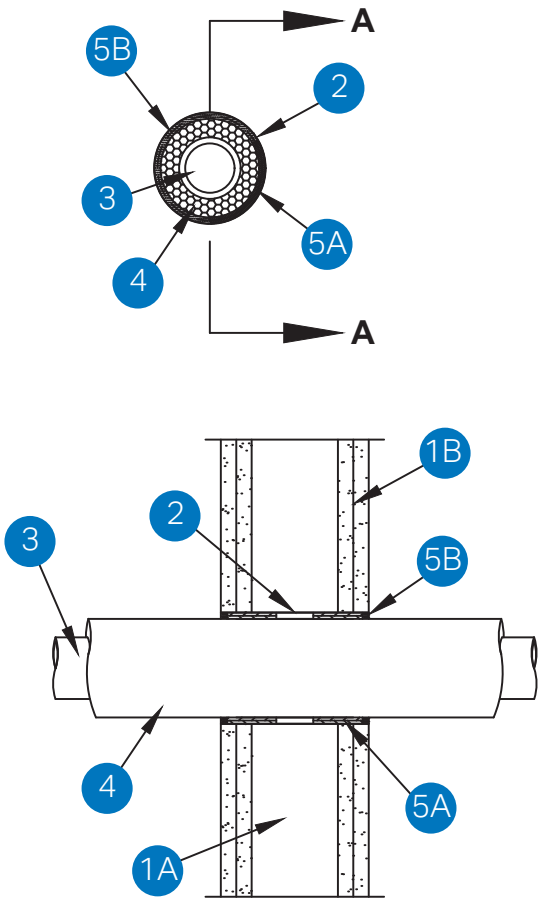


Figure 3 – Excerpt from STI System No. W-L-2585

REFERENCE DETAILS AND FIRESTOP SYSTEMS

The following reference details and firestop systems are provided as examples for this firestop application:

- STI System No. W-L-2585 – See Appendix D for details.
- PFP 204 – See Appendix E for details.
- STI System No. W-L-2237 – See Appendix F for details.

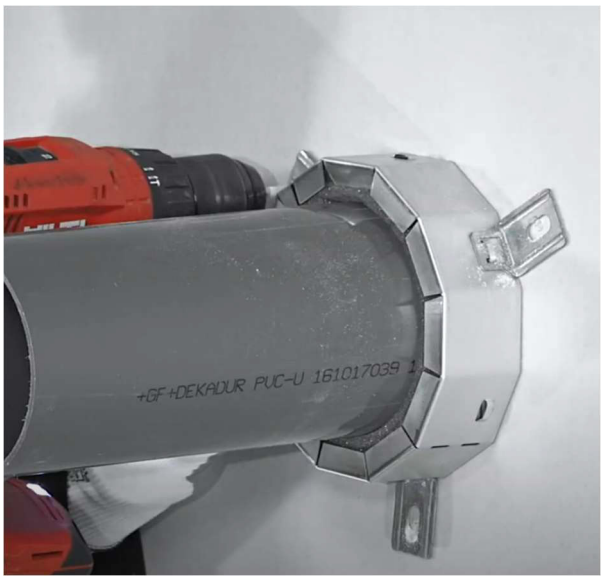


Figure 4 – STI W-L-2237 intumescent collar system

WASTEWATER PIPE

DIA. 4.4 IN (111 MM) X 0.14 IN (3.5MM) WALL HDPE (HIGH DENSITY POLYETHYLENE)

DESIGN GUIDANCE

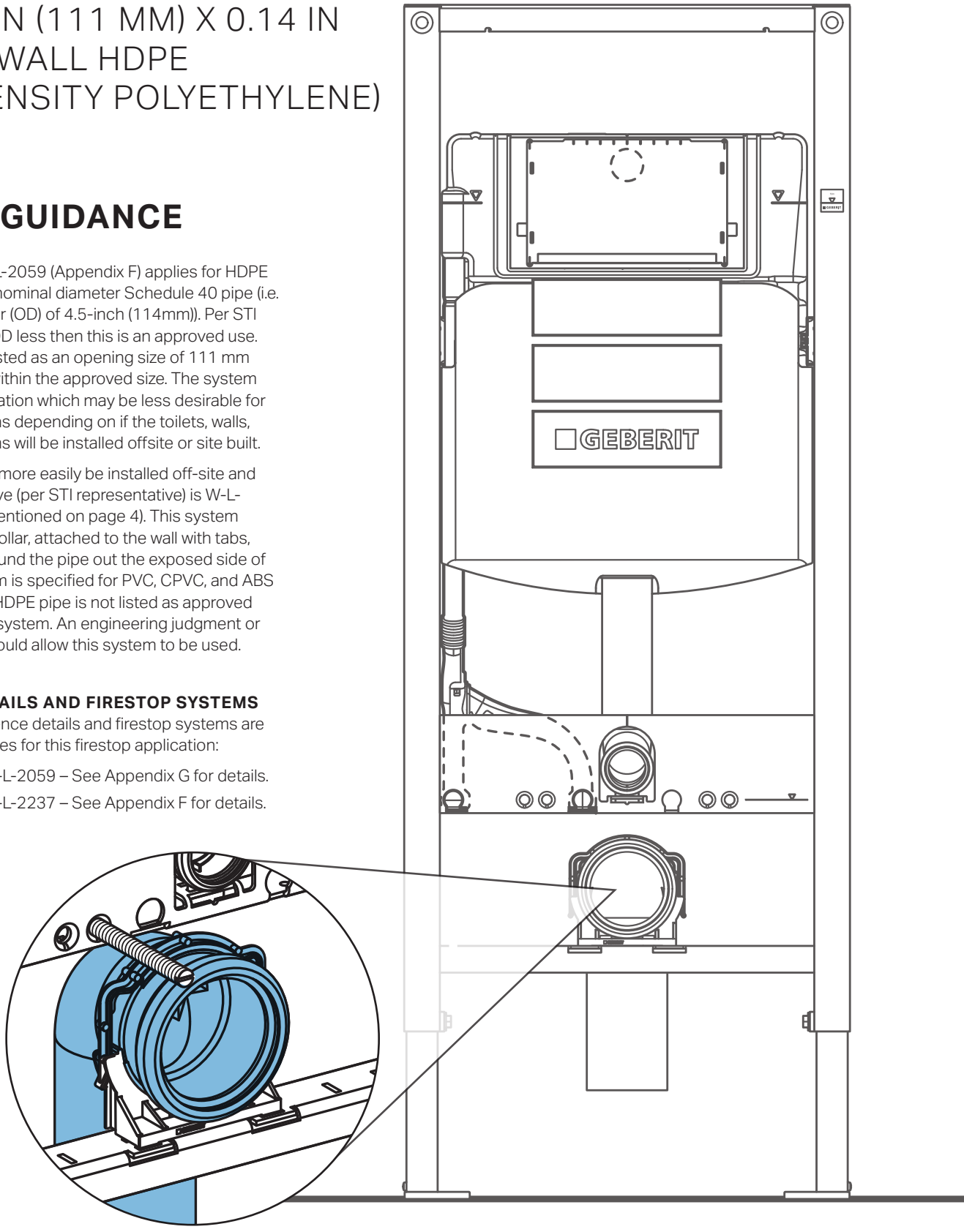
STI System No. W-L-2059 (Appendix F) applies for HDPE pipes up to 4-inch nominal diameter Schedule 40 pipe (i.e. up to outer diameter (OD) of 4.5-inch (114mm)). Per STI specifications, an OD less then this is an approved use. The waste pipe is listed as an opening size of 111 mm (4.4 inch) which is within the approved size. The system requires field installation which may be less desirable for modular applications depending on if the toilets, walls, and firestop systems will be installed offsite or site built.

A solution that can more easily be installed off-site and is less labor intensive (per STI representative) is W-L-2237 (previously mentioned on page 4). This system also used a metal collar, attached to the wall with tabs, requiring space around the pipe out the exposed side of the wall. This system is specified for PVC, CPVC, and ABS pipes. Use with an HDPE pipe is not listed as approved application for this system. An engineering judgment or additional testing could allow this system to be used.

REFERENCE DETAILS AND FIRESTOP SYSTEMS

The following reference details and firestop systems are provided as examples for this firestop application:

- STI System No. W-L-2059 – See Appendix G for details.
- STI System No. W-L-2237 – See Appendix F for details.



