Firestop Products & Systems
Submittal Documentation

X Service Penetrations

____ Construction Joints/Gaps

Project:

_____

_____

_____

Contractor:

_____

_____

_____

Installer:

_____

_____

_____

Supplier:

Grabber Construction Products

866-237-GRAB(4722)

Distributor:

_____

_____

_____

Table of Contents

Through-Penetrations Firestop Systems

Type of assembly

CFW – Concrete Floors & Walls
CF – Concrete Floors
CMD – Concrete Metal Decks
PCF – Precast Concrete Floors
FF – Framed Floors
HFS – Hambro Floor Systems
CW – Concrete Walls
FW – Framed Walls

GRABBER CONSTRUCTION PRODUCTS

205 Mason Circle, Concord CA 94520

GrabberGard EFC, IFC & EFS

THESE PRODUCTS ARE TESTED TO THE FOLLOWING TEST STANDARDS

In the USA:

ASTM E-814	Standard Test Method for Fire Tests of Through Penetrations Fire Stops
ASTM E-1399	Cyclic Movement and Measuring the Minimum and Maximum Joint Widths of Architectural Joint Systems
UL 1479	Fire Tests of Through-Penetration Firestops
UL 2079	Tests for Fire Resistance of Building Joint Systems

In Canada:

ULC S115	Standard Method of Fire Tests of Firestop Systems

TESTED BY THIRD PARTY AGENCIES

Underwriters Laboratories, Inc. (UL)
Intertek Testing Services Inc. – Warnock Hersey (WHI)

No Asbestos or PCBs are used or contained in this product.

LEED is a trademark of the US Green Building Council

To Whom It May Concern:

Re: LEED Information on Grabber Construction Products' GrabberGard Firestopping Products

This letter will detail the contribution of Grabber Construction Products' GrabberGard firestopping products to the LEED® (Leadership in Energy and Environmental Design) Green Building Rating System® in accordance with LEED-NC Version 4.1 For New Construction & Major Renovations.

In reference to LEED® Material and Resource (MR) – Credit 2 – Construction Waste Management – the following Grabber' materials are recyclable where facilities exist:

Packaging	Recyclable Product	Weight Per Unit
Carton	Cardboard	56 g – EBI-60
		70 g – Putty Stick
		190 g – 10 oz plastic tube
		350 g – 20 oz foil package
		410 g – 10 L plastic jar
		600 g – 29 oz plastic tube
10.1 oz (300ml) plastic tube	HDPE	49 g / Tube
20 oz (600ml) foil pack	Aluminum	5 g / Pack
29 oz (850ml) tube	Fiberboard	84 g / Tube
35.2 oz (1L) EZ pour plastic bottle	HDPE	50 g / Bottle
2.5 gallon (9.5L) plastic pail	HDPE	0.8 kg / Pail
2.65 gallon (10 L) plastic jar	HDPE	345 g / Jar
5 gallon (18.9L) plastic pail	HDPE	1.2 kg / Pail
Wooden pallet	Wood	21 kg / Pallet

In reference to LEED® Material and Resources – Credits 4.1 & 4.2 – Recycled Content, all GrabberGard firestopping products contain 5% post-consumer recycled content.

In reference to LEED® Material and Resources – Credit 5 - Regional Materials, Grabber can confirm that a minimum of 50% of the raw materials used in manufacturing the GrabberGrad firestopping products are sourced and processed within a 500-miles radius of our manufacturing facility in Vancouver, BC.

If the project site is located within a 500-mile radius of our manufacturing site then this manufacturing site can contribute to earning Materials and Resource Credit 5.1 & 5.2.

The volatile organic content (VOC) of GrabberGard firestopping products are listed below and meets the minimum LEED® requirements for low-emitting materials. These materials can assist to earn Indoor Environmental Quality (IEQ) – Credit 4.1 – Low-Emitting Materials: Adhesives & Sealants (Architectural Sealants) & Credit 4.2 – Low-Emitting Materials: Paints & Coatings (Architectural Sealants).

GrabberGard Firestopping Product	VOC content [g/L]
EFC	32.5
IFC	37.1
EFS	81.3

If you have any additional questions, please feel free to contact us at (800) 237-4722.

PRODUCT DATA SHEET GRABBERGARD EFC

Description

GRABBERGARD EFC is a superior performance latex-based endothermic firestop caulk. It has excellent adhesion and bonding characteristics and will not slump or sag out after it has been properly installed. GRABBERGARD EFC elastomeric caulk has been designed to stop the passage of fires, smoke and fumes through fire-rated assemblies after it has been fully cured. GRABBERGARD EFC is chemically compatible with plastic pipes and cable jackets and is water resistant after fully cured. Once cured Grabbergard EFC provides a durable and flexible firestop and can be repaired if damaged or cut.

Applications

GRABBERGARD EFC firestop caulk provides an effective firestop seal when used as a single or multiple component system for through-penetrations, construction joints and voids. To make certain installation is correct, consult manufacturer's current listings, as well as, Third Party published Fire Resistance Directories and/or their websites. GRABBERGARD EFC common uses and features are listed below:

Used on: Single and multiple penetrations
Metallic pipes
- Copper, steel, cast iron
- Conduits

Non-metallic pipes
- ABS, CPVC, FRPP, PE, PEX, PVC
- Rigid and ENT conduit

Insulated pipes
- Fiberglass
- AB/PVC

Electrical cables and wires
- Jacket & non-jacketed

Cable trays
Mechanical ducts
Construction joints/gaps
- Top-of-Wall
- Horizontal and vertical joints
- Perimeter floor joints

Voids
Common construction substrate materials:
- Concrete
- Concrete block
- Steel deck
- Wood
- Gypsum wallboard

Features: Red Color
Non-toxic
Safe and easy to use
Easy clean up (Water Only)
Low volatile organic content (VOC)
No asbestos or PCB
Water resistance (when fully cured)
Mildew resistant (when fully cured)
Paintable (with latex based paints)
Excellent application characteristics
- Flows easily
- No slump
- Superior bond and adhesion

Excellent acoustic properties
Seals smoke and gases
One-component systems

Advantages

Endothermic – When GRABBERGARD EFC is exposed to high temperatures or direct fire, it releases water vapor, forms a solid char and retards the spread of fire.

Single Component

GRABBERGARD EFC Caulk can be used as a single component firestop in many applications. Just install the caulk directly into the opening without using fibrous insulation materials. In many situations GRABBERGARD EFC will replace the more conventional intumescent firestop devices such as pipe collars and wrap strips. This will reduce both the cost and installation time.

Versatility

GRABBERGARD EFC adheres to dry and damp concrete, wood, metals and other common construction material surfaces to form an air and watertight bond. GRABBERGARD EFC can be painted over using a latex-based paint after fully cured.

Flexibility

When installed GRABBERGARD EFC is properly installed in construction joints it will allow up to 33 per cent extension and compression movement of the intersecting assemblies. It will also accommodate longitudinal and lateral movement of through and partial service penetrating items installed in the assembly. GRABBERGARD EFC will remain flexible after it has fully cured.

Intertek
December 2019

PRODUCT DATA SHEET GRABBERGARD EFC

Limitations

Consult the Installation Instructions, Storage and Handling and Transportation Sections. **Exposure to rain, running or standing water; before, the sealant is cured may cause the installed material(s) to wash out.** The curing process occurs naturally through the evaporation of its water content into the atmosphere. Slower cure times may be experienced if the sealant is installed at low temperatures, damp and/or in high humidity environments. Any materials used in the firestop system for damming, insulation or support that may not allow for the free passage of air could result in longer curing times. The environment in which the compound is being used should be considered when estimating cure times.

Compliance/Approvals

GRABBERGARD EFC has been Third Party tested for many firestop applications. They meet or exceed the requirements of ASTM E 814; ASTM E 119; UL 1479; UL 2079; ULC S 115-M95; ULC S 101; ASTM E 84. Underwriters Laboratories (UL) and Intertek Warnock Hersey are Third Party fire endurance testing agencies accredited by ICBO, BOCA, and SBCCI (National Evaluation Services) in the United States.

Additional Testing

GRABBERGARD EFC caulk becomes an integral component in a complete building system of walls, floor/ceiling assemblies, service penetration, joints and the like. For this reason, its physical compatibility to other materials used in these complex configurations requires more than the routine firestopping product testing. The results of these additional tests are listed in Table 1,Physical and Chemical Properties.

GRABBERGARD EFC caulk has proven that it has all the physical and chemical characteristics desired in a firestopping product. After it has been installed and fully cured, it has excellent stability and flexibility, even after four weeks at freezing temperatures of -15°F (-26°C) and exposure to extreme temperatures of 300 F(149°C) for 24 hours. Dimensional changes were well within the accepted standards (<2% per ASTM C 356). Dynamic testing has demonstrated the high elasticity properties of GRABBERGARD EFC.

Installation Instructions

GRABBERGARD EFC must be installed in compliance with the listed system designs published by Third Party testing laboratories (UL, ITS Warnock Hersey). Refer to their respective published Fire Resistance Directories and/or their Websites. GRABBERGARD EFC does not require mineral wool insulation in many applications.

Prep-work

To install properly, remove excessive dust, dirt, debris, grease, oil and standing water.

Application

Apply caulking material with standard cartridge or bulk-loading application guns or trowel in place with standard toweling tools. Install the required amount of caulking material into the opening using sufficient pressure to ensure it is in contact with all surfaces, substrates and/or penetrating items. The manufacturer recommends tooling the surface with a moist putty knife or similar tooling utensil. Tooling the caulking material will create a stronger bond and a smooth finish especially on irregular or porous surfaces. Do not apply GRABBERGARD EFC to mineral wool that is or was wet from exposure to water, standing water, rain or snow.
Caution: Mineral wool may cause eye, skin or respiratory tract irritation. Avoid contact with eyes, skin of clothing. Recommend using gloves and goggles. Refer to mineral wool manufacturer's Material Safety Data Sheets.

Installation Temperature

For best results, installation temperatures should be between 45°-90°F(7°-32°C).

Maintenance

No special maintenance is required after the GRABBERGARD EFC sealant is installed and fully cured. If, after installation, the GRABBERGARD EFC sealant is damaged or cut, repairs should be made with the same sealant.

Intertek
December 2019

PRODUCT DATA SHEET GRABBERGARD EFC

Manufacturer's Recommendations

The manufacturer recommends this product be installed by those trained in proper installation procedures (Approved Installer Card) and be able to read and understand a firestop system design listing (i.e. UL or WHi Listed System Design).

Storage and Handling

Keep product stored in a protected covered area in its original unopened containers. Manufacturer recommends storage temperatures to between 40°-90°F(4°-32°C).

DO NOT ALLOW TO FREEZE

Product has a shelf life of one(1) year. Stock rotation program is recommended.

Transportation

Recommended transportation temperatures should be between 40°-90°F(4°-32°C).

DO NOT ALLOW TO FREEZE

First Aid

In case of contact with eyes, flush with water and consult a physician. Skin contact, clean up thoroughly with water or soapy water. Consult a physician if eye or skin irritation develops or is persistent. **SEE MSDS FOR ADDITIONAL INFORMATION.**

Availability

GRABBERGARD EFC caulk is supplied in:

- 10 fl. oz. (300ml) plastic cartridges
- 29 fl. oz. (850ml) cartridges
- 20 fl. oz. (590ml) sausages
- 5 gal. (18.9L) tapered plastic pails

Coverage

Estimated product usage will vary depending on opening size and configuration. Check GRABBERGARD'S estimating charts for coverage.

Warranty

Grabber Construction Products will not accept liability for more than product refund. Any claim regarding product defect must be received in writing within 1 year from date of shipment. Grabber makes no other Warranty or Guarantee express or implied, including warranties of fitness for a particular purpose or merchantability. The seller shall assume no other liability for incidental or consequential damages arising out of the sale or use of this product.