WASTEWATER PIPE

DIA. 4.4 IN (111 MM) X 0.20 IN (5MM) WALL GEBERIT 367.072.18.1 CAST IRON FITTING

DESIGN GUIDANCE

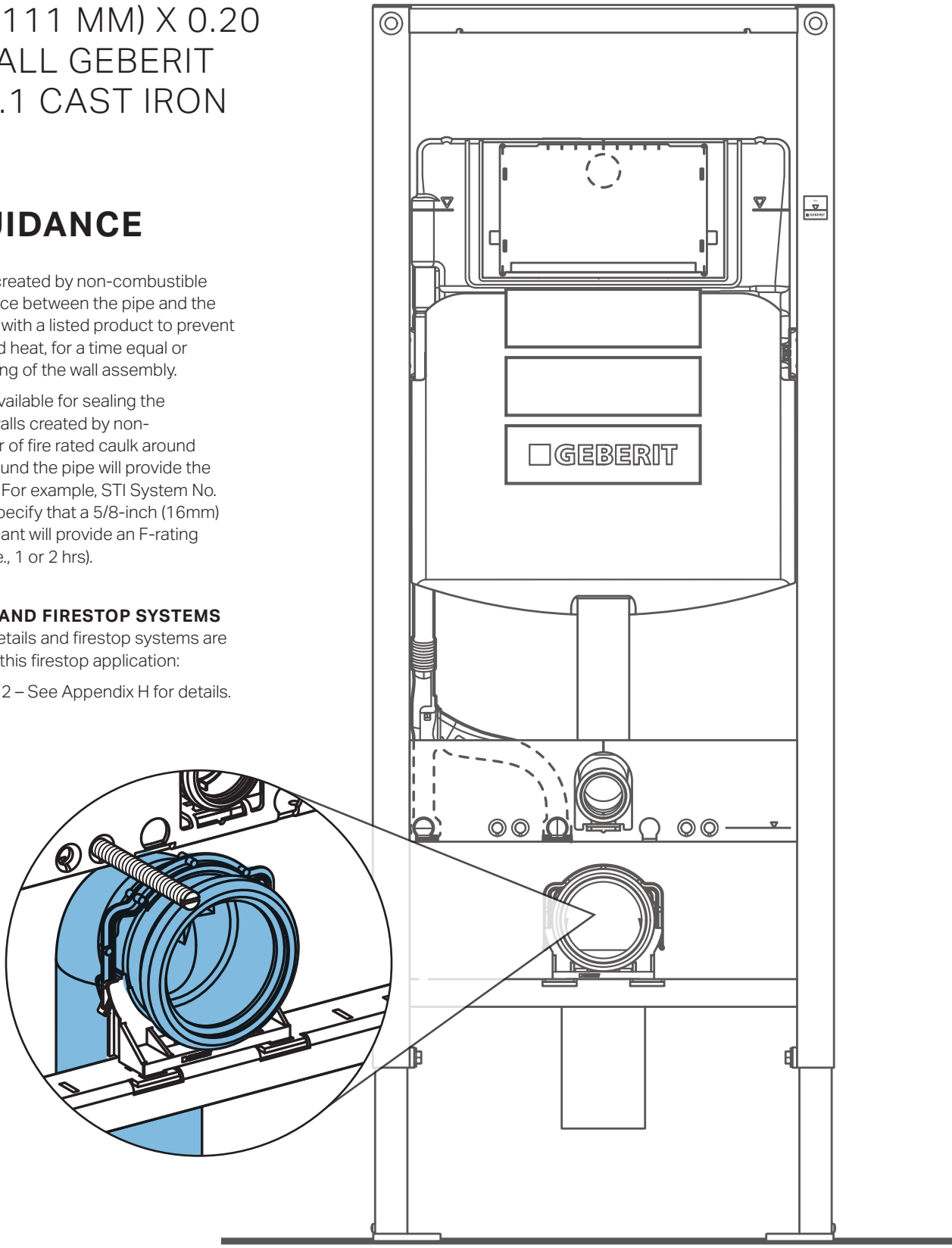
Membrane penetrations created by non-combustible pipes only require the space between the pipe and the wall to be properly sealed with a listed product to prevent the passage of smoke and heat, for a time equal or longer than the hourly rating of the wall assembly.

There are many options available for sealing the penetrations in gypsum walls created by non-combustible pipes. A layer of fire rated caulk around 5/8 inch (16 mm) wide around the pipe will provide the necessary firestop rating. For example, STI System No. W-L-1222 (Appendix G) specify that a 5/8-inch (16mm) strip of SpecSeal LCI Sealant will provide an F-rating equal to that of the wall (i.e., 1 or 2 hrs).

REFERENCE DETAILS AND FIRESTOP SYSTEMS

The following reference details and firestop systems are provided as examples for this firestop application:

- STI System No. W-L-1222 – See Appendix H for details.



THREADED ROD

12 MM STAINLESS STEEL

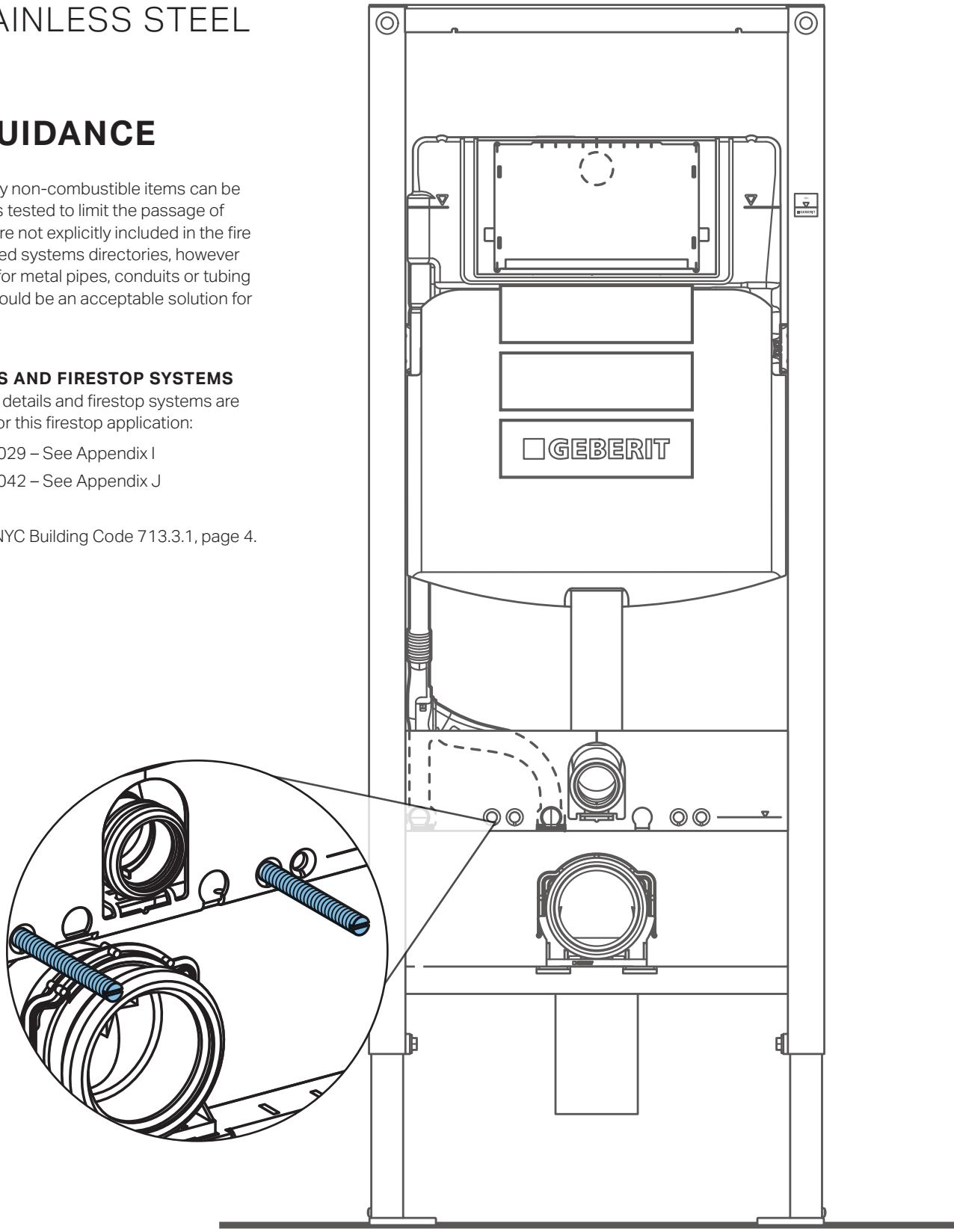
DESIGN GUIDANCE

Through penetrations by non-combustible items can be protected with materials tested to limit the passage of flame.* Threaded rods are not explicitly included in the fire stop manufacturers' listed systems directories, however listed firestop systems for metal pipes, conduits or tubing of the same diameter would be an acceptable solution for a threaded rod.

REFERENCE DETAILS AND FIRESTOP SYSTEMS
The following reference details and firestop systems are provided as examples for this firestop application:

- STI System No. W-L-1029 – See Appendix I
- STI System No. W-L-1042 – See Appendix J

*For further detail, see NYC Building Code 713.3.1, page 4.



BIDET SEAT OR TOILET

16MM WATER AND POWER OPENINGS

DESIGN GUIDANCE

The bidet fixture requires two penetrations in the fire rated wall; a fresh water supply pipe (metal pipe or flexible hose with stainless steel sheathing) and an electrical wire or wire bundle.

A metal pipe penetration can be protected with a caulk product. The pipe must be rigidly supported on both sides of the wall. There are several options from multiple manufacturers. Refer to page 8.

Electrical wire or wire bundle penetration can also be protected with a simple caulk product. These require a larger annular opening in the gypsum panel, and a minimum size sealant bead filling the opening around the cable. In general, the sealant shall be minimum 5/8" (16mm) thickness. The cable must also be rigidly supported on both sides.

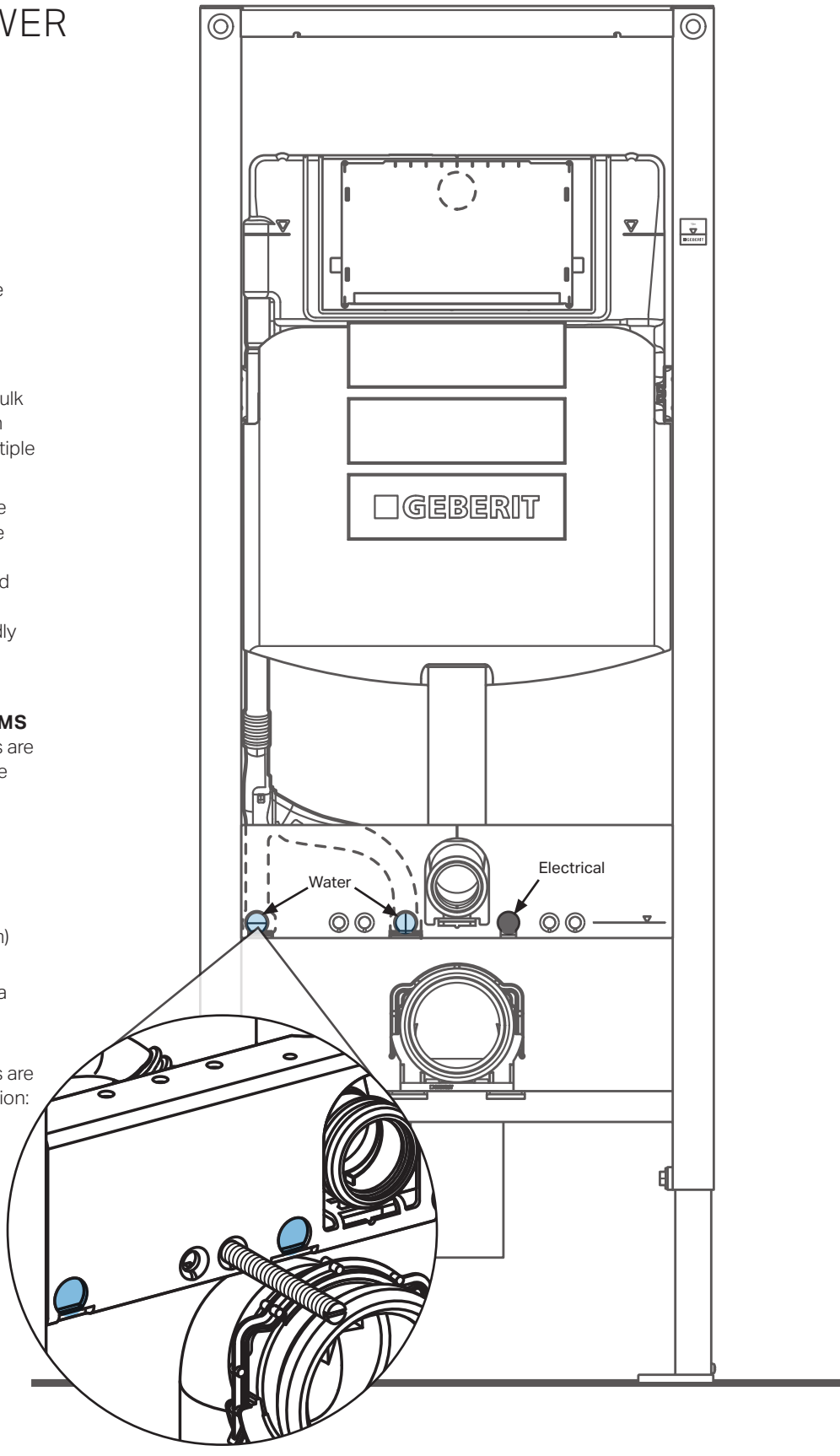
REFERENCE DETAILS AND FIRESTOP SYSTEMS

The following reference details and firestop systems are provided as examples for the fresh water supply pipe application:

- Hilti W-L 1410 (Appendix K); steel pipe up to 3 in. (76mm) diameter. Copper pipe up to 1 in. (25mm) diameter.
- STI W-L-1222 (Appendix G); steel pipe up to 8 in. (203mm) diameter. Copper pipe up to 4 in. (102mm) diameter
- The caulk product W-L-1222 can also be used for a flexible metal pipe with a diameter up to 1-1/4 inch (32 mm).

The following reference details and firestop systems are provided as examples for the electrical wire application:

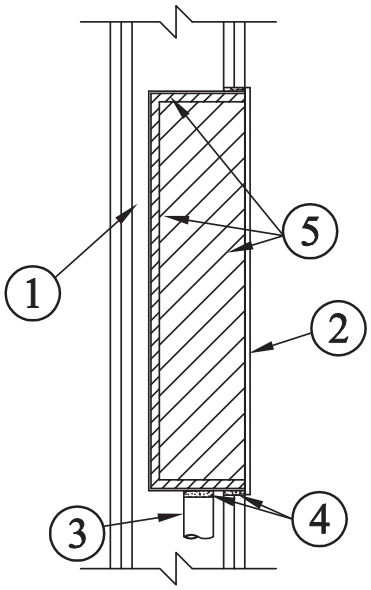
- STI W-L-3171 (Appendix L); single cable
- STI W-L-3169 (Appendix M); cable bundle (up to 4.5 in (114mm) diameter)
- Hilti W-L-3065 (Appendix N); cable bundle (4 in. (102mm) opening with bundle <45% of opening area)



APPENDIX

APPENDIX A - GYPSUM PANEL BOX-OUT

3M ENGINEERING JUDGEMENT NO. 601140 REV 1
MODIFIED SYSTEM NO. W-L-7190
RATING - 1 HR F
OBTAINABLE RATING: SEE BELOW*



1. GYPSUM WALLBOARD ASSEMBLY.
2. PENETRATING ITEM PER APPROPRIATE VERSION OF CORRESPONDING EJ.
3. CONDUIT.
4. FIRESTOP SEALANT AS OUTLINED IN APPROPRIATE VERSION OF CORRESPONDING EJ.
5. INTERAM E-5A-4 MAT, 425 ALUMINUM FOIL TAPE.

*THE OBTAINABLE RATING IN THIS SCENARIO IS REDUCED TO "UP TO 1 HOUR F ONLY OR AS LONG AS THE OVERALL ASSEMBLY REMAINS FULLY INTACT IN A FIRE SCENARIO."

CONFIGURATION OR ORIENTATION OF PENETRANT(S)/OPENING(S) MAY NOT MATCH SITE CONDITION(S).

CONSULT CURRENT INDEPENDENT TESTING LABORATORIES (UL/INTERTEK) FOR SYSTEMS OR DESIGN DETAILS

PROJECT: WANDA VISTA

SIGNATURE: Bruce Fitzwater

REV:	DATE:	DESCRIPTION	DRWN BY:
0	07-11-19	ORIGINAL ISSUE	BLF
1	09-20-19	REVISED APPLICATION	BLF

3M Fire Protection Products

THIS ELEMENTARY FIRESTOP DRAWING IS TO BE USED ALONG WITH THE CORRESPONDING ENGINEERING JUDGMENT AND REFERENCED LISTED/TESTED SYSTEMS FROM INDEPENDENT TESTING LABORATORIES (UL/INTERTEK). DRAWING NOT TO SCALE.

DWG. LOCATION: 601140 REV1.DWG

DATE: 09-20-19

APPENDIX B - GYPSUM PANEL BOX-OUT SINGLE SIDED WALL DETAIL

From: National Gypsum Association – Fire Rated Assemblies in Commercial Construction, 2nd ed. (2018)

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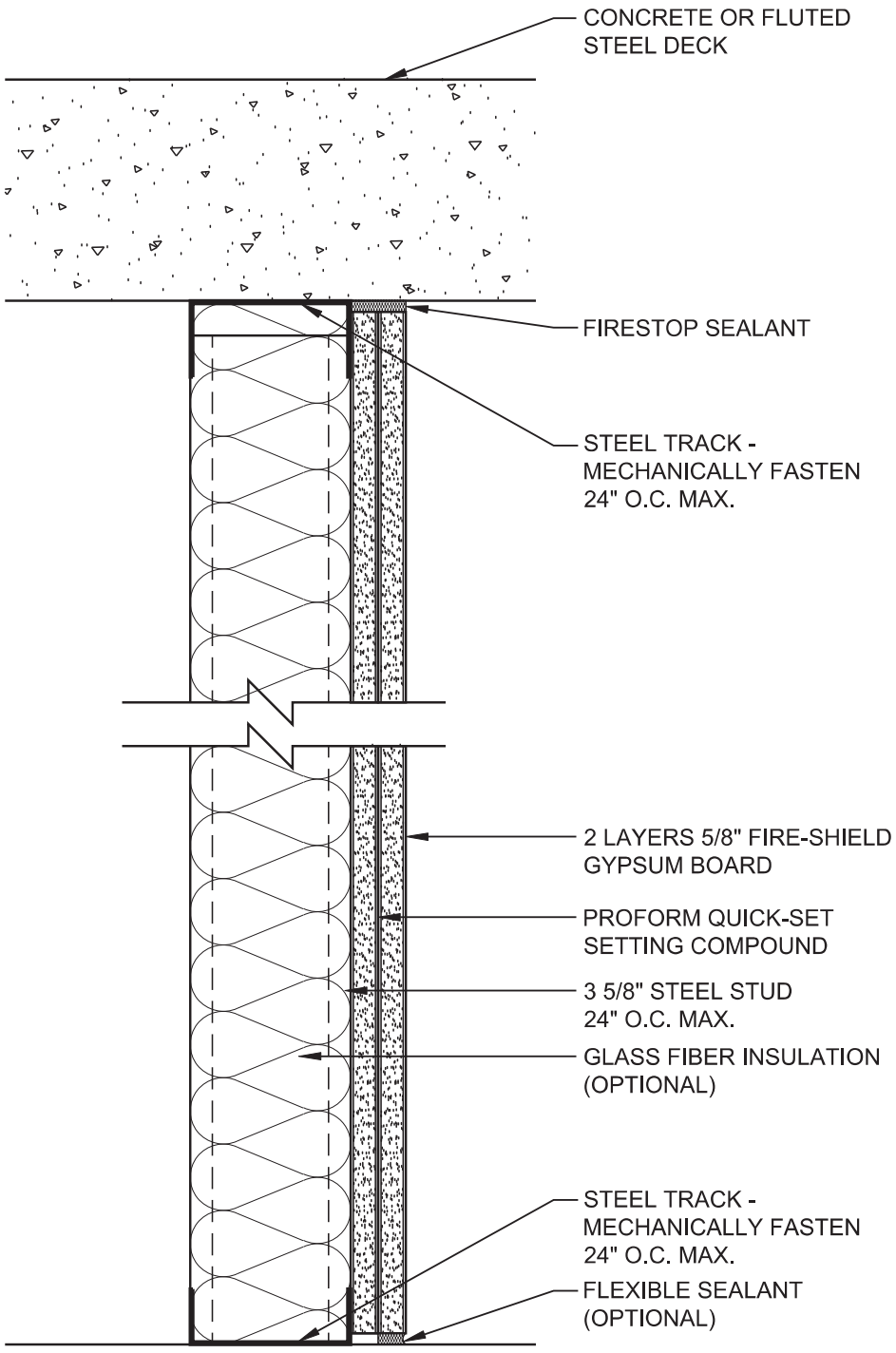

PARTITION - 1 HR
UL DESIGN: V497

PARTITION RATED FROM BOTH SIDES

DATE: 09/01/18	1 HOUR 1 SIDED PARTITION TO STEEL DECK	National Gypsum
SCALE: 3"=1'-0"	DETAIL: SS 111	

APPENDIX C - GYPSUM PANEL BOX-OUT CORNER JOINT DETAIL

From: National Gypsum Association – Fire Rated Assemblies in Commercial Construction, 2nd ed. (2018)