Technical Services

For technical information and assistance regarding application information, code requirements and performance specifications:

Toll Free 1-866-237-GRAB(4722)
Web Site www.grabberman.com

GREENGUARD GOLD

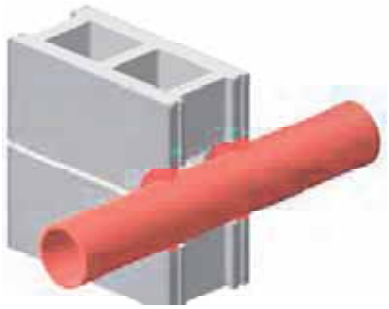
Intertek
December 2019

PRODUCT DATA SHEET GRABBERGARD EFC

Table 1 – Physical and Chemical Properties

As Supplied

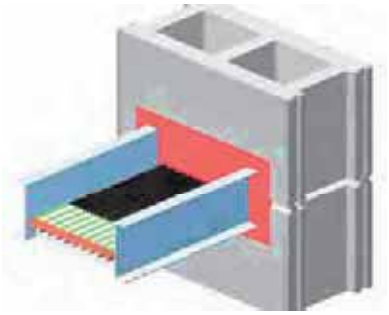
Type of Polymer	Waterborne Resin
Odor	Mild Latex
Solids Content (Wt%)	77±2%
Application Temperatures	45°-90°F(7°-32°C)
Viscosity (ASTM D-2196)	560000-744000cps
Extrudability	Passed
Color - (ASTM C-834)	Rust Red
Specific Gravity - (ASTM D-1475)	1.40-1.50
Dry Time - (ASTM D-1640)	
Dry to touch @ 6mils	20-30 mins
Full Cure Time (depends on thickness & environment)	7-21 days
pH - (ASTM E-70)	8-9



Typical Pipe Penetration

As Cured

In Service Temperature	up to 120°F(49°C)
Moisture Absorption	<4%
Stability [Dimensional, Cracking, Blisters, Flexibility]	Passed
Corrosion - (ASTM C-655) [for Aluminum, Copper, Steel, Galvanized Steel, Stainless Steel]	Passed
Volume Shrinkage - (ASTM C-1241)	Passed
Chemical Compatibility - (ASTM D-543)	Passed
Slump Test - (ASTM D-2202 - Modified)	Passed
Hardness - (ASTM D-2240, Shore A)	22
Freeze/Thaw - (ASTM D-2243)	Excellent
Tensile Properties - (ASTM D-2370)	
Tensile Strength	26 psi
Maximum Elongation	1400%
Corrosion - (ASTM D-5894)	Passed
Surface Burning Characteristics - (ASTM E-84)	
Flame Spread Index	<25
Smoke Developed Index	<50
STC Sound Transmission Loss - (ASTM 90-99)	Full Recovery

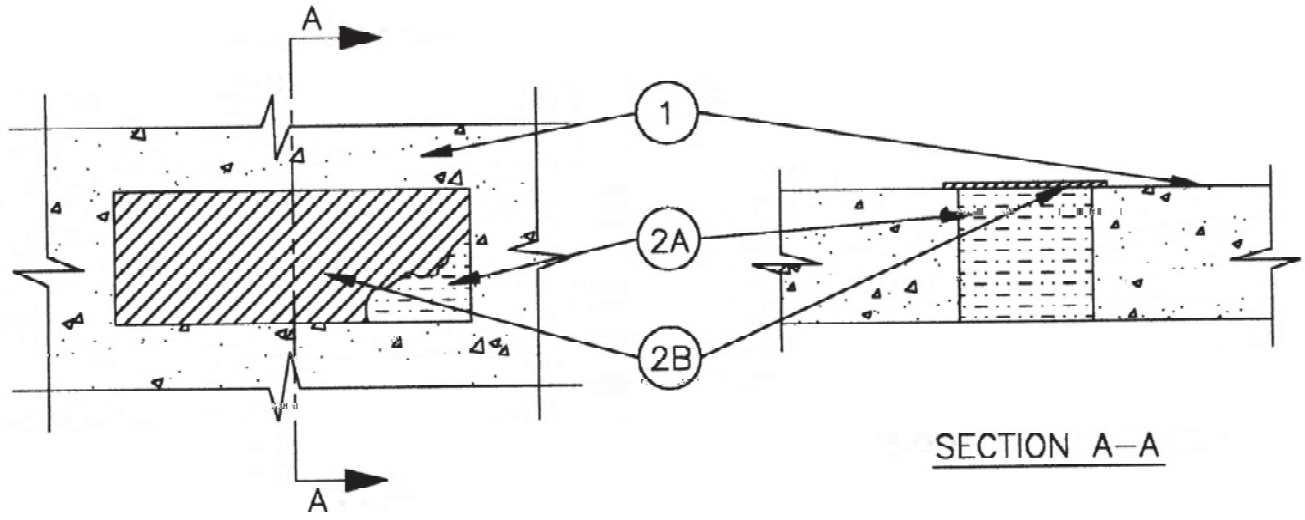


Typical Cable Tray Penetration

GREENGUARD GOLD

Intertek
December 2019

System No. C-AJ-0108
F Rating – 2 Hr
T Rating – 2 Hr



1. **Floor or Wall Assembly –** Min 4-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) structural concrete. Min 5 in. thick reinforced lightweight or normal weight (100-150 pcf) structural concreter wall. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max size of opening to be 4-1/2 by 40 in. or 4-1/2 in diam.
   A. See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufactures.

2. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 4 in. or 4-1/2 in. thickness of min 4 pcf mineral wool batt insulation for sealants B1 and B2, respectively, compressed 25 percent into opening as a permanent form. Packing material to be recessed from top surface of floor or both surfaces of wall assembly to accommodate the required thickness of fill material (Item 2B1).
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of fill material applied within the opening, flush with top surface of floor or both surfaces of wall assembly.
   GRABBER CONSTRUCTION PRODUCTS INC – GrabberGard EFC

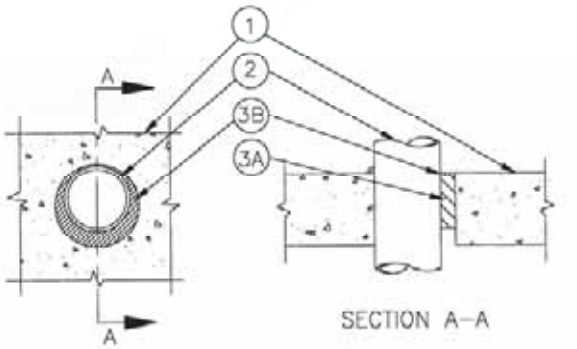
*Bearing the UL Classification Marking

FL0712

Underwriters Laboratories Inc.®

System No. C-AJ-1499

L Rating at Ambient – Less than 1 CFM/ sq. ft.
L Rating at 400°F – Less than 1 CFM/sq. ft.
F Rating – 3 Hr
T Rating – 1/4 Hr



1. **Floor or Wall Assembly** – Min 4-1/2 in. thick lightweight or normal weight (100-150 pcf) concrete. Wall may also be constructed of any UL Classified Concrete Block. Max diam of opening is 25-1/4 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants** – One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe, conduit or tubing and edge of through opening shall be min 0 in. (point contact) to max 2-1/8 in. 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 24 in. diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. **Conduit** – Nom 6 in. diam (or smaller) rigid steel conduit.
   C. **Conduit** – Nom 4 in. diam (or smaller) steel electrical metallic tubing.
   D. **Iron Pipe** – Nom 24 in. diam (or smaller) cast or ductile iron pipe.
   E. **Copper Tubing** – Nom 6 in. diam (or smaller) Type L (or heavier) copper tube.
   F. **Copper Pipe** – Nom 6 in. diam (or smaller) Regular (or heavier) copper pipe.

3. **Firestop System** – The firestop system shall consist of the following:
   A. **Packing Materia**l – Min 4 in. or 4-1/2 in. thickness of 4 pcf mineral wool batt insulation for sealants B1 and B2, respectively, firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall to accommodate the required thickness of fill material (Item 3B).
   B. **Fill Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of wall. At point contact location between penetrant and periphery of opening a min 1/2 in. diam bead of fill material shall be applied at the periphery of opening/penetrant interface on top surface of floor assembly or both surfaces of wall.

GRABBER CONSTRUCTION PRODUCTS INC – GrabberGard EFC

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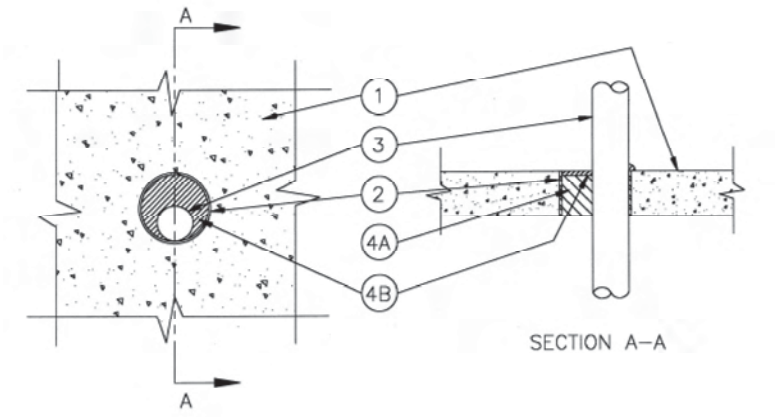
System No. C-AJ-1500

L Rating at Ambient – Less than 1 CFM/ sq. ft.
L Rating at 400°F – Less than 1 CFM/sq. ft.
F Rating – 3 Hr
T Rating – 1/4 Hr



1. **Floor or Wall Assembly –** Min 4-1/2 in. thick lightweight or normal weight concrete (100-150 pcf). Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 8 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Metallic Sleeve –** (Optional) – Sleeve to be cast or grouted into floor or wall assembly, flush with floor or both wall assembly. The following metallic sleeves may be used within the firestop system:
   A. Nom 8 in. diam (or smaller) Schedule 40 (or heavier) steel sleeve.
   B. Nom 4 in. diam (or smaller) steel electrical metallic tubing (EMT) sleeve.

3. **Through Penetrants –** One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe, conduit or tubing and sleeve or periphery of opening shall be min 0 in. (point contact) to max 3-1/2 in. 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 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 4 in. diam (or smaller) cast or ductile iron pipe.
   C. **Conduit –** Nom 4 in. diam (or smaller) steel electrical metallic tubing or rigid steel conduit.
   D. **Copper Tubing –** Nom 3 in. diam (or smaller) Type L (or heavier) copper tube.
   E. **Copper Pipe –** Nom 3 in. diam (or smaller) Regular (or heavier) copper pipe.

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C-AJ-1500

4. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 4 in. or 4-1/4 in. thickness of min 4 pcf density mineral wool batt insulation for sealants B1 and B2, respectively, firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material (Item 4B).
   B. **Fill Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of wall. At point contact location between penetrant and sleeve or concrete, a 1/2 in. diam bead of fill material shall be applied at the sleeve or concrete/penetrant interface on the top surface of floor or both surfaces of wall.

GRABBER CONSTRUCTION PRODUCTS INC – GrabberGard EFC

*Bearing the UL Classification Marking

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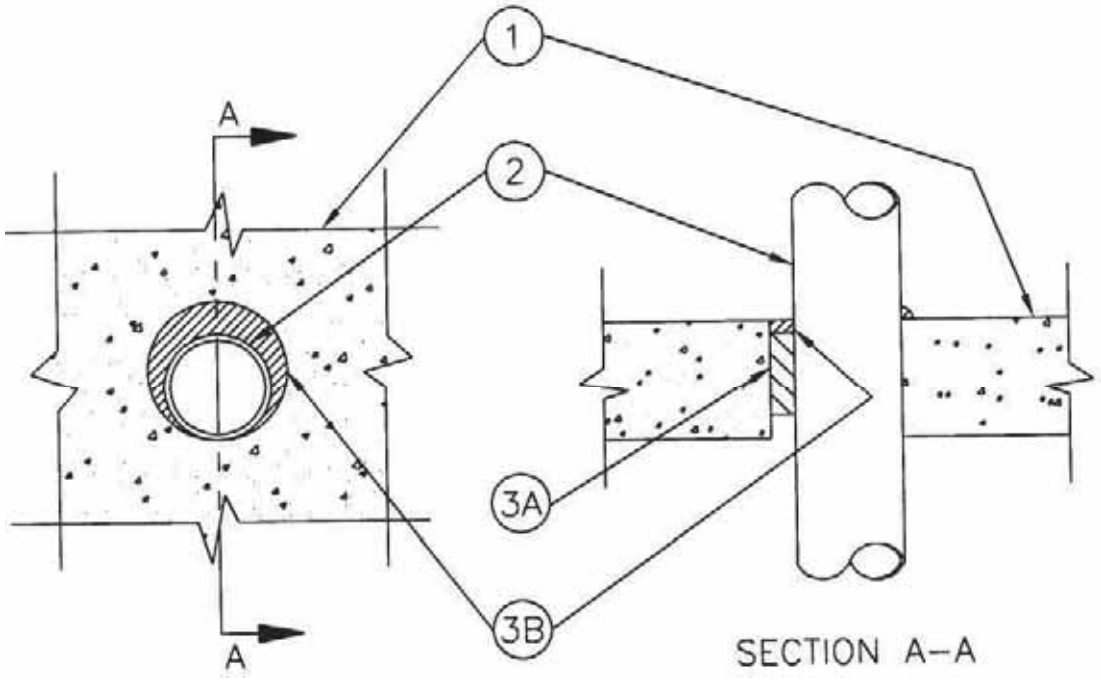
System No. C-AJ-2470

F Rating - 2 Hr
T Rating - 2 Hr



1. **Floor or Wall Assembly –** Min 5 in. thick normal weight (150 pcf) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 3-3/4 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Nonmetallic Pipe –** Nom 2 in. diam (or smaller) SDR 11 chlorinated polyvinyl chloride (CPVC) pipe for use in closed (process or supply) piping systems. One pipe to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe and periphery of opening shall be min 3/8 in. to max 1 in. Pipe to be rigidly supported on both sides of floor or wall assembly.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 3-1/2 in. thickness of min 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material (Item 3B).
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of wall.
   GRABBER CONSTRUCTION PRODUCTS INC – GrabberGard EFC

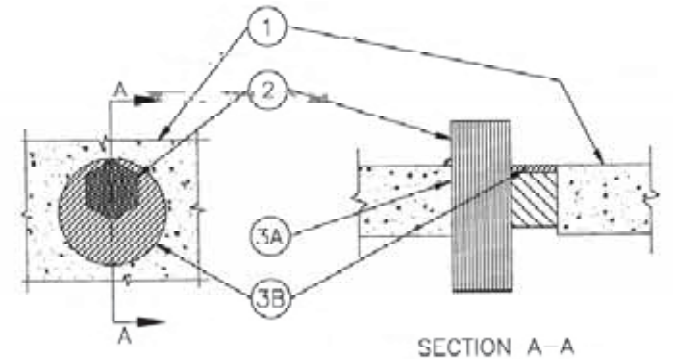
*Bearing the UL Classification Marking

FL0712

Underwriters Laboratories Inc.®

System No. C-AJ-3233

F Rating - 3 Hr
T Rating - 1/2 Hr



1. **Floor or Wall Assembly –** Min 5 in. thick normal weight (150 pcf) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 10-1/4 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Cables –** Aggregate cross-sectional area of cable in opening to be max 27 percent of the cross-sectional area of the opening. The annular space between cables and periphery shall be min 0 in. (point contact) to max 3-1/2 in. Cables to be rigidly supported on both sides of floor or wall assembly. Any combination of the following types and sizes of copper conductor cables may be used:
   - A. 1/C 750 kcmil (or smaller) copper conductor polyvinyl chloride (PVC) jacketed aluminum clad or steel clad TEK cable with cross-linked polyethylene (XLPE) insulation.
   - B. 3/C 350 kcmil (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TEK cable with XLPE insulation.
   - C. 4/C No. 14 AWG (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TEK cable with XLPE insulation.
   - D. Max 25 pair No. 20 AWG (and smaller) copper conductor PVC jacketed cable with PVC insulation.
   - E. 1/C 400 kcmil (or smaller) aluminum or copper conductor cable with XLPE insulation.
   - F. 4/C No. 6 AWG (or smaller) copper conductor PVC jacketed cable with XLPE insulation
   - G. **Through Penetration Product*** – Max 3/C No. 2 AWG (or smaller) aluminum or steel clad **Armored Cable** or aluminum or steel clad **Metal Clad Cable** with copper conductors.

ALFEX CORP

3. **Firestop System –** The firestop system shall consist of the following:
   - A. **Packing Material –** Min 3-1/2 in thickness of min 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material (Item 3B).
   - B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of wall. Sealant to be forced into interstices of cable group to max extent possible.

GRABBER CONSTRUCTION PRODUCTS INC – GrabberGard EFC

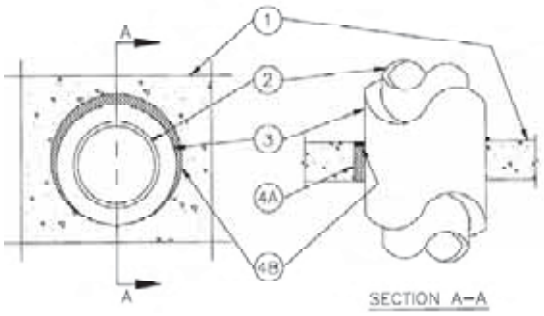
*Bearing the UL Classification Marking

FL0712

Underwriters Laboratories Inc.®

System No. C-AJ-5266

F Rating - 2 Hr
T Rating - 1-3/4 Hr



1. **Floor or Wall Assembly –** Min 4-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening is 18 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants –** One metallic pipe or tubing to be installed either concentrically or eccentrically within the firestop system. Pipe or tubing to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. **Steel Pipe –** Nom 12 in. diam (or smaller) Schedule ST 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 12 in. diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tubing –** Nom 2 in. diam (or smaller) Type L (or heavier) copper tubing.
   D. **Copper Pipe –** Nom 2 in. diam (or smaller) Regular (or heavier) copper pipe.

3. **Pipe Covering* –** Max 2 in. thick hollow cylindrical heavy density 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 butt tape supplied with the product. The annular space between the insulated pipe and the edge of the through opening shall be min 0 in. (point contact) to max 1-1/4 in.
   See **Pipe and 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.

4. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 4 in. thickness of min 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall. At the point contact location between pipe and concrete, a min 3/8 in. diam bead of fill material shall be applied at the concrete/pipe-covering interface on the top surface of floor and on both surfaces of wall.
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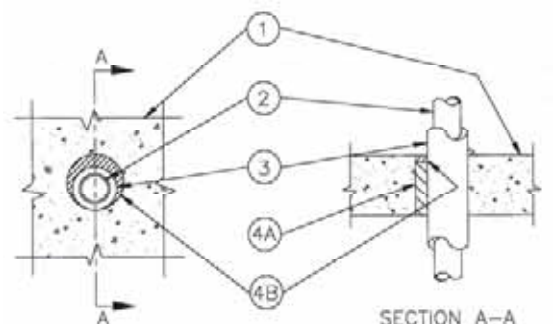
*Bearing the UL Classification Marking

FL0712

Underwriters Laboratories Inc.®

System No. C-AJ-5267

F Rating - 2 Hr
T Rating - 3/4 & 1-1/4 Hr (See Item 2)



1. **Floor or Wall Assembly –** Min 4-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening is 4-1/2 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants –** One metallic pipe or tubing to be installed either concentrically or eccentrically within the firestop system. Pipe or tubing to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. **Steel Pipe –** Nom 2 in. diam (or smaller) Schedule ST 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 2 in. diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tubing –** Nom 2 in. diam (or smaller) Type L (or heavier) copper tubing.
   D. **Copper Pipe –** Nom 2 in. diam (or smaller) Regular (or heavier) copper pipe.
   T Rating is 1-1/4 Hr for penetrants A, B. T Rating is 3/4 Hr for penetrants C and D.

3. **Tube Insulation – Plastics+ –** Nom 3/4 in. thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing. The annular space between the insulated pipe and the edge of the through opening shall be min 0 in. (point contact) to max 7/8 in.
   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 UL 94 Flammability Classification of 94-5VA may be used.

4. **Firestop System** – The firestop system shall consist of the following:
   A. **Packing Material –** Min 4 in. thickness of min 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall.

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+Bearing the UL Recognized Component Mark
*Bearing the UL Classification Marking

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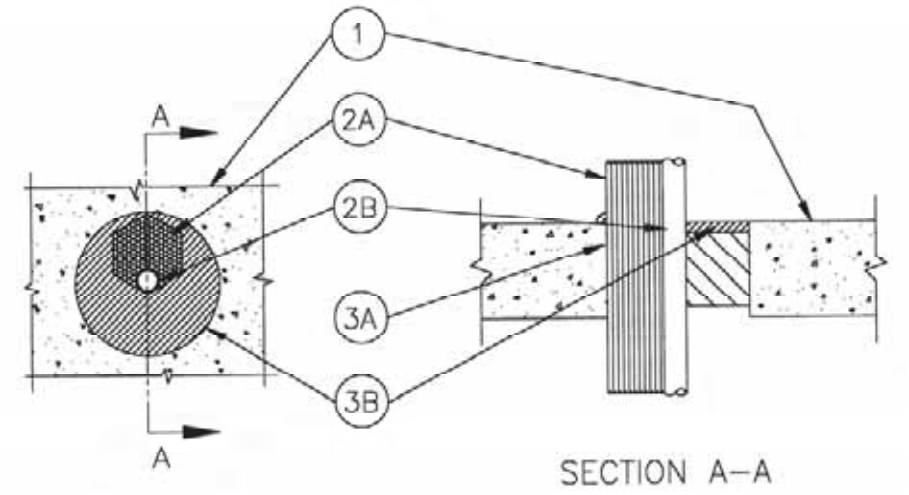
System No. C-AJ-8145

F Rating - 2 Hr
T Rating - 0 Hr



1. **Floor or Wall Assembly –** Min 5 in. thick lightweight or normal weight (100-150 pcf) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 10-1/4 in. See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants –** Pipes, conduits or cables to be bundled within the opening such that the aggregate cross-sectional area of penetrants in opening to be max 27 percent of the cross-sectional area of the opening in floor or wall. The space between penetrants and periphery of opening shall be min 0 in. (point contact) to max 3-1/2 in. Penetrants to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of penetrants may be used:

   A. **Metallic Pipes –** The following types and sizes of metallic pipes, conduits or tubing may be used:
      - A1. **Steel Pipe –** Nom 2 in. diam (or smaller) Schedule 5 (or heavier) steel pipe.
      - A2. **Conduit –** Nom 2 in. diam (or smaller) steel electrical metallic tubing or steel conduit.

   B. **Cables –** Any combination of the following types and sizes of cables may be used:
      - B1. 1/C 750 kcmil (or smaller) copper conductor polyvinyl chloride (PVC) jacketed aluminum clad or steel clad TEK cable with cross-linked polyethylene (XLPE) insulation.
      - B2. 3/C 350 kcmil (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TEK cable with XLPE insulation.
      - B3. 4/C No. 14 AWG (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TEK cable with XLPE insulation.
      - B4. Max 25 pair No. 20 AWG (and smaller) copper conductor PVC jacketed cable with PVC insulation.
      - B5. 1/C 400 kcmil (or smaller) aluminum or copper conductor cable with XLPE insulation.
      - B6. 4/C No. 6 AWG (or smaller) copper conductor PVC jacketed cable with XLPE insulation.

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3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 3-1/2 in. thickness of min 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material (Item 3B).
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of wall. Sealant to be forced into interstices of penetrants to max extent possible.

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*Bearing the UL Classification Marking

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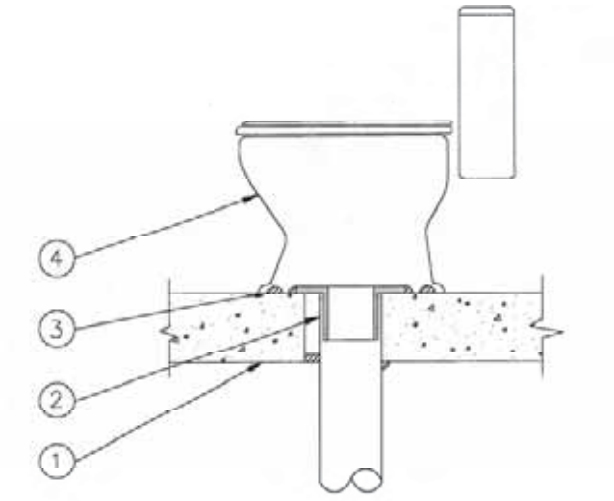
System No. F-A-2126
F Rating – 2 Hr
T Rating – 2 Hr



1. **Floor Assembly –** Min 4-1/2 in. thick lightweight or normal weight concrete (100-150 pcf). Max diam of opening is 6 in.