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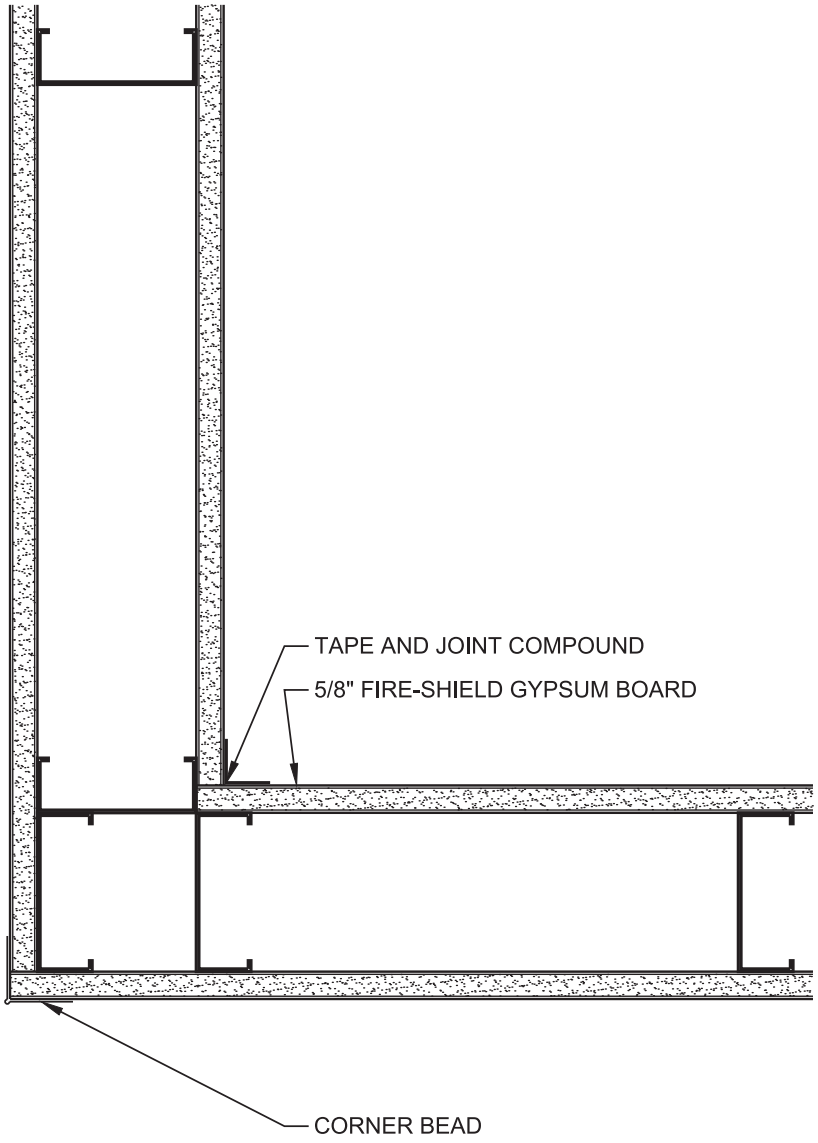


PARTITION - 1 HR
UL DESIGN: U465
UL DESIGN: V438

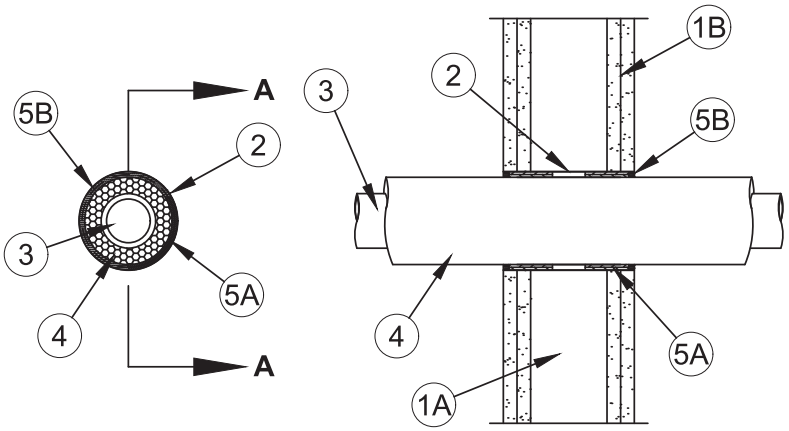
DATE: 09/01/18	1 HOUR PARTITION CORNER DETAIL	National Gypsum®
SCALE: 3"=1'-0"	DETAIL: SS 602	

APPENDIX D - STI SYSTEM NO. W-L-2585

Classified by
Underwriters Laboratories, Inc.
to ASTM/UL1479 (ASTM E814)

System No. W-L-2585

ANSI/UL1479 (ASTM E814)
F Ratings - 1 and 2 Hr (See Item 1)
T Ratings - 1 and 2 Hr (See Item 1)
L Ratings @ Ambient - Less Than 1 CFM/sq ft
L Ratings @ 400 F - Less Than 1 CFM/sq ft



Section A-A

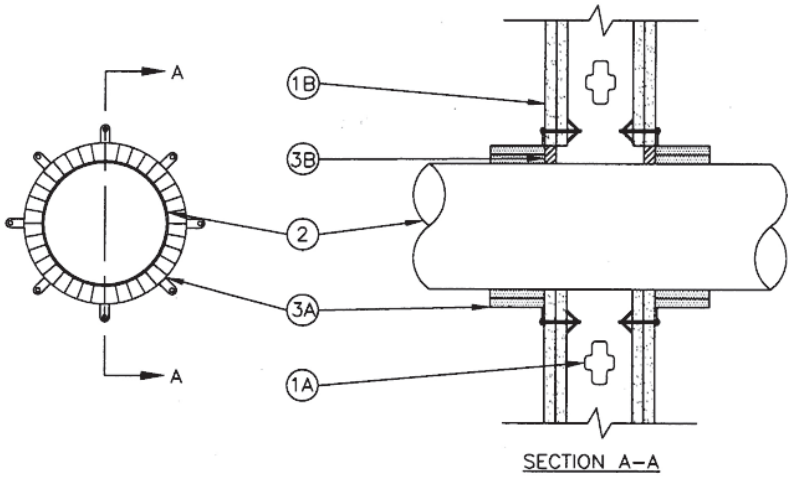
1. **Wall Assembly -** The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner described in the individual U400, V400 or W400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs -** Wall framing may consist of steel channel studs. Steel studs to be min 3-1/2 in. (89 mm) wide and spaced max 24 in. (610 mm) OC.
   B. **Gypsum Board* -** Gypsum board type, thickness, number of layers, and orientation shall be as specified in the individual Wall and Partition Design. Opening diameter is max 4-5/8 in. (117.5 mm).
   The hourly F and T Rating of the firestop system are equal to the hourly fire rating of the wall assembly in which it is installed.
2. **Steel Sleeve -** Nom 4-5/8 in. (117.5 mm) diam (or smaller) cylindrical sleeve fabricated from min 0.010 in. (0.305 mm) thick (30 gauge) galvanized steel and having a min 2 in. (51 mm) lap at the longitudinal seam. Sleeve friction fitted into wall assembly, flush with wall surfaces.
3. **Through Penetrant -** One nonmetallic pipe to be installed within the opening. Pipe to be rigidly supported on both sides of the wall assembly. The following types and sizes of nonmetallic pipe may be used:
   A. Polypropylene (PP) Pipe - Nom 2 in. (51 mm) diam (or smaller) Sch. 80 PP pipe for use in closed (process or supply) piping systems.
   B. Polypropylene (PP) Pipe - Nom 2 in. (51 mm) diam (or smaller) SDR 11 PP pipe for use in closed (process or supply) piping systems.
   C. Polypropylene (PP) Pipe - Nom 2 in. (51 mm) diam (or smaller) SDR 7.4 PP pipe for use in closed (process or supply) piping systems.
   D. Polypropylene (PP) Pipe - Nom 2 in. (51 mm) diam (or smaller) Aquatherm SDR 11 PP pipe for use in closed (process or supply) piping systems.
   E. Polypropylene (PP) Pipe - Nom 2 in. (51 mm) diam (or smaller) Aquatherm SDR 7.4 PP pipe for use in closed (process or supply) piping systems.

(CONTINUED ON NEXT PAGE)

4. **Tube Insulation - Plastics+ -** Nom 3/4 in. (19 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing. The annular space between the insulated through penetrant and the periphery of the opening shall be nominal 3/8 in. (9.5 mm).
   See Plastics+ (QMFZ2) category in the Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation material meeting the above specifications and having a UL94 Flammability Classification of 94-5VA may be used.
5. **Firestop System -** The firestop system shall consist of the following:
   A. **Fill, Void or Cavity Material* - Wrap Strip -** Nom 1/8 in. (3.2 mm) or 3/16 in. (4.8 mm) thick intumescent material faced on both sides with a plastic film, supplied in 2 in. (51 mm) wide strips. One stack consisting of two layers of wrap strip wrapped around the through penetrant with the ends butted and held in place by means of foil tape. The wrap strip is slid along the through penetrant into annulus such that the trailing edge is recessed nominal 1/4 in. (6 mm) from the wall. One set of wrap strips to be installed on each side of wall.
   SPECIFIED TECHNOLOGIES INC - SpecSeal BLU Wrap Strip, SpecSeal BLU2 Wrap Strip
   B. **Fill, Void or Cavity Material* - Sealant -** When an annular space is present between the wrap strip and sleeve, a min 5/8 in. (16 mm) depth of sealant shall be applied into the annular space flush with both sides of the wall. A min 1/4 in. (6 mm) depth of sealant applied over wrap strip on both sides of wall.
   SPECIFIED TECHNOLOGIES INC - SpecSeal SSS Sealant, 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.

CLASSIFIED UL US	**F Ratings – 1 & 2 Hr (See Item 1)** **T Ratings – 3/4 & 2 Hr (See Item 1)**	**W-L-2233**

ANSI/UL1479 (ASTM E814)
F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 3/4 and 2 Hr (See Item 1)



SECTION A–A

1. **Wall Assembly** – The 1 and 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U400 series Wall and 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.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as required in the individual Wall and Partition Design. Max diam of opening is 7 in.
   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed. The hourly T Rating is 3/4 and 2 hr for 1 and 2 hr rated assemblies, respectively.

2. **Through Penetrants –** One non-metallic pipe to be installed concentrically or eccentrically within the opening. The annular space between pipe and periphery of opening to be min. 0 in. (point contact) to max 1/2 in. Pipe to be rigidly supported on both sides of floor assembly. The following types and sizes of non-metallic pipes may be used:
   A. **Polyvinyl Chloride (PVC) Pipe –** Nom 6 in. diam (or smaller) Schedule 40 solid core or cellular core PVC pipe for use in closed (process and supply) or vented (drain, waste or vent) piping systems
   B. **Chlorinated Polyvinyl Chloride (CPVC) Pipe –** Nom 6 in. diam (or smaller) SDR 17 CP' pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.

(CONTINUED ON NEXT PAGE)

W-L-2233

3. **Firestop System -** The firestop system shall consist of the following:
   A. **Fill Void or Cavity Material* – Sealant –** Min 5/8 in. thickness of fill material applied within annulus, flush with both surfaces of wall.
      Passive Fire Protection Partners – 3600EX, 4800DW
   B. **Firestop Device* - Collar** –Collar to be installed in accordance with the manufacturer's installation instructions. Collar to be installed and latched around pipe and secured to both sides of wall with min 3/16 in. diam steel toggle bolts in conjunction with steel nuts and min 1-1/4 in. diam steel washers. Min of two, three or four bolts for nom 2 in. diam (or smaller), nom 3 in. diam and nom 4 and 6 in. diam pipes, respectively.
      Passive Fire Protection Partners – Plastic pipe Collar (PPC) 1.5, 2, 3, 4 and 6

*Bearing the UL Classification Marking

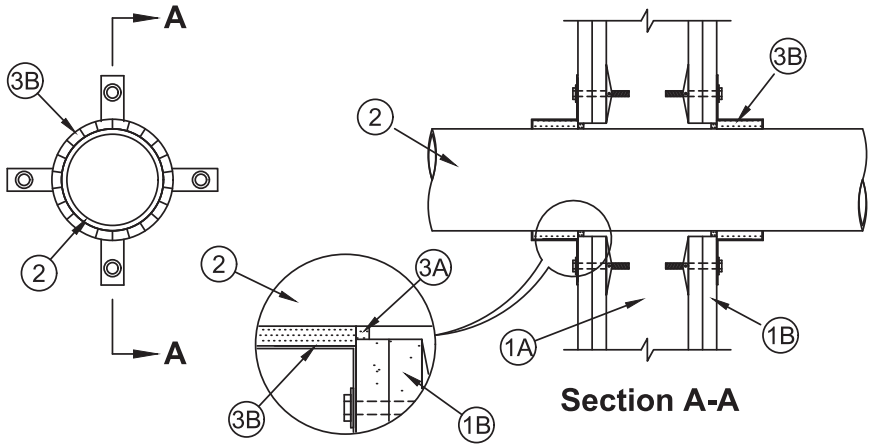
****Not tested to 50 Pa Pressure Differential as required by Canadian Code Requirements for Combustible Drain, Waste or Vent piping System.**

APPENDIX F - STI SYSTEM NO. W-L-2237

Classified by
Underwriters Laboratories, Inc.
to ANSI/UL 1479 (ASTM E814) and CAN/ULC S115

System No. W-L-2237

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings - 1 and 2 Hr (See Item 1)	F Ratings - 1 and 2 Hr (See Item 1)
T Ratings - 1 and 2 Hr (See Item 1)	FT Ratings - 1 and 2 Hr (See Item 1)
	FH Ratings - 1 and 2 Hr (See Item 1)
	FTH Ratings - 1 and 2 Hr (See Item 1)



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. **Wall Assembly -** The 1 or 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, V300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall incorporate 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 3-5/8 in. (92 mm) wide and spaced max 24 in.(610 mm) OC.
   B. **Gypsum Board* -** Thickness, type, number of layers and fasteners as required in the individual Wall and Partition Designs. For nom 2-1/2 in. (64 mm) diam and smaller pipes and conduits, diam of opening shall be max 1/4 in. (6 mm) larger than nom pipe diam. For pipes and conduits greater than nom 2-1/2 in. (64 mm) diam of opening shall be max 1/2 in. (13 mm) larger than nom pipe diam.
   The hourly F, T, FT, FH and FTH Ratings of the firestop system are equal to the hourly fire rating of the wall assembly in which it is installed.
2. **Through Penetrants -** One nonmetallic pipe or conduit to be centered within opening with a max annular space between pipe or conduit and periphery of 1/8 in. (3.2 mm) for nom 2-1/2 in. (64 mm) diam and smaller pipes and conduits and 1/4 in. (6 mm) for pipes and conduits greater than 2-1/2 in. (64 mm) diam. Pipe or conduit to be rigidly supported on both sides of the wall assembly. The following types and sizes of nonmetallic pipes and conduits may be used.
   A. **Polyvinyl Chloride (PVC) Pipe -** Nom 4 in. (102 mm) diam (or smaller) Schedule 40 solid or cellular core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   B. **Chlorinated Polyvinyl Chloride (CPVC) Pipe -** Nom 4 in. (102 mm) diam (or smaller) SDR17 CPVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   C. **Acrylonitrile Butadiene Styrene (ABS) Pipe -** Nom 4 in. (102 mm) diam (or smaller) Schedule 40 solid or cellular core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   D. **Rigid Nonmetallic Conduit+ -** Nom 4 in. (102 mm) diam (or smaller) Schedule 40 PVC conduit installed in accordance with the National Electrical Code (NFPA 70).

(CONTINUED ON NEXT PAGE)

APPENDIX F - STI SYSTEM NO. W-L-2237 (CONTINUED)

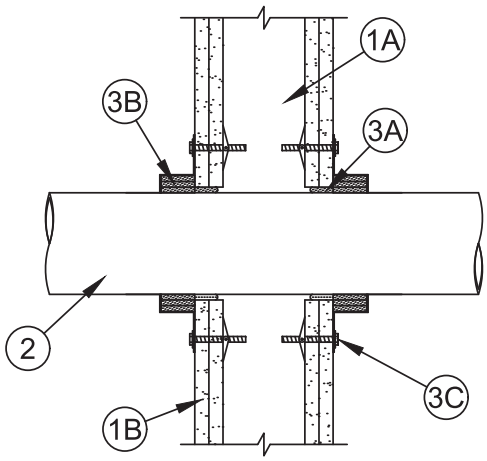
3. **Firestop System -** The firestop system consists of the following:
   A. **Fill, Void or Cavity Material* - Sealant -** Min 1/4 in. (6 mm) thickness applied within annulus, flush with both surfaces of wall.
      SPECIFIED TECHNOLOGIES INC - SpecSeal LCI Sealant
   B. **Firestop Device* -** Galv steel collar lined with an intumescent material sized to fit the specific diam of the through penetrant. Device shall be installed around through penetrant in accordance with the accompanying installation instructions. Device incorporates anchor tabs for securement to both surfaces of wall assembly by means of 3/16 in. (4.8 mm) diam steel toggle bolts in conjunction with min 1-1/4 in. (32 mm) diam steel fender washers.
      SPECIFIED TECHNOLOGIES INC - SpecSeal LCC Collar or SpecSeal SSC Collar
      *** 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

APPENDIX G - STI SYSTEM NO. W-L 2059

Classified by
Underwriters Laboratories, Inc.
to ASTM/UL1479 (ASTM E814)

System No. W-L-2059

F Ratings - 1 and 2 Hr (See Items 2 and 3)
T Ratings - 3/4, 1, 1-1/2 and 2 Hr (See Items 2 and 3)
L Rating At Ambient - 1 CFM/sq ft
L Rating At 400 F - Less Than 1 CFM/sq ft



Section A-A

1. **Wall Assembly -** The 1 or 2 h fire rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300, U400 and V400 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* -** 5/8 in. (16 mm) thick, 4 ft (1219 mm) wide with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300, U400 or V400 Series Design in the UL Fire Resistance Directory. Max diam of opening is 5 in. (127 mm).
2. **Through-Penetrants -** One nonmetallic pipe or conduit to be centered within the firestop system. The annular space shall be max 1/4 in. (6 mm). Pipe or conduit to be rigidly supported on both sides of the wall assembly. The following types and sizes of nonmetallic pipes or conduits may be used:
   A. **Polyvinyl Chloride (PVC) Pipe -** Nom 4 in. (102 mm) diam (or smaller) Schedule 40 or 80 solid or cellular core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems. **When Schedule 80 PVC pipe is used, the F and T Ratings are 1 hr. When Scheduled 80 PVC pipe is used in closed (process or supply) piping systems, the F and T Ratings are equal to the assembly rating of the wall in which it is installed.**
   B. **Rigid Nonmetallic Conduit+ -** Nom 4 in. (102 mm) diam (or smaller) Schedule 40 or 80 PVC conduit installed in accordance with Article 347 of the National Electrical Code (NFPA No. 70). **When Schedule 80 PVC conduit is used, the F and T Ratings are 1 hr.**
   C. **Chlorinated Polyvinyl Chloride (CPVC) Pipe -** Nom 4 in. (102 mm) diam (or smaller) SDR 13.5 CPVC pipe for use in closed (process or supply) piping systems.
   D. **Acrylonitrile Butadiene Styrene (ABS) Pipe -** Nom 4 in. (102 mm) diam (or smaller) Schedule 40 solid or foamed core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   E. **Fire Retardant Polypropylene (FRPP) Pipe -** Nom 4 in. (102 mm) diam (or smaller) Schedule 40 FRPP pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   F. **Polyvinylidene Fluoride (PVDF) Pipe -** Nom 4 in. (102 mm) diam (or smaller) Schedule 40 PVDF pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   G. **Fiberglass Reinforced Pipe (FRP) Pipe -** Nom 4 in. (102 mm) diam (or smaller) glass fiber reinforced thermosetting resin pipe for use in closed (process or control) or vented (drain, waste or vent) piping systems. When FRP pipe is used, T Rating is 3/4 hr.
   H. **High Density Polyethylene (HDPE) Pipe -** Nom 4 in. (102 mm) diam (or smaller) Schedule 40 HDPE pipe for use in closed (process or supply) piping systems.