2. **Nonmetallic Pipe –** One nonmetallic drain pipe with max 4 in. diam toilet flange installed either concentrically or eccentrically within the firestop system. The annular space between drain pipe and periphery of opening shall be min 0 in. (point contact) to max 1-1/2 in. Pipe to be rigidly supported on lower side of floor assembly. The following types and sizes of nonmetallic pipes, fittings and flanges may be used:
   A. **Polyvinyl Chloride (PVC) Pipe –** Nom 4 in. diam (or smaller) Schedule 40 solid core or cellular core PVC pipe for use in vented (drain, waste or vent) piping system.
   B. **Acrylonitrile Butadiene Styrene (ABS) Pipe –** Nom 4 in. diam (or smaller) Schedule 40 cellular core or solid core ABS pipe for use in vented (drain, waste or vent) piping systems.

3. **Fill, Void or Cavity Material* – Sealant –** Min 1 in. thickness of fill material applied within the annulus, flush with bottom surface of floor. At point contact location between concrete and pipe, a min 1/2 in diam bead of fill material shall be applied at the pipe/concrete interface on bottom surface of floor assembly. A min 1/2 in. diam bead of fill material shall be applied around top edge of toilet flange. Prior to placement of water closet, a min 1/2 in. diam bead of fill material shall be applied to the bottom surface of the outer rim of the water closet.
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4. **Water Closet –** Floor mounted vitreous china water closet.

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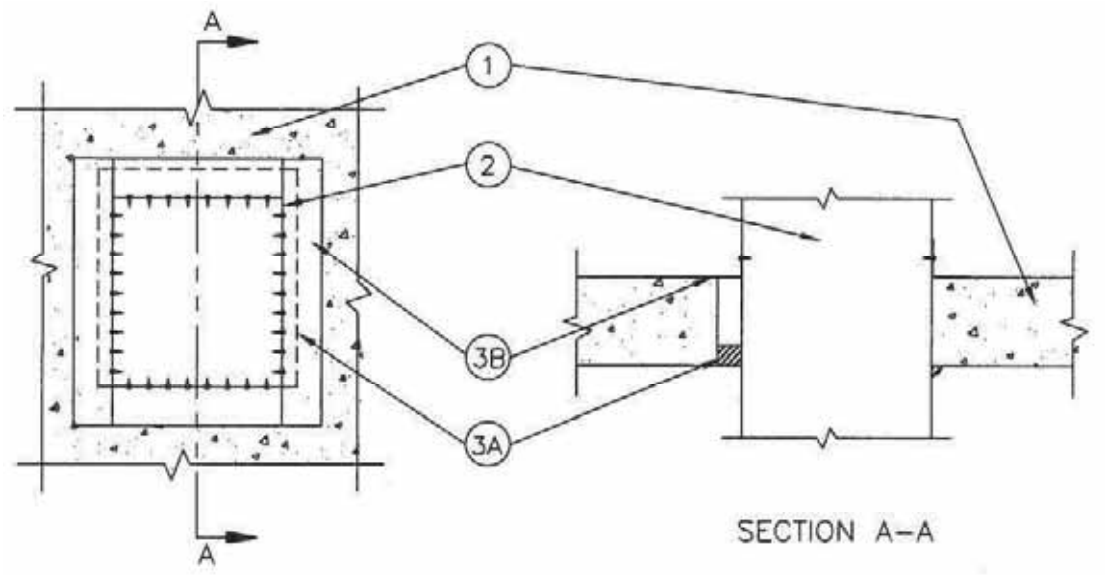
System No. F-A-7015

F Rating – 2 Hr
T Rating – 1/2 Hr



1. **Floor Assembly –** Min 4-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete. Max area of opening is 625 sq in. with a max dimension of 25 in.

2. **Through Penetrant –** Nom 24 by 24 in. (or smaller) 26 ga. (or heavier) square steel duct to be installed either concentrically or eccentrically within the firestop system. An annular space of min 0 in. (point contact) to max 1 in. Duct to be rigidly supported on top surface of floor assembly.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Fill, Void or Cavity Material* – Sealant –** Min 1 in. thickness of fill material applied within annulus, flush with bottom surface of floor. At the point contact location between penetrant and periphery of opening, min 1/2 in. diam bead of fill material shall be applied at the concrete/duct interface on exposed surface of floor.
      GRABBER CONSTRUCTION PRODUCTS INC – GrabberGard EFC
   B. **Retaining Angles –** Min 16 gauge 1-1/2 in. by 1-1/2 in. galv steel angles. Angles attached to duct on unexposed side of floor with min 1/2 in. long, No. 8 (or larger) sheet metal screws, spaced max 4 in. OC.

*Bearing the UL Classification Marking

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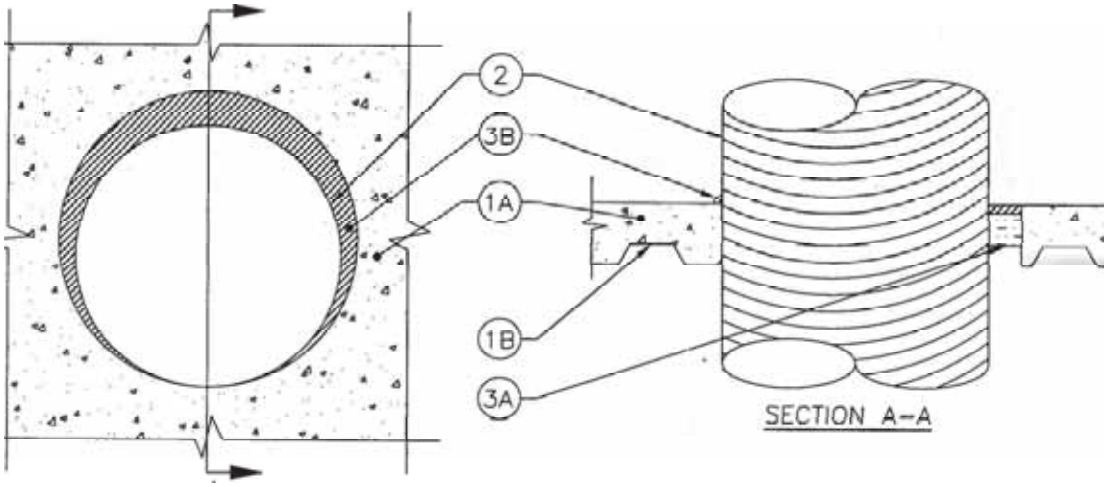
System No. F-A-7016
F Rating – 2 Hr
T Rating – 1/2 Hr



1. **Floor Assembly –** The fire-rated unprotected concrete and steel floor assembly shall be constructed of the materials and in the manner described in the individual D900 Series Floor -Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Concrete –** Min 2-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete.
   B. **Steel Floor and Form Units* –** Composite or non-composite max 3 in. deep fluted galv units as specified in the individual Floor-Ceiling design. Max diam of opening is 18 in.

2. **Steel Duct –** Nom 16 in. diam (or smaller) No. 22 gauge (or heavier) spiral wound steel duct to be installed either concentrically or eccentrically within the firestop system. The annular space between the duct and the periphery of the opening shall be min. 0 in. (point contact) to max 2 in. Duct to be rigidly supported on both sides of floor assembly.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 2 in. thickness of min 4 pcf density mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed form top surface of floor as required to accommodate required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of sealant applied within the annulus, flush with top surface of floor. Min 1/2 in. diam bead of sealant shall be applied at the duct/concrete interface at point contact location on the top surface of floor.

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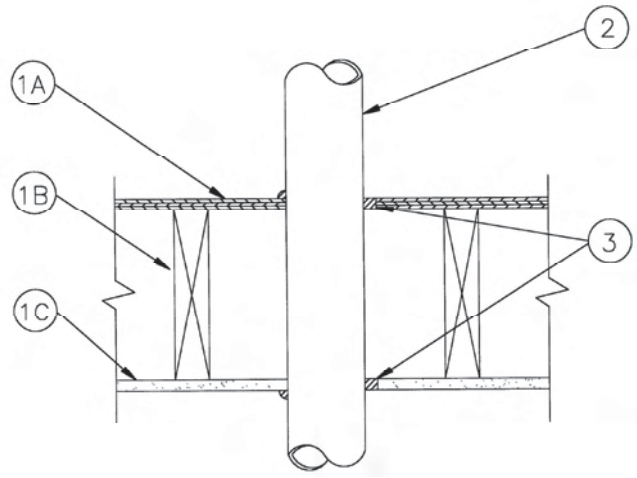
Underwriters Laboratories Inc.®

System No. F-C-1122

F Rating – 1 Hr
T Rating – 1/4 Hr



1. **Floor-Ceiling Assembly –** The fire rated wood truss or combination wood and steel truss Floor-Ceiling assembly shall be constructed of the materials and in the manner described in the individual L500 Series Design in the UL Fire Resistance Directory and shall include the following construction features:
   - A. **Flooring System –** Lumber of plywood subfloor with finish floor of lumber, plywood or **Floor Topping Mixture-*** as specified in the individual Floor-Ceiling Design. Max diam of floor opening is 5-1/8 in.
   - B. **Wood Joists* –** Nom 2 by 10 in. deep (or deeper) lumber joists spaced 16 in. OC with nom 1 by 3 in. lumber bridging and with ends firestopped or steel or combination lumber and steel joists, trusses or **Structural Wood Members*** with bridging as required and with ends firestopped.
   - C. **Gypsum Board * –** Nom 5/8 in. thick as specified in the individual Floor-Ceiling Design.

2. **Through Penetrants –** One metallic pipe, conduit or tubing to be installed concentrically or eccentrically within the firestop system, The annular space between pipe, conduit or tubing and periphery of opening shall be min 1/4 in. to max 3/4 in. Pipe, conduit or tubing to be rigidly supported on both sides of floor assembly. The following types and sizes of metallic pipe, conduit or tubing may be used:
   - A. **Steel Pipe –** Nom 4 in. diam (or smaller) Schedule 10 (or heavier) steel pipe.
   - B. **Conduit –** Nom 4 in. diam (or smaller) electrical metallic tubing (EMT) 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
   - E. **Iron Pipe –** Nom 4 in. diam (or smaller) service weight (or heavier) cast iron soil pipe, nom 4 in. (or smaller) or Class 50 (or heavier) ductile iron pressure pipe.

3. **Fill, Void or Cavity Material* – Sealant –** Min 3/4 in. thickness of fill material applied within the annulus, flush with top surface of floor. Min 5/8 in. applied within the annulus, flush with the surface of ceiling.

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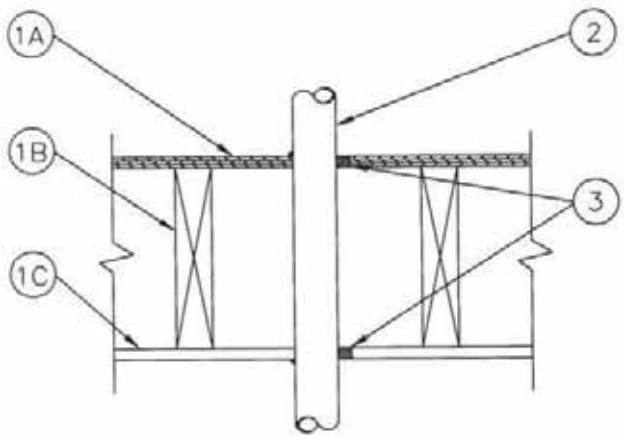
*Bearing the UL Classified Marking

FL0712

Underwriters Laboratories Inc.®

System No. F-C-2287

F Rating – 1 Hr
T Rating – 1 Hr



1. **Floor-Ceiling Assembly –** The fire rated wood truss or combination wood and steel truss Floor-Ceiling assembly shall be constructed of the materials and in the manner described in the individual L500 Series Design in the UL Fire Resistance Directory and shall include the following construction features:
   - A. **Flooring System –** Lumber of plywood subfloor with finish floor of lumber, plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. Max diam of floor opening is 3-1/8 in.
   - B. **Wood Joists* –** Nom 2 by 10 in. deep (or deeper) lumber joists spaced 16 in. OC, with nom 1 by 3 in. lumber bridging and with ends firestopped or steel or combination lumber and steel joists, trusses or **Structural Wood Members*** with bridging as required and with ends firestopped.
   - C. **Gypsum Board* –** Nom 5/8 in. thick as specified in the individual Floor-Ceiling Design. Max diam of opening is 3-1/8 in.