(CONTINUED ON NEXT PAGE)

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

   A. **Fill, Void or Cavity Material* - Sealant -** Fill material forced into annular space to max extent possible. Caulk shall be installed flush with both surfaces of wall assembly.

   SPECIFIED TECHNOLOGIES INC - SpecSeal 100, 101, 102, 105, 120 or 129 Sealant, SpecSeal LCI Sealant, Pensil 300 Sealant or SpecSeal Series SIL300 Sealant

   B. **Fill, Void or Cavity Material - Wrap Strip -** Nom 1/8 or 3/16 in. (3.2 or 4.8 mm) thick intumescent material faced on both sides with a plastic film, supplied in 2 in. (51 mm) wide strips or nom 1/4 in. (6 mm) thick intumescent material faced on both sides with a plastic film, supplied in 1-1/2 in. (38 mm) wide strips. The layers of wrap strips are individually wrapped around the through-penetrant with ends butted and held in place with masking tape. Butted ends in successive layers shall be aligned.

Fire Rating of Wall Hr	Max Diam of Throught Penetrant in. (mm)	No. of Wrap Strip Layers	F Rating Hr	T Rating Hr
1	1-1/2 (38)	1	1	1
2	1-1/2 (38)	1	2	1-1/2
1	2 (51)	1	1	1
2	2 (51)	1	2	1-1/2
1	3 (76)	2	1	1
2	3 (76)	2	2	2
1	4 (102)	3	1	1
2	4 (102)	3	2	2

   Except as noted in Item 2, the F and T Rating of the firestop system is dependent upon the fire rating of wall, diam of through penetrant and the number of wrap strips as tabulated below:

   SPECIFIED TECHNOLOGIES INC - SpecSeal BLU Wrap Strip, SpecSeal BLU2 Wrap Strip or SpecSeal RED Wrap Strip

   C. **Steel Collar -** Collar fabricated from coils of precut 0.016 in. (0.4 mm) thick (30 MSG) galv sheet steel available from wrap strip manufacturer. Collar shall be min 1-1/2 in. (38 mm) deep with 1 in. (25 mm) wide by 2 in. (51 mm) long anchor tabs for securement to the concrete floor or wall. Retainer tabs, 3/4 in. (19 mm) wide tapering down to 1/4 in. (6 mm) wide and located opposite the anchor tabs, are folded 90 degree toward pipe surface to maintain the annular space around the pipe and to retain the wrap strips. Steel collar wrapped around wrap strips and pipe with a 1 in. (25 mm) wide overlap along its perimeter joint and secured together by means of a min 1/2 in. (13 mm) wide by 0.028 in. (0.7 mm) thick stainless steel hose clamp installed at mid-depth of the steel collar. As an alternate to the steel hose clamp, the steel collar may be secured together by means of three No. 8 by 1/4 in. (6 mm) long steel sheet metal screws when more than one layer of wrap strip is used.

   Wrap strip/collar assembly is slid along the through-penetrant until abuts the surface of the wall. Collar secured to wall by 1/8 in. (3.2 mm) diam by 1-3/4 in. (44 mm) long steel molly bolts in conjunction with 1-1/4 in. (32 mm) diam steel fender washers. The number of molly bolts used is dependent upon the nom diam of the through penetrant. Two molly bolts, symmetrically located, are required for nom 1-1/2 in. (38 mm) and 2 in. (51 mm) diam through penetrants. Three molly bolts, symmetrically located, are required for nom 2-1/2 in. (64 mm) and 3 in. (76 mm) diam through penetrants. Four molly bolts, symmetrically located, are required for nom 3-1/2 in. (89 mm) and 4 in. (102 mm) diam through penetrants. Steel collars are installed on each side of wall.

   D. **Firestop Device* -** (Optional, Not Shown) - As an alternate to Item 3B and 3C, galv steel collar lined with an intumescent material sized to fit the specific diam of the through-penetrant. Device shall be installed around through-penetrant in accordance with accompanying installation instructions. Device incorporates anchor tabs for securement to each surface of wall assembly by means of 1/8 in. (3 mm) diam by 1-3/4 in. (45 mm) long steel molly bolts in conjunction with 1/4 in. (6 mm) diam by 1-1/2 in. (38 mm) diam steel fender washers.

   SPECIFIED TECHNOLOGIES INC - SpecSeal Firestop Collar, SpecSeal LCC Collar or SpecSeal SSC Collar . When SpecSeal LCC Collar or SpecSeal SSC Collar are used, the max annular space shall be 1/8 in. (3 mm) for max 2-1/2 in. (64 mm) diam pipe and shall be max 1/4 in. (6 mm) for pipe larger than 2-1/2 in. (64 mm) diam.

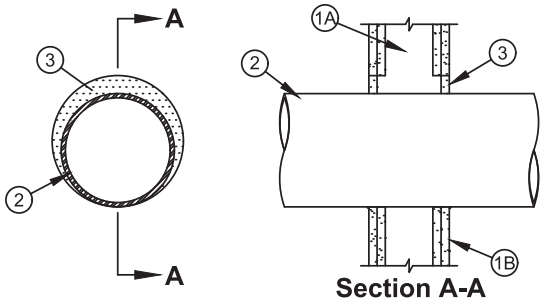
   * Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

APPENDIX H - STI SYSTEM NO. W-L-1222

Classified by
Underwriters Laboratories, Inc.
to ASTM/UL1479 (ASTM E814)

System No. W-L-1222

F Ratings - 1 and 2 Hr (See Item 1)
T Ratings - 1/4, 3/4 and 1 Hr (See Item 2)



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 10-5/8 in. (270 mm).

   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.

2. **Through Penetrant -** One metallic pipe, conduit or tube to be installed eccentrically or concentrically within the firestop system. Pipe, conduit or tubing may be installed at an angle not greater than 45 degrees from perpendicular. The annular space between the pipe, conduit or tube and the periphery of the opening shall be min 0 in. (0 mm, point contact) to max 2 in. (51 mm). Pipe, conduit or tube to be rigidly supported on both sides of the wall assembly. The following types and sizes of metallic pipes, conduits and tubes may be used:

   A. **Steel Pipe -** Nom 8 in. (203 mm) diam (or smaller) Schedule 5 (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) steel electrical metallic tubing (EMT) or nom 4 in. (102 mm) diam (or smaller) flexible steel conduit.

   D. **Copper Pipe -** Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.

   E. **Copper Tube -** Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tube.

Type of Penetrant	Max Diam	T Rating
Steel or iron pipe, steel conduit or EMT	2 in. (51 mm)	1 hr
Steel or iron pipe, steel conduit or EMT	8 in. (203 mm)	3/4 hr
Copper pipe or tube	4 in. (102 mm)	1/4 hr

2A. **Through Penetrating Product* - Flexible Metal Piping -** As an alternate to Item 2, one nom 1-1/4 in. (32 mm) diam (or smaller) steel flexible metal pipe to be installed either concentrically or eccentrically within the firestop system. The annular space between the pipe and the periphery of the opening shall be min 0 in. (0 mm, point contact) to max 2 in. (51 mm). Pipe to be rigidly supported on both sides of the wall assembly.

OMEGA FLEX INC

GASTITE, DIV OF TITEFLEX

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3. **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. At point contact location, min 1/4 in. (6 mm) diam bead of fill material applied at metallic pipe/gypsum board interface on both surfaces of wall.

SPECIFIED TECHNOLOGIES INC - SpecSeal LCI Sealant

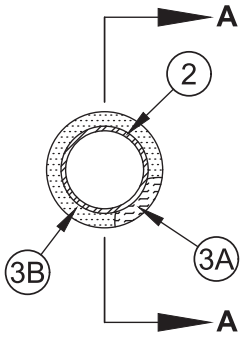
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

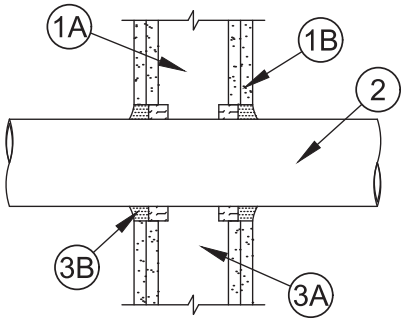
APPENDIX I - STI SYSTEM NO. W-L-1029

Classified by
Underwriters Laboratories, Inc.
to ASTM/UL1479 (ASTM E814)

System No. W-L-1029

(Formerly System No. 467)
F Ratings - 1 and 2 Hr (See Item 1B)
T Rating - 0 Hr
L Rating At Ambient - Less Than 1 CFM/sq ft
L Rating At 400 F - Less Than 1 CFM/sq ft





Section A-A

1. **Wall Assembly -** The 1 or 2 h fire rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300 and U400 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. lumber spaced 16 in. OC. Steel studs to be min 2-1/2 in. wide and spaced max 24 in. OC.

   B. **Gypsum Board* -** 5/8 in. thick, 4 ft wide with square or tapered edges. The gypsum wallboard type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300 or U400 Series Design in the UL Fire Resistance Directory. Max diam of opening is 6 in.

   The hourly F rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.

2. **Through Penetrants -** One metallic pipe, conduit or tubing to be centered within the firestop system. A nom annular space of 3/4 in. is required within the firestop system. Pipe, conduit or tubing to be 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 4 in. diam (or smaller) Schedule 5 (or heavier) steel pipe.

   B. **Conduit -** Nom 4 in. diam (or smaller) steel electrical metallic tubing or steel conduit.

   C. **Copper Tubing -** Nom 4 in. diam (or smaller) Type L (or heavier) copper tubing.

   D. **Copper Pipe -** Nom 4 in. diam (or smaller) Regular (or heavier) copper pipe.

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

   A. **Packing Material -** Min 1 in. thickness of min 3.5 pcf fiberglass insulation shall be wrapped around the through-penetrant and secured together by means of No. 24 AWG steel tie wire. Packing material shall be centered at mid-depth of opening and recessed from both surfaces of wall assembly required to accommodate the required thickness of fill material.

   B. **Fill, Void or Cavity Material* - Caulk or Putty -** In 2 hr fire rated assemblies min 3/4 in. thickness fill material applied within the annulus, flush both surfaces of wall. Additional fill material to be installed such that a min 1/4 in. crown is formed around the penetrating item. In 1 h fire-rated assemblies, min 5/8 in. thickness of fill material applied within annulus on both surfaces of wall. Additional fill material to be installed such that a min 3/8 in. crown is formed around the penetrating item and lapping 1 in. beyond the periphery of the opening.

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

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

Specified Technologies Inc. 210 Evans Way Somerville, NJ 08876

Created or Revised: January 23, 2014

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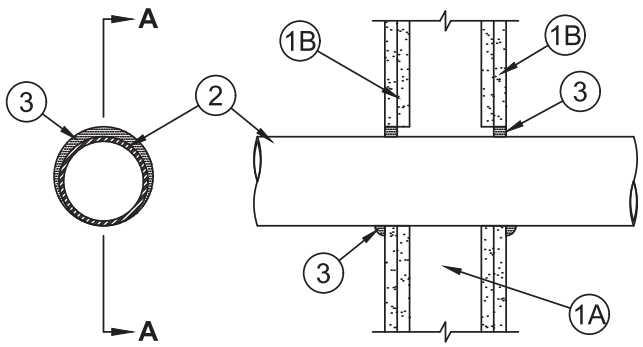
APPENDIX J - STI SYSTEM NO. W-L-1042

Classified by
Underwriters Laboratories, Inc.
to ASTM/UL1479 (ASTM E814)

System No. W-L-1042

F Ratings - 1 and 2 Hr (See Item 1)
T Rating - 1/4 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 specified in the individual U300 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs -** Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC.
   B. **Gypsum Board* -** Thickness, type, number of layers and fasteners as specified in the individual Wall and Partition Design. Diam of opening to be 1/2 to 1 in. (13 to 25 mm) larger than outside diam of through penetrant (Item 2). Max diam of opening is 5 in. (128 mm).

   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.
2. **Through Penetrant -** One metallic pipe, conduit or tubing installed concentrically or eccentrically within the firestop system. Pipe, conduit or tubing may be installed at an angle not greater than 45 degrees from perpendicular. Pipe, conduit or tube to be rigidly supported on both sides of wall assembly. The annular space between the pipe, conduit or tube and periphery of the opening shall be min 0 in. (point contact) to max 1/2 in. (0 to 13 mm). The following types and sizes of metallic pipes, conduits or tubing may be used:
   A. **Steel Pipe -** Nom 4 in. (102 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. **Iron Pipe -** Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Conduit -** Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing (EMT) or steel conduit.
   D. **Copper Tubing -** Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tube.
   E. **Copper Pipe -** Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
3. **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. At the point contact location or when the annulus between the through penetrant and wall is 1/8 in. (3 mm) or less, min 1/2 in. (13 mm) diam bead of fill material applied at the through penetrant/gypsum board interface.

   SPECIFIED TECHNOLOGIES INC - Type WF300 Caulk

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

Specified Technologies Inc. 210 Evans Way Somerville, NJ 08876

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Created or Revised: January 23, 2014

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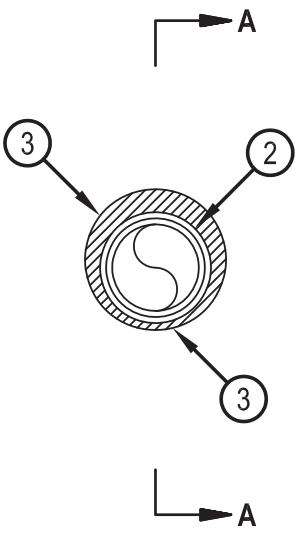
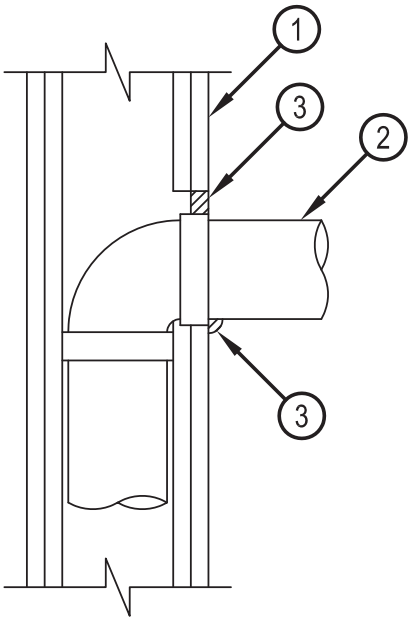
WL 1410

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

System No. W-L-1410

ANSI/UL1479 (ASTM E814)	CAN/ULC 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 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 3-1/2 in. (89 mm) wide and spaced max 24 in. (610 mm) OC.
   B. Gypsum Board* — One or two layers of 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 and FH Ratings of the firestop system are equal to the hourly fire rating of the wall assembly.
2. Through penetrants — One metallic pipe or conduit to be installed either concentrically or eccentrically within the firestop system. The annular space shall be 0 in. (point contact) to 1 in. (25 mm). Pipe or conduit to be rigidly supported on the penetrated side of the wall assembly. The following types and sizes of metallic pipes or conduits may be used:
   A. Steel pipe — Nom 3 in. (76 mm) diam (or smaller) Schedule 5 (or heavier) steel pipe.
   B. Conduit — Nom 3 in. (76 mm) diam (or smaller) steel electrical metallic tubing (EMT), nom 3 in. (76 mm) diam steel conduit or nom 1 in. (25 mm) diam (or smaller) flexible steel conduit.
   C. Copper Tubing — Nom 1 in. (25 mm) diam (or smaller) Type L (or heavier) copper tubing.
   D. Copper Pipe — Nom 1 in. (25 mm) diam (or smaller) Regular (or heavier) copper pipe.
3. Fill, Void or Cavity Material++— Sealant — Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with surface of wall. Min 1/2 in. (13 mm) diam bead of sealant applied at point contact location.

   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant, FS-ONE MAX Intumescent Sealant, CFS-S-SIL GG Sealant, CP601S Elastomeric Sealant, CP 606 Sealant,or CP618 Putty.

++ Bearing the UL Classification Mark

Hilti Firestop Systems

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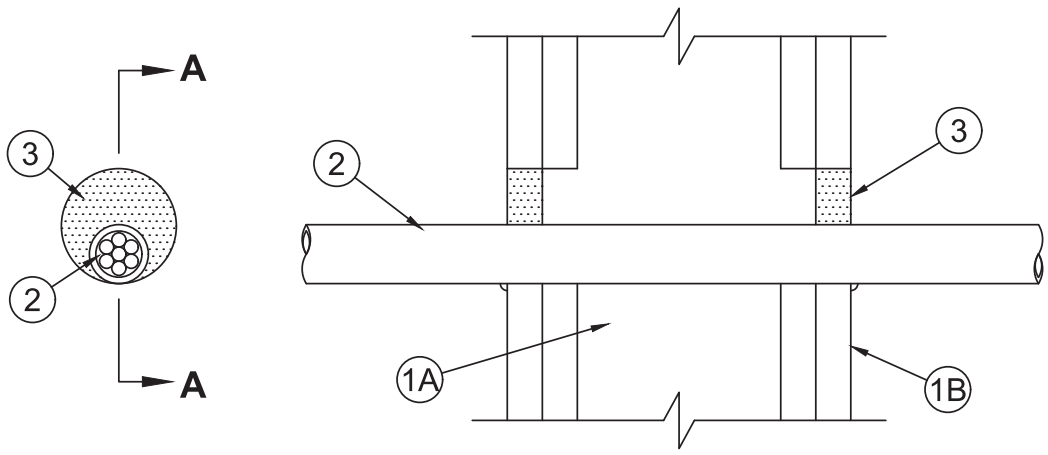
January 26, 2015

APPENDIX L - STI SYSTEM NO. W-L-3171

Classified by
Underwriters Laboratories, Inc.
to ASTM/UL1479 (ASTM E814)

System No. W-L-3171

F Ratings - 1 and 2 Hr (See Item 1)
T Ratings - 1/4 and 3/4 Hr (See Item 2A)



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. lumber spaced 16 in. OC. Steel studs to be min 3-5/8 in. wide and spaced max 24 in. 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 1 in. larger than OD of cable (Item 2).

   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.

2. **Cable -** One cable to be installed eccentrically or concentrically within the opening. The annular space between the cable and the periphery of the opening shall be min 0 in. (point contact) to max 1 in. Cable to be rigidly supported on both sides of the floor or wall assembly. The following types and sizes of cable may be used:

   A. Max 200 pair No. 24 AWG (or smaller) copper conductor with polyvinyl chloride (PVC) insulation and jacketing material.

   B. Max 1/C No. 350 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 3/C No. 2/0 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 Hylar jacket and insulation.

2A. **Through Penetrating Product* -** As an alternate to the cable (Item 2), one max 4/C No. 2/0 AWG (or smaller) aluminum or steel **Armored Cable+** or **Metal Clad Cable+** installed within the opening. Annular space between through-penetrating product and periphery of opening to be min 0 in. (point contact) to max 1 in. Through penetrating product rigidly supported on both sides of wall assembly. **When Armored Cable or Metal Clad Cable is used, T Rating is 1/4 hr.**

AFC CABLE SYSTEMS INC

3. **Fill, Void or Cavity Material* - Sealant -** Min 5/8 in. thickness of fill material applied within annulus, flush with both surfaces of wall assembly. At point contact location, min 1/4 in. diam bead of fill material applied at cable/gypsum board interface on both surfaces of wall.