2. **Through Penetrant –** One non-metallic pipe or conduit to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe and periphery of opening shall be min 0 in. (point contact) to max 7/8 in. Pipe to be rigidly supported on both sides of floor assembly.
   - A. **Chlorinated Polyvinyl Chloride (CPVC) Pipe –** Nom 2 in. diam (or smaller) SDR 11 cellular or solid core chlorinated polyvinyl chloride (CPVC) pipe for use in closed (process or supply) piping systems.
   - B. **Polyvinyl Chloride (PVC) Pipe –** Nom 2 in. diam (or smaller) Schedule 40 (or heavier) PVC pipe for use in closed (process or supply) piping systems.
   - C. **Rigid Nonmetallic Conduit+ –** Nom 2 in. diam (or smaller) Schedule 40 PVC conduit installed in accordance with Article 347 of the National Electrical Code (NFPA No. 70).

3. **Fill, Void or Cavity Material* – Sealant –** Min 3/4 in. thickness of fill material applied within the annulus, flush with top surface of floor. Min 5/8 in. thickness of fill material applied within the annulus, flush with bottom surface of ceiling. Min 1/4 in. diam bead of fill material applied at the pipe/floor and pipe/ceiling interfaces at point contact locations on both sides of assembly.

GRABBER CONSTRUCTION PRODUCTS INC – GrabberGard EFC

*Bearing the UL Classification Marking
+Bearing the UL Listing Mark

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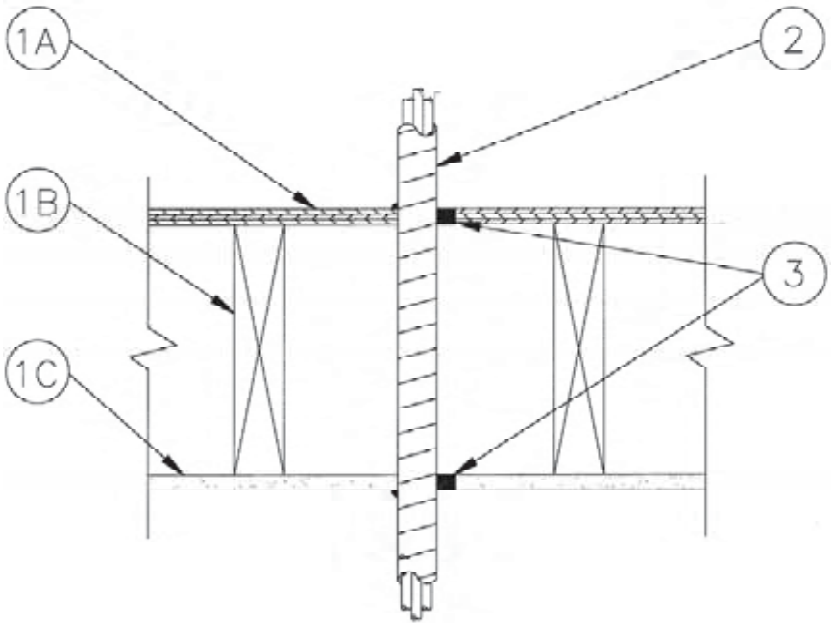
Underwriters Laboratories Inc.®

System No. F-C-3080

F Rating – 1 Hr
T Rating – 1 Hr



1. **Floor-Ceiling Assembly –** The 1 hr fire rated wood truss or combination wood and steel truss floor-ceiling assembly shall be constructed of the materials and in the manner described in the individual L500 Series Design in the UL Fire Resistance Directory and shall include the following construction features:
   - A. **Flooring System –** Lumber of plywood subfloor with finish floor of lumber, plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. Max diam of opening is 5-1/8 in.
   - B. **Wood Joists* –** Nom 2 by 10 in. deep (or deeper) lumber joists spaced 16 in. OC with nom 1 by 3 in. lumber bridging and with ends firestopped or steel or combination lumber and steel joists, trusses or **Structural Wood Members*** with bridging as required and with ends firestopped.
   - C. **Gypsum Board* –** Nom 5/8 in. thick as specified in the individual Floor-Ceiling Design. Max diam of opening is 5-1/8 in.

2. **Cables –** Max 3/C No. 3/0 AWG with 1 No. 8 AWG bare copper ground, aluminum-clad or steel-clad TEK cable, with or without polyvinyl chloride jacket to be installed concentrically or eccentrically within the firestop. The annular space between cable and periphery of opening shall be min 0 in. (point contact) to max 3/4 in. Cable to be rigidly supported on both sides of assembly.

3. **Fill, Void or Cavity Material* – Sealant –** Min 3/4 in. thickness of fill material applied within the annulus, flush with top surface of floor. Min 5/8 in. thickness of fill material applied within the annulus, flush with bottom surface of ceiling. Min 1/4 in. diam bead of fill material shall be applied at the cable/floor and cable/ceiling interfaces at point contact locations on both sides of assembly.

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*Bearing the UL Classified Marking

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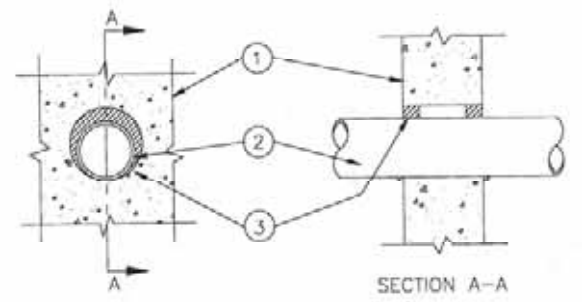
System No. W-J-1157

F Ratings – 1, 2, 3 and 4 Hr (Item 1)
T Ratings – 0 & 1/4 Hr (See Item 2)



1. **Wall Assembly –** Min 4-7/8, 6-1/8, 7-3/8, 8-5/8 in. thick normal weight or lightweight (100-150 pcf) concrete for 1, 2, 3, 4 hr rated assemblies, respectively. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 14-1/8 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

   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 installed either concentrically or eccentrically within the firestop system. The annular space between pipe, conduit or tubing and periphery of opening shall be min 0 in. to max 1-3/8 in. Pipe, conduit or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:
   - A. **Steel Pipe –** The following types and sizes of steel pipes may be used:
     - A1. Nom 4 in. diam (or smaller) Schedule 7 (or heavier) steel pipe.
     - A2. Nom 8 in. diam (or smaller) Schedule 10 (or heavier) steel pipe.
     - A3. Nom 10 in. diam (or smaller) Schedule 20 (or heavier) steel pipe.

     When steel pipe is used, T Rating is 1/4 hr for nom 4 in. diam (or smaller) and 0 hr for steel pipes greater than nom 4 in. diam.
   - B. **Iron Pipe –** Nom 4 in. diam (or smaller) cast or ductile iron pipe. When iron pipe is used T Rating is 1/4 hr.
   - C. **Conduit –** Nom 4 in. diam (or smaller) steel electrical metallic tubing (EMT). When EMT is used T Rating is 1/4 hr.
   - D. **Copper Tubing –** Nom 4 in. diam (or smaller) Type L (or heavier) copper tubing. When copper tube is used T Rating is 0 hr.
   - E. **Copper Pipe –** Nom 4 in. diam (or smaller) Regular (or heavier) copper pipe. When copper pipe is used T Rating is 0 hr.

3. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. thickness of sealant for 1 rated wall assembly, and min 1 in. thickness of sealant for 2, 3 and 4 hr rated wall assemblies, applied within the annulus, flush with both surfaces of wall. At point contact location between penetrant and periphery of opening, a min 1/2 in. diam bead of fill material shall be installed at the concrete/penetrant interface on both surfaces of wall.

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*Bearing the UL Classification Marking

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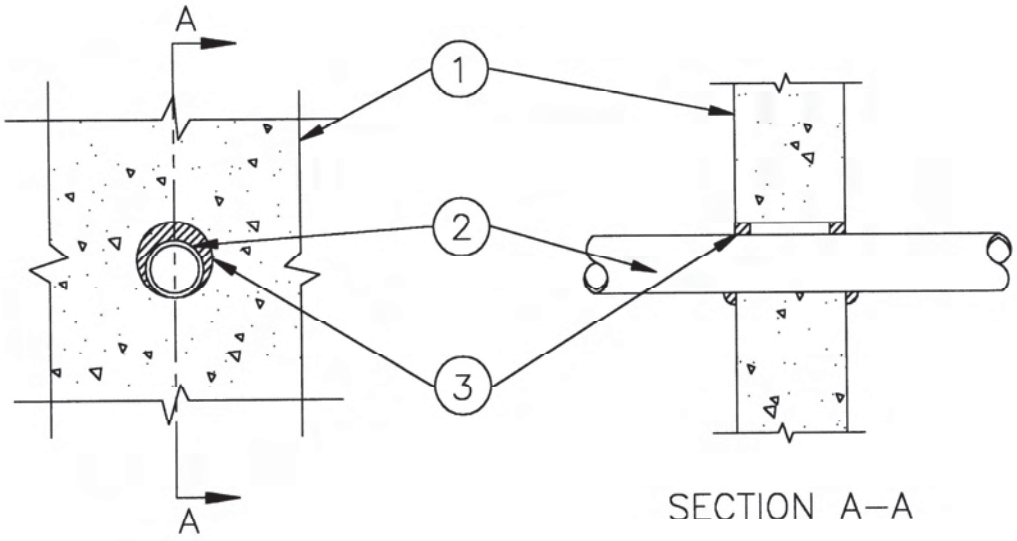
Underwriters Laboratories Inc.®

System No. W-J-2153

F Rating – 1, 2, 3 & 4 Hr (See Item 1)
T Rating – 1, 2, 3 & 4 Hr



1. **Wall Assembly –** Min 4-7/8, 6-1/8, 7-3/8 or 8-5/8 in. thick lightweight or normal weight (100- 150 pcf) concrete for 1, 2, 3 or 4 hour rated wall assemblies, respectively. Wall may also be constructed of any UL Classified **Concrete Blocks.** Max diam of opening is 3-1/8 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.
   The F and T Ratings of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed

2. **Through Penetrants –** One nonmetallic pipe or tubing installed either concentrically or eccentrically within the firestop system. The annular space between pipe and periphery of opening shall be min 0 in. to max 7/8 in. Pipe or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of nonmetallic pipes or tubing may be used:
   A. **Chlorinated Polyvinyl Chloride (CPVC) Pipe –** Nom 2 in. diam (or smaller) SDR 11 CPVC pipe for use in closed (process or supply) piping systems.
   B. **Polyvinyl Chloride (PVC) Pipe –** Nom 2 in. diam (or smaller) Schedule 40 (or heavier) cellular or solid core PVC pipe for use in closed (process or supply) piping systems.
   C. **Crosslinked Polyethylene (PEX) Tubing –** Nom 3/4 in. diam (or smaller) SDR 9 PEX tubing for use in closed (process or supply) piping systems.

3. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. thickness for 1 hr rated wall assemblies and 1 in. thickness of fill material for 2, 3 or 4 hr rated wall assemblies, respectively, applied within the annulus, flush with both surfaces of wall. At point contact location between penetrant and periphery of opening, a min 1/2 in. diam bead of fill material shall be applied at the concrete/penetrant interface on both surfaces of wall.
   GRABBER CONSTRUCTION PRODUCTS INC – GrabberGard EFC

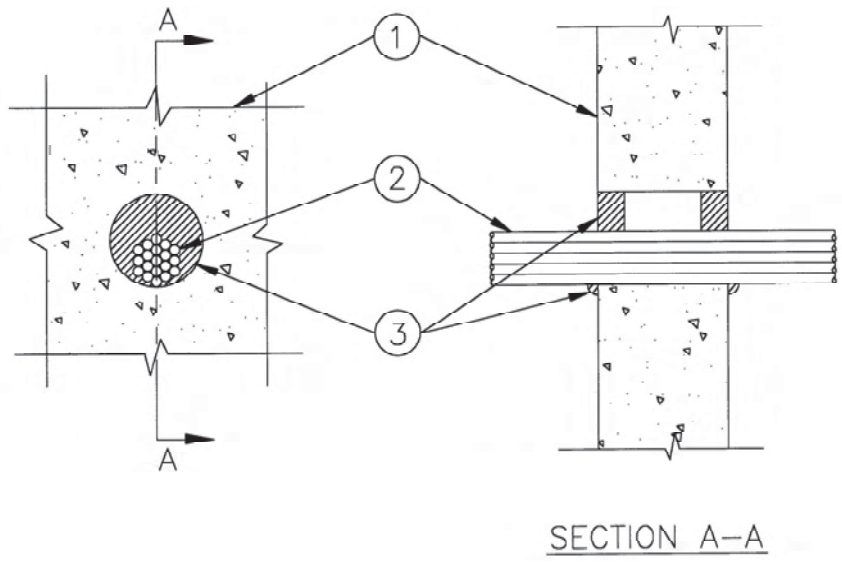
*Bearing the UL Classification Marking

FL0712

Underwriters Laboratories Inc.®

System No. W-J-3123

F Rating – 1 & 2 Hr (See Item 1)
T Rating – 3/4 Hr



SECTION A–A

1. **Wall Assembly –** Min 4-7/8 or 6-1/8 in. thick lightweight or normal weight (100-150 pcf) concrete for 1 or 2 hr rated assemblies, respectively. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 3-1/8 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Cables –** Aggregate cross-sectional area of cable in opening to be max 44 percent of the cross-sectional area of the opening. The annular space between cables and periphery shall be min 0 in. (point contact) to max 1-1/2 in. Cables to be rigidly supported on both sides of floor or wall assembly. Any combination of the following types and sizes of copper conductor cables may be used:
   A. 3/C No. 3/0 (or smaller) copper conductor polyvinyl chloride (PVC) jacketed aluminum clad or steel clad TEK cable with XLPE insulation.
   B. 2/C No. 10 AWG (or smaller) copper conductor PVC cable with XLPE insulation.

3. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 or 1-1/4 in. thickness of fill material for 1 or 2 hr rated wall assemblies, respectively, applied within the annulus, flush with both surfaces of wall. Sealant to be forced into interstices of cable group to max extent possible. At the point contact location between cable(s) and concrete, a min 1/2 in. diam bead of fill material shall be applied at the concrete/cable interface on both surfaces of wall.
   GRABBER CONSTRUCTION PRODUCTS INC – GrabberGard EFC

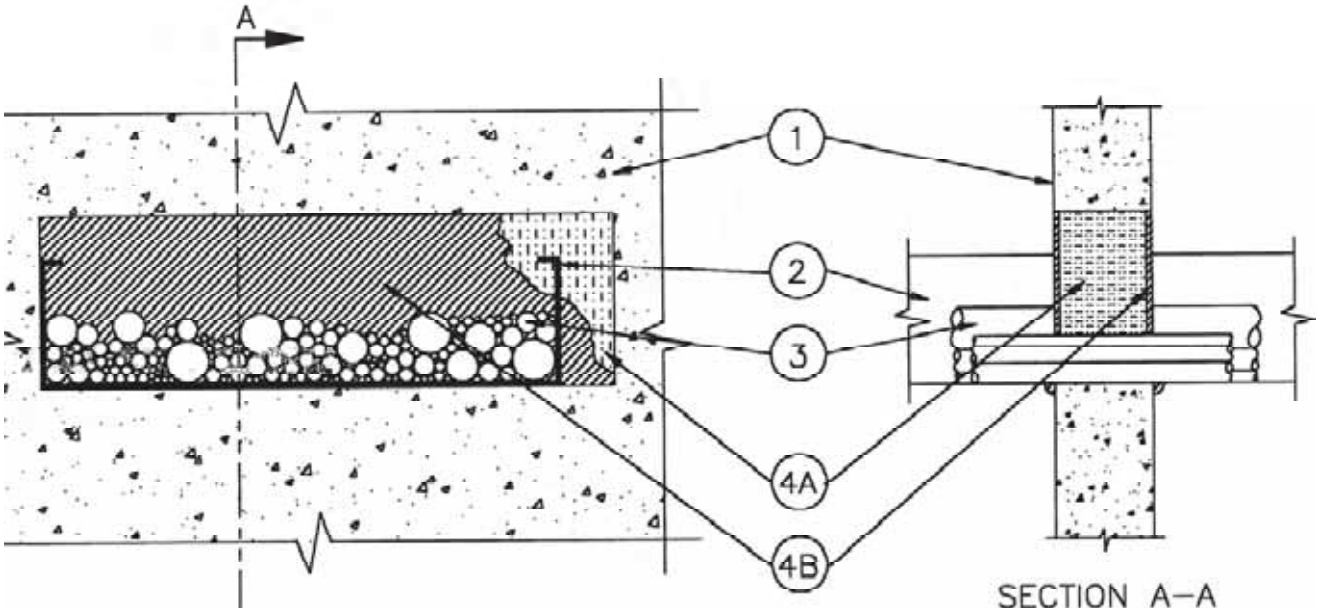
*Bearing the UL Classification Marking

FL0712

Underwriters Laboratories Inc.®

System No. W-J-4047

F-Rating – 2 Hr
T-Rating – 3/4 Hr



1. **Wall Assembly –** Min 4-7/8 in. thick lightweight or normal weight (100-150 pcf) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max opening size to be 26 in. by 8 in. (208 sq. in.).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Cable Tray+ –** Max 24 in. wide by max 6 in. deep 15 gauge (or heavier) aluminum or steel cable tray installed within the opening. The annular space between the cable tray and the periphery of the opening shall be min 0 in. (point contact) to max 2 in. Cable tray to be rigidly supported on both sides of wall assembly.

3. **Cables –** Aggregate cross-sectional area of cables in opening to be max 40 percent of the cross-sectional area of the opening. The annular space between cables and periphery of opening shall be shall be min 0 in. (point contact) to max 5-3/4 in. Cables to be rigidly supported on both sides of wall assembly. The following types and sizes of cables may be used:
   - A. 1/C 750 kcmil (or smaller) copper conductor polyvinyl chloride (PVC) jacketed aluminum clad or steel clad TEK cable with cross-linked polyethylene (XLPE) insulation.
   - B. 3/C 350 kcmil (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TEK cable with XLPE insulation.
   - C. 4/C No. 14 AWG (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TEK cable with XLPE insulation.
   - D. Max 25 pair No. 20 AWG (and smaller) copper conductor PVC jacketed cable with PVC insulation.
   - E. 1/C 400 kcmil (or smaller) aluminum or copper conductor cable with XLPE insulation.
   - F. 4/C No. 6 AWG (or smaller) copper conductor PVC jacketed cable with XLPE insulation.

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W-J-4047

4. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 3-5/8 in. thickness of min 4 pcf mineral wool batt insulation packed into opening as a permanent form. Packing material to be recessed from both surfaces of wall as to accommodate the required thickness of fill material (Item B).
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/4 in. thickness of fill material applied within annulus, flush with both sides of wall. At point contact location between penetrant and periphery of opening, a min 1/2 in. diam bead of fill material shall be applied at the concrete/penetrant interface on both surfaces of wall.

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*Bearing the UL Classification Marking

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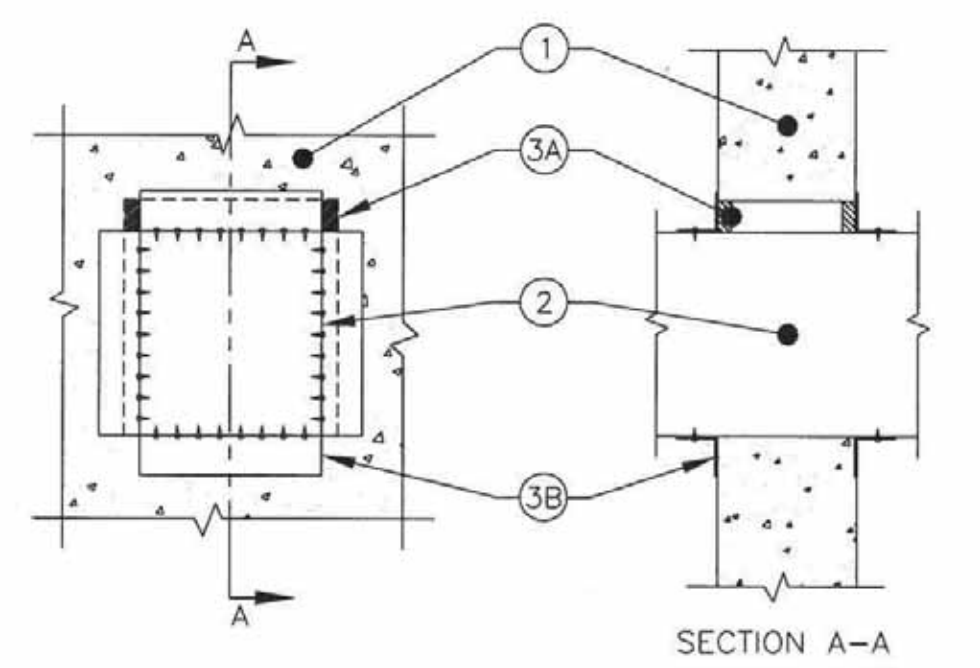
System No. W-J-7066

F Rating – 1 & 2 Hr (See Item 1)

T Rating – 0 Hr



1. **Wall Assembly –** Min 6 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max size of opening to be 957 sq. in. with a max dimension of 33 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Steel Duct –** Nom 26 in. by 30 (or smaller) No. 24 gauge (or heavier) galv steel duct to be installed either concentrically or eccentrically within the firestop system. An annular space of min 0 in. (point contact) to max 1-1/2 in. is required within the firestop system. Steel duct to be rigidly supported on both sides of wall assembly.

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 assembly. At point contact location between duct and concrete, a min 1/4 in. diam bead of sealant shall be applied at the concrete/duct interface on both surfaces of wall assembly.
   GRABBER CONSTRUCTION PRODUCTS INC – GrabberGard EFC
   B. **Retaining Angles –** Min 16 gauge galv steel angles sized to lap duct a min of 2 in. and lap wall surfaces of a min of 1 in. Angles attached to duct on both sides of wall with min 1/2 in. long, No. 10 (or larger) sheet metal screws spaced a max of 1 in. from each end of duct and spaced a max of 6 in. OC.

*Bearing the UL Classification Marking

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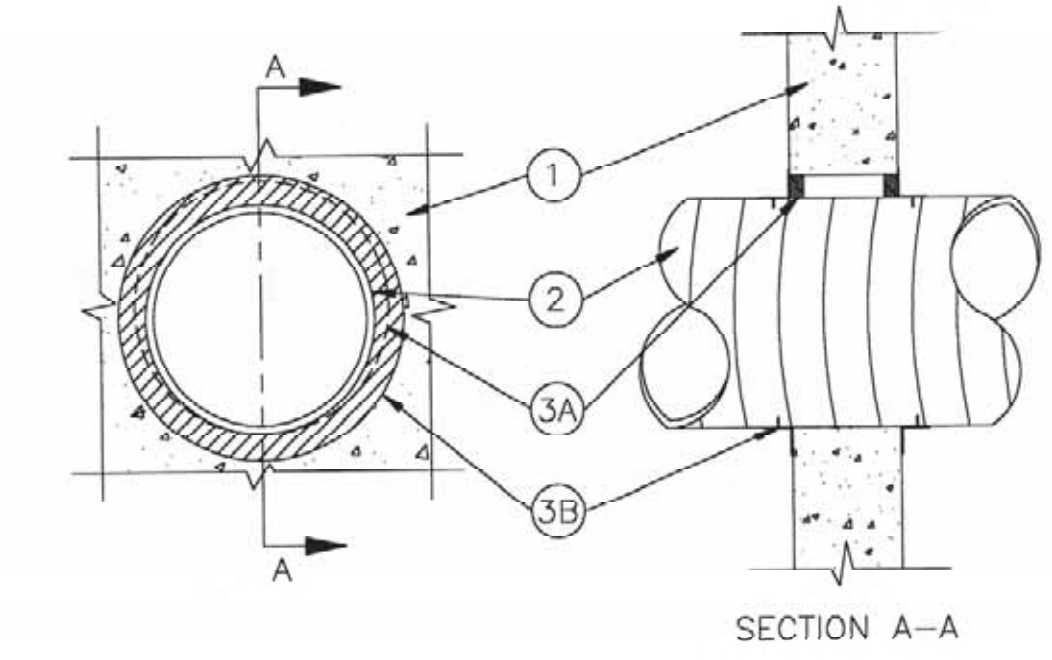
System No. W-J-7067

F Rating – 1 & 2 Hr (See Item 1)

T Rating – 0 Hr



1. **Wall Assembly –** Min 6 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 17 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Steel Duct –** Nom 16 in. diam (or smaller) No. 22 gauge (or heavier) galv steel duct to be installed either concentrically or eccentrically within the firestop system. The annular space between duct and periphery of opening shall be min 0 in. (point contact) to max 1 in. Duct to be rigidly supported on both sides of wall assembly.