SPECIFIED TECHNOLOGIES INC - SpecSeal LCI Sealant

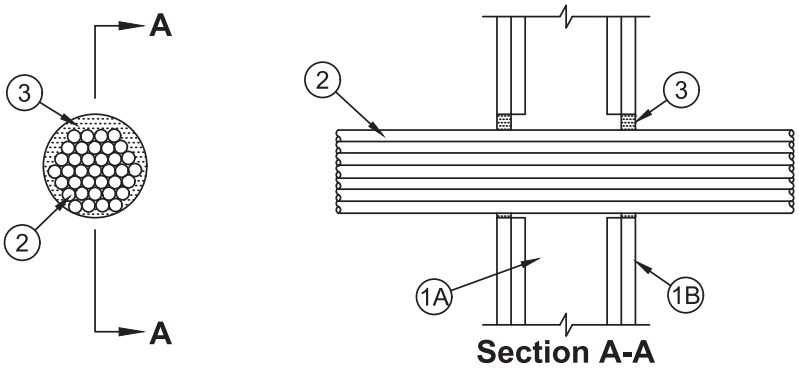
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

APPENDIX M - STI SYSTEM NO. W-L-3169

Classified by
Underwriters Laboratories, Inc.
to ASTM/UL1479 (ASTM E814)

System No. W-L-3169

F Ratings - 1 and 2 Hr (See Item 1)
T Ratings - 1/4 and 3/4 Hr (See Item 2A)



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 3-5/8 in. (92 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 5 in. (127 mm).

   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.

2. **Cables -** Max 4-1/2 in. diam tight bundle of cables to be installed eccentrically or concentrically within the opening. The annular space between the cables and the periphery of the opening shall be min 0 in. (0 mm, point contact) to max 1/2 in. (13 mm). Cable bundle to be rigidly supported on both sides of the floor or wall assembly. The following types and sizes of cables may be used:

   A. Max 200 pair No. 24 AWG (or smaller) copper conductor with polyvinyl chloride (PVC) insulation and jacketing material.

   B. Max 1/C No. 350 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 3/C No. 2/0 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 Hylar jacket and insulation.

   J. Max 4/C (with ground) No. 300 kcmil (or smaller) aluminum conductor SER cables with PVC insulation and jacket.

2A. **Through Penetrating Product* -** As an alternate to the cables (Item 2), max 4 in. (102 mm) diam tight bundle of max 4/C No. 2/0 AWG (or smaller) aluminum or steel **Armored Cable+** or **Metal Clad Cable+** installed within the opening. Annular space between through-penetrating products and periphery of opening to be min 0 in. (0 mm, point contact) to max 1 in. (25 mm). Through penetrating product rigidly supported on both sides of floor or wall assembly. **When Armored Cable or Metal Clad Cable is used, T Rating is 1/4 hr.**

AFC CABLE SYSTEMS INC

3. **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. Sealant to be forced into interstices of cable bundle to max extent possible. At point contact location, min 1/4 in. (6 mm) diam bead of fill material applied at cable bundle/gypsum board interface on both surfaces of wall.

SPECIFIED TECHNOLOGIES INC - 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.

Specified Technologies Inc. 210 Evans Way Somerville, NJ 08876

Created or Revised: January 23, 2014

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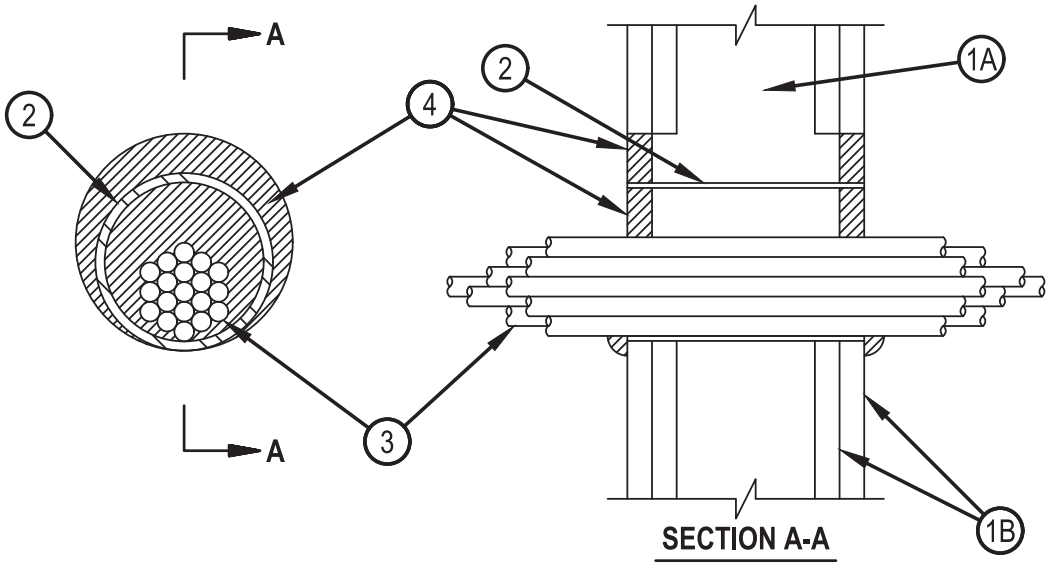
W-L-3169
PAGE 1 **OF** 1

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

System No. W-L-3065

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 and 2 Hr (See Item 1)	F Rating — 1 and 2 Hr (See Item 1)
T Rating — 0 and 3/4 Hr (See item 3)	FT Rating — 0 and 3/4 Hr (See item 3)
L Rating At Ambient — 15 CFM/sq ft	FH Rating — 1 and 2 Hr (See Item 1)
L Rating At 400 F — 8 CFM/sq ft	FTH Rating — 0 and 3/4 Hr (See item 3)
	L Rating At Ambient — 15 CFM/sq ft
	L Rating At 400 F — 8 CFM/sq ft



SECTION A-A

1. Wall Assembly — The 1 or 2 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* — Nom 5/8 in. (16 mm) thick gypsum board, with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory. Max diam of opening is 5-1/2 in. (138 mm) when sleeve (Item 2) is employed. Max diam of opening is 4 in. (102 mm) when sleeve (Item 2) is not employed.

   The F, FH Ratings of the firestop system are equal to the fire rating of the wall assembly.
2. Metallic Sleeve — (Optional) - Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing (EMT) or Schedule 5 (or heavier) steel pipe or min 0.016 in. thick (0.41 mm, No. 28 ga) galv steel sleeve installed flush with wall surfaces. The annular space between steel sleeve and periphery of opening shall be min 0 in. (0 mm, point contact) to max 1 in. (25mm). When Schedule 5 steel pipe or EMT is used, sleeve may extend up to 18 in. (457 mm) beyond the wall surfaces. As an option when Schedule 5 steel pipe or EMT is used, sleeve may extend continuously beyond one wall surface. When cable bundle penetrates wall assembly at an angle of 45 degrees, no metallic sleeve is used.

Hilti Firestop Systems

(CONTINUED ON NEXT PAGE)

System No. W-L-3065

WL 3065

3. Cables — Aggregate cross-sectional area of cable in opening to be max 45 percent of the cross-sectional area of the opening. The annular space between the cable bundle and the periphery of the opening to be min 0 in. (point contact) to max 1 in. (25 mm). When sleeve is continuous on one side of wall (see Item 2), the cable fill may be 0 to 45% and the max annular space is not limited. Cables to be rigidly supported on both sides of the wall assembly. Any combination of the following types and sizes of copper conductor cables may be used:
   A. Max 7/C No. 12 AWG with polyvinyl chloride (PVC) insulation and jacket.
   B. Max 25 pair No. 24 AWG telephone cable with PVC insulation and jacket.
   B1. Max 4 pr No. 22 AWG Cat 5 or Cat 6 computer cables.
   C. Type RG/U coaxial cable with polyethylene (PE) insulation and PVC jacket having a max outside diameter of ½ in. (13 mm).
   C1. Max RG 6/U coaxial cable with fluorinated ethylene insulation and jacketing.
   D. Multiple fiber optical communication cable jacketed with PVC and having a max OD of 5/8 in. (16 mm).
   E. Through Penetrating Products*— Max three copper conductor No. 8 AWG .Metal-Clad Cable+.
   AFC CABLE SYSTEMS INC
   F. Max 3/C (with ground)(or smaller) No. 8 AWG copper conductor cable with PVC insulation and jacketing.
   G. Max 3/4 in. (19 mm) diam copper ground cable with or without a PVC jacket.
   H. Fire Resistive Cables* - Max 1-1/4 in. (32 mm) diam single conductor or multi conductor Type MI cable. A min 1/8 in. (3 mm) separation shall be maintained between MI cables and any other types of cable.
   I. Max 4/C with ground 300 kcmil (or smaller) aluminum SER cable with PVC insulation and jacket.
   J. Through Penetrating Product* - Any cables, Metal-Clad Cable+ or Armored Cable+ currently Classified under the Through Penetrating Products category.
   K. Maximum 3/C No. 8 AWG metal-clad cable.
   L. Maximum 5/8 diam fiber-optic cable with PVC jacket.
   For cable bundle penetrating the wall assembly at an angle of 45 degrees, the T, FT, FTH Ratings are 0 hr and 3/4 hr for 1 and 2 hr wall assemblies, respectively.
   See Through Penetrating Product (XHLY) category in the Fire Resistance Directory for names of manufacturers.
4. Fill, Void or Cavity Material*— Sealant or Putty — Fill material applied within the annulus, flush with each end of the steel sleeve or wall surface. Fill material installed symmetrically on both sides of the wall. A min 5/8 in. (16 mm) thickness of sealant is required for the 1 or 2 hr F Rating . An additional 1/2 in. (13 mm) diam bead of fill material shall be applied at the interface of sleeve with gypsum board.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP601S, CP606, FS-One Sealants or FS-ONE MAX Intumescent Sealantor or CP618 Putty

5. Packing Material — (Optional, Not Shown) — Mineral wool forming material may be used as a backer for the fill material (Item 4). When used, it shall be firmly packed into annular space within the sleeve as a permanent form and recessed from end of sleeve to accommodate the required thickness of fill material.

* 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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Geberit North America is part of the Geberit Group, a European market leader and global provider of sanitary technology. Located in Des Plaines, Illinois, Geberit North America provides concealed tank and carrier systems for wall-hung and floor-mounted toilets and fixtures. Geberit systems improve the look of any bathroom by hiding the unsightly toilet tank. Replacing a standard tank and toilet with the Geberit system results in more usable space, improved hygiene and better accessibility. The unique dual-flush valve saves water and is practically maintenance free. Geberit also offers cable-controlled bath waste and overflows in a variety of designer finishes. Critical working parts are outside the waterway, ensuring years of trouble-free operation.

For more information, contact your Geberit sales representative, call 800/566-2100 or go to **www.geberit.us**