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 assembly. At the point contact location between duct and concrete, a min 1/4 in. diam bead of sealant shall be applied at the concrete/duct interface on both surfaces of wall assembly.
   GRABBER CONSTRUCTION PRODUCTS INC – GrabberGard EFC
   B. **Retaining Angles –** Min 16 gauge galv steel angles roll-formed and sized to lap duct a min of 1 in. and lap wall surfaces of a min of 1 in. Angles attached to duct on both sides of wall with min 1/2 in. long, No. 10 (or larger) sheet metal screws spaced a max of 6 in. OC.

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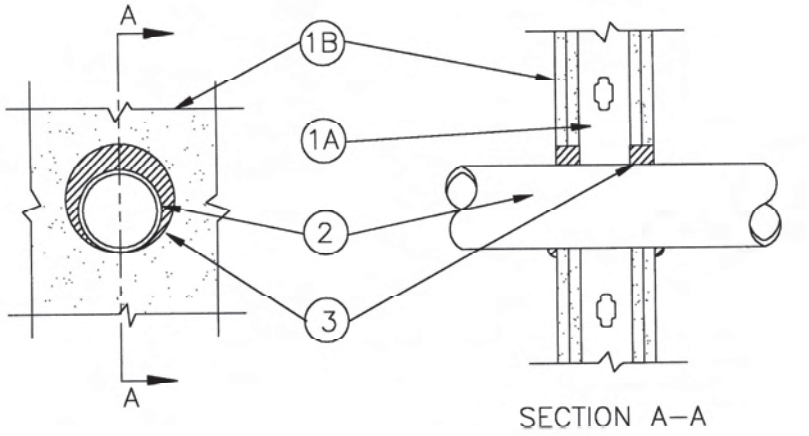
System No. W-L-1342

F Rating – 1, 2, 3 & 4 Hr (See Item 1)
T Rating – 0 & 1/4 Hr (See Item 2)



SECTION A–A

1. **Wall Assembly –** The 1, 2, 3 or 4 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or 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 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 25-3/8 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 installed either concentrically or eccentrically within the firestop system. The annular space between pipe, conduit or tubing and periphery of opening shall be min 0 (point contact) in. to max 1-1/4 in. Pipe, conduit or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:
   - A. **Steel Pipe –** The following types and sizes of steel pipes may be used:
     - A1. Nom 12 in. diam (or smaller) Schedule 10 (or heavier) steel pipe.
     - A2. Nom 24 in. diam (or smaller) Schedule 40 (or heavier) steel pipe.

     When steel pipe is used, T Rating is 1/4 hr for nom 4 in, diam (or smaller) and 0 hr for steel pipes greater than nom 4 in, diam.
   - B. **Iron Pipe –** Nom 24 in. diam (or smaller) cast or ductile iron pipe. **When iron pipe is used T Rating is 1/4 hr.**
   - C. **Conduit** – Nom 4 in. diam (or smaller) steel electrical metallic tubing (EMT) or steel conduit. **When EMT or steel conduit is used, T Rating is 1/4 hr.**
   - D. **Copper Tubing** – Nom 6 in. diam (or smaller) Type L (or heavier) copper tubing. **When copper tube is used, T Rating is 0 hr.**
   - E. **Copper Pipe** – Nom 6 in. diam (or smaller) Regular (or heavier) copper pipe. **When copper pipe is used, T Rating is 0 hr.**

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3. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. thickness of fill material for 1 hr rated wall assemblies and 1 in. thickness of fill material for 2, 3 or 4 hr rated wall assemblies, applied within the annulus, flush with both surfaces of wall. At point contact location between penetrant and gypsum board, a min 1/2 in. diam bead of fill material shall be installed at the gypsum board/penetrant interface on both surfaces of wall.
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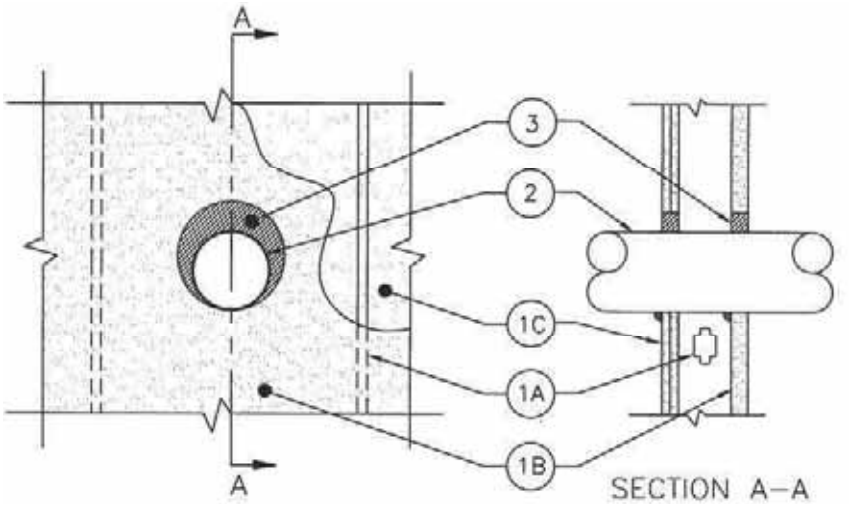
System No. W-L-1475

ANSI/UL 1479 (ASTM E814)	CAN/ULC S 115
F Rating – 2 Hr	F Rating – 2 Hr
FT Rating – 0 Hr	FT Rating – 0 Hr
	FH – Rating 2 Hr
	FTH Rating – 0 Hr



1. **Wall Assembly -** The 2 hr fire rated shaft wall assembly shall be constructed of the materials and in the manner described in the individual U400, V400 or W 400 -Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   - A. **Steel Studs** – C-H-shaped studs, 2-1/2 in.(64 mm) wide by min 1-1/2 in. (38 mm) deep, spaced 24 in. (610 mm) OC.
   - B. **Gypsum Board* –** 1 in. (25 mm) thick gypsum board liner panels, supplied in nom 24 in. (610 mm) widths as specified in the individual Wall and Partition Design. Max diam of opening is 10 in. (254 mm).
   - C. **Gypsum Board* –** Two layers of 1/2 in. (13 mm) thick gypsum board as specified in the individual Wall and Partition Design. Max diam of opening is 10 in. (254 mm).

2. **Through Penetrants –** One metallic pipe, conduit or tubing installed either concentrically or eccentrically within the firestop system. The annular space between pipe, conduit or tubing and periphery of opening shall be min 0 in. (point contact) to max 1-3/8 in. (35 mm). Pipe, conduit or tubing to be rigidly supported on both sides of wall assembly. The following types of and sizes of metallic pipes, conduits or tubing may be used:
   - A. **Steel Pipe –** Nom 8 in. (203 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   - B. **Iron Pipe –** Nom 8 in. (203 mm) diam (or smaller) cast or ductile iron pipe.
   - C. **Conduit –** Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing (EMT) or nom 6 in. (152 mm) (or smaller) rigid steel conduit.
   - D. **Copper Tubing –** Nom 4 in.(102 mm) diam (or smaller) Type L (or heavier) copper tubing.
   - E. **Copper Pipe –** Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.

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3. **Fill, Void or Cavity Material* – Sealant –** Min 1 in. (25 mm) thickness of sealant applied within the annulus, flush with both surfaces of wall. Min. 1/2 in. (13 mm) diam bead of fill material shall be applied at the gypsum board/ penetrant interface at the point contact location on outer surface of wall on side using two layers of 1/2 in. (13 mm) gypsum board (Item 1C).
GRABBER CONSTRUCTION PRODUCTS INC – GrabberGard IFC or GrabberGard EFC

*Bearing the UL Classification Marking

FL0119

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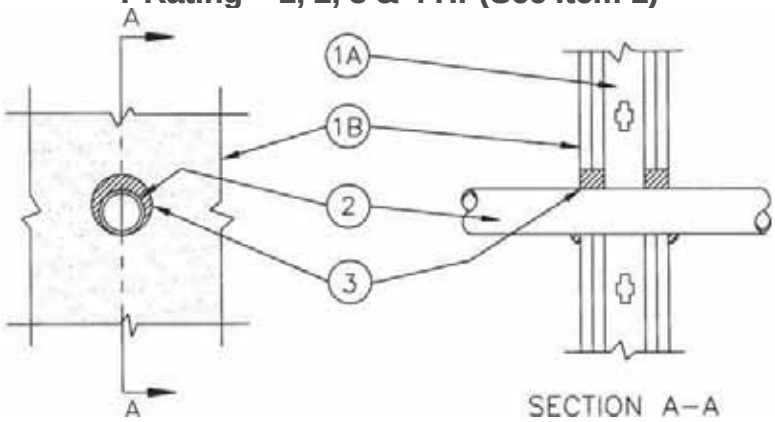
System No. W-L-2387

F Rating – 1, 2, 3 & 4 Hr (See Item 1)

T Rating – 1, 2, 3 & 4 Hr (See Item 1)



1. **Wall Assembly –** The 1, 2, 3 or 4 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or 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 3-5/8 in. wide and spaced max 24 in. OC.
   B. **Gypsum Board* –** The gypsum board type, thickness, number of layers, fasteners 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 3-1/8 in.

   The hourly F and T Ratings of the firestop system are equal to the hourly fire rating of the assembly in which it is installed.

2. **Through Penetrants –** One nonmetallic pipe or tubing installed either concentrically or eccentrically within the firestop system. Pipe or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of nonmetallic pipes or tubing may be used:
   A. **Chlorinated Polyvinyl Chloride (CPVC) Pipe –** Nom 2 in. diam (or smaller) SDR 11 CPVC pipe for use in closed (process or supply) piping systems. The annular space between pipe and periphery of opening shall be min 1/4 in. to max 1/2 in.
   B. **Crosslinked Polyethylene (PEX) Tubing -** Nom 1-1/2 in. diam (or smaller) SDR 9 PEX tubing for use in closed (process or supply) piping systems. The annular space between tubing and periphery of opening shall be min 1/4 in. to max 3/8 in.
   C. **Polyvinyl Chloride (PVC) Pipe** - Nom 2 in. diam (or smaller) Schedule 40 solid core or cellular core PVC pipe for use in closed (process or supply) piping system. The annular space between pipe and periphery of opening shall be min 1/4 in. to max 1/2 in.

3. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. thickness of fill material for 1 hr rated wall assemblies and min 1 in. thickness of fill material for 2, 3 or 4 hr rated wall assemblies, applied within the annulus, flush with both surfaces of wall.

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*Bearing the UL Classification Marking

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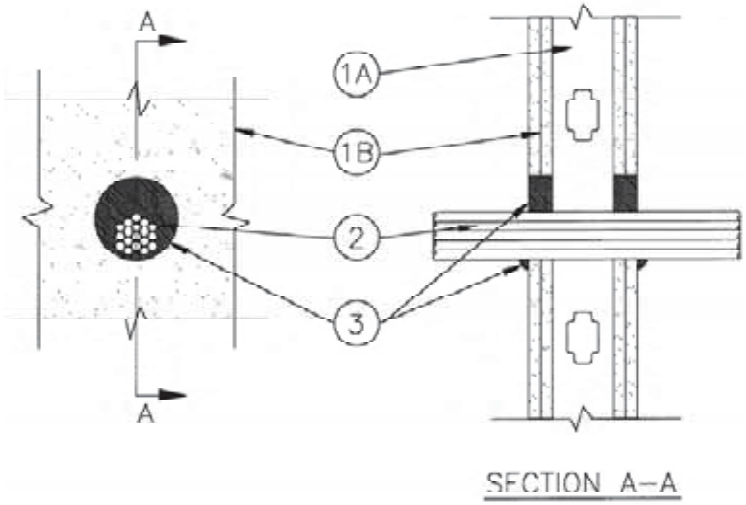
System No. W-L-3247

F Rating – 1 & 2 Hr (See Item 1)

T Rating – 3/4 Hr (See Item 1)



SECTION A–A

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 or 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 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 3-1/8 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 T rating is 1/2 hr for 1 hr rated and 3/4 hr for 2 hr rated assemblies.

2. **Cables –** Aggregate cross-sectional area of cable in opening to be max 44 percent of the cross-sectional area of the opening. The annular space between cables and periphery shall be min 0 in. (point contact) to max 1-1/2 in. Cables to be rigidly supported on both sides of wall assembly. Any combination of the following types and sizes of copper conductor cables may be used:
   A. 3/C No. 3/0 (or smaller) copper conductor polyvinyl chloride (PVC) jacketed aluminum clad or steel clad TEK cable with XLPE insulation
   B. 2/C No. 10 AWG (or smaller) copper conductor PVC jacketed cable with XLPE insulation.
   C. **Through Penetration Product*** – Max 3/C No. 2 AWG (or smaller) aluminum or steel clad **Armored Cable*** or aluminum or steel clad **Metal Clad Cable*** with copper conductors.

3. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 or 1-1/4 in. thickness of fill material for 1 or 2 hr rated wall assemblies, respectively, applied within the annulus, flush with both surfaces of wall. Caulk to be forced into interstices of cable group to max extent possible. At the point contact location between cable(s) and gypsum board, a min 1/2 in. diam bead of fill material shall be applied at the gypsum board/cable interface on both surfaces of wall.

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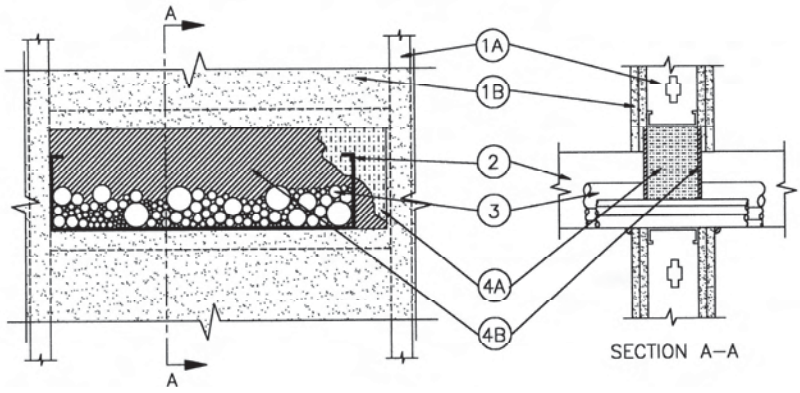
System No. W-L-4047

F Rating – 1 & 2 Hr (See Item 1B)

T Rating – 3/4 Hr



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 or 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 3-5/8 in. wide and spaced max 24 in. OC. Additional framing members may be installed in stud cavity containing cable tray (Item2) to form a rectangular box around cable tray.
   - B. **Wallboard, Gypsum* –** Thickness, type, number of layers and fasteners, as specified in the individual Wall and Partition Design. Max opening size to be 26 in. by 8 in. (208 sq. in.).
     The hourly F Rating of the firestop system is equal to the hourly F Rating of the wall assembly in which it is installed.

2. **Cable Tray+ –** Max 24 in. wide by max 6 in. deep 15 ga. (or heavier) aluminum or steel cable tray installed within the opening. The annular space between the cable tray and periphery of the opening shall be min 0 in. (point contact) to max 2 in. Cable tray to be rigidly supported on both sides of wall assembly.

3. **Cables –** Aggregate cross-sectional area of cables in cable tray to be max 40 percent of the cross-sectional area of the opening. The annular space between cables and periphery of opening shall be min 0 in. (point contact) to max 5-3/4 in. Cables to be rigidly supported on both sides of wall assembly. Any combination of the following types and sizes of cables may be used:
   - A. 1/C 750 kcmil (or smaller) copper conductor polyvinyl chloride (PVC) jacketed aluminum clad or steel clad TEK cable with cross-linked polyethylene (XLPE) insulation.
   - B. 3/C 350 kcmil (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TEK cable with XLPE insulation.
   - C. 4/C No. 14 AWG (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TEK cable with XLPE insulation.
   - D. Max 25 pair No. 20 AWG (or smaller) copper conductor PVC jacketed cable with PVC insulation.
   - E. 1/C 400 kcmil (or smaller) aluminum or copper conductor cable with XLPE insulation.
   - F. 4/C No. 6 AWG (or smaller) copper conductor PVC jacketed cable with XLPE insulation.

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4. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 3-5/8 in. thickness of min 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be installed flush with both sides of studs (Item 1A). Packing material to be recessed from both surfaces of wall as required to accommodate the required thickness of fill material (Items 4B).
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/4 in. thickness of fill material applied within annulus, flush with both surfaces of wall. At point contact location between penetrant and periphery of opening, a min 1/2 in. diam bead of fill material shall be applied at the gypsum board/penetrant interface on both surfaces of wall assembly.

GRABBER CONSTRUCTION PRODUCTS INC – GrabberGard eFC

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+Bearing the UL Listing Marking

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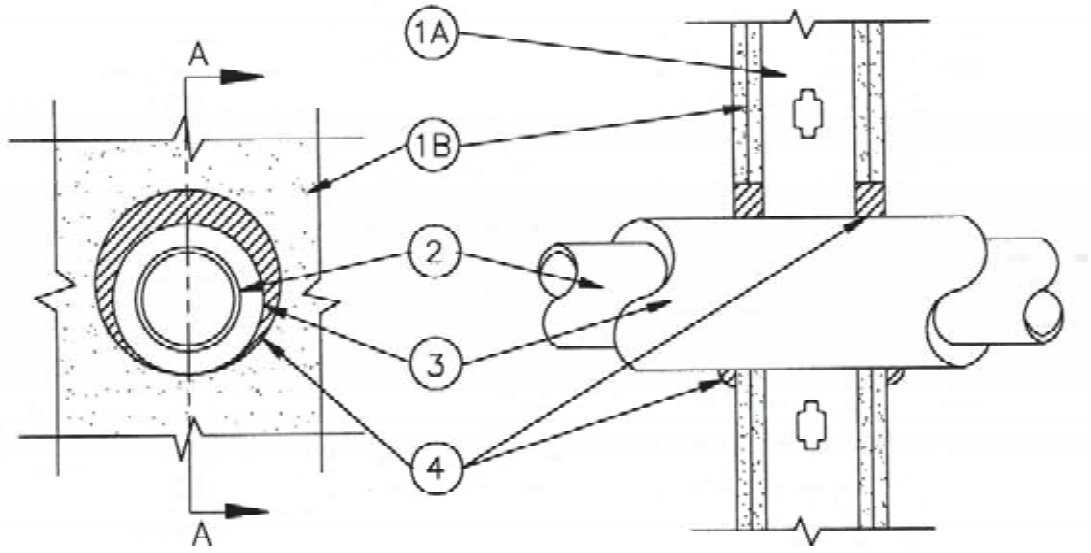
System No. W-L-5219

F Rating – 1 & 2 Hr (See Item 1)
T Rating – 1/2, 1 & 2 Hr (See Item 3)



SECTION A–A

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 or 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 3-5/8 in. wide and spaced max 24 in. OC.
   - B. **Gypsum Board* –** Nom 5/8 in. by 4 ft. wide with square or tapered edges. The gypsum wallboard type, number of layers, and fastener type and sheet orientation shall be as specified in the individual Wall and Partition Design. Max diam of opening is 7-1/2 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 or tubing to be centered within the firestop system. Pipe or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes and tubing may be used:
   - A. **Steel Pipe –** Nom 4 in. diam (or smaller) Schedule 40 (or heavier) steel pipe
   - B. **Iron Pipe –** Nom 4 in. diam (or smaller) cast or ductile iron pipe
   - C. **Copper Tubing –** Nom 2 in. diam (or smaller) Type L (or heavier) copper tube
   - D. **Copper Pipe –** Nom 2 in. diam (or smaller) Regular (or heavier) copper pipe

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W-L-5219

3. **Tube Insulation – Plastic+ –** Nom 1/2 or 3/4 in. thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing. The annular space between tube insulation and the periphery of opening shall be min 0 in. (point contact) to max 1 in.
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 UL 94 Flammability Classification of 94-5VA may be used.
The T Rating is dependant on the hourly F Rating, type of penetrant and thickness of insulation, as shown below.

F Rating	Penetrant	Insulation Thickness, Inches	T Rating
1 Hr	A and B	1/2	1/2 Hr
1 Hr	A and B	3/4	1 Hr
1 Hr	C and D	1/2 and 3/4	1/2 Hr
2 Hr	A and B	1/2	1/2 Hr
2 Hr	A and B	3/4	1 Hr
2 Hr	C and D	1/2 and 3/4	1/2 Hr

4. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. or 1-1/4 in. thickness of fill material applied within the annulus, flush with both surfaces of wall, for 1 and 2 hr. rated assemblies, respectively. At the point contact location between insulation/wallboard interface, a min. 1/2 in. diam bead of fill material shall be applied on both sides of wall.
GRABBER CONSTRUCTION PRODUCTS INC – GrabberGard EFC

*Bearing the UL Classification Mark

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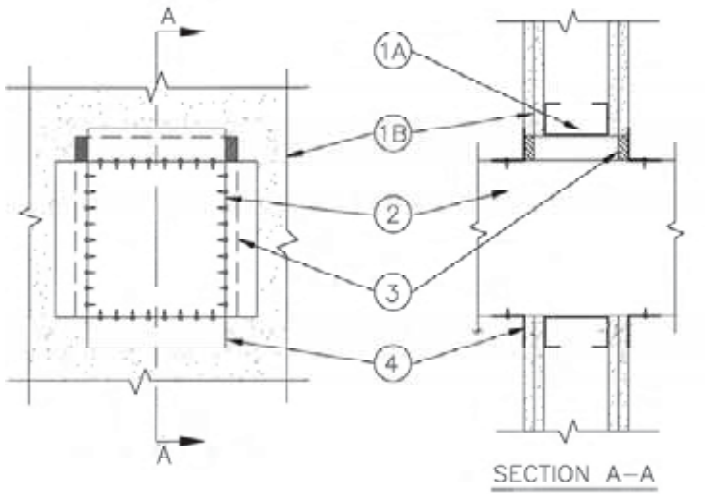
Underwriters Laboratories Inc.®

System No. W-L-7109

F Rating – 1 & 2 Hr (See Item 1)

T Rating – 0 Hr



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 Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing shall consist of steel channel studs to be min 3-5/8 in. wide and spaced max 24 in. OC. Additional 3-5/8 in. wide steel studs shall be used to completely frame opening.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as required in the individual Wall and Partition Design. Max size of opening to be 957 sq in. with a max dimension of 33 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-Penetrant –** Nom 26 in. by 30 (or smaller) No. 24 gauge (or heavier) galv steel duct to be installed either concentrically or eccentrically within the firestop system. An annular space of min 0 in. (point contact) to max 1-1/2 in. is required within the firestop system. Steel duct to be rigidly supported on both sides of wall assembly.

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 the point contact location between duct and gypsum board, a min 1/4 in. diam bead of sealant shall be applied at the gypsum board/duct interface on both surfaces of wall assembly.
   GRABBER CONSTRUCTION PRODUCTS INC – GrabberGard EFC

4. **Retaining Angles –** Min 16 gauge galv steel angles sized to lap duct a min of 2 in. and lap wall surfaces of a min of 1 in. Angles attached to duct on both sides of wall with min 1/2 in. long, No. 10 (or larger) sheet metal screws spaced a max of 1 in. from each end of duct and spaced a max of 6 in. OC.

*Bearing the UL Classification Marking

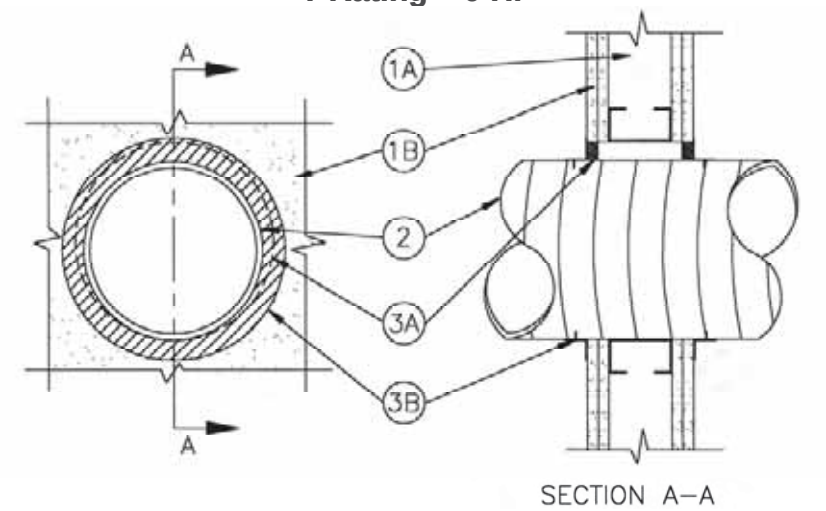
FL0712

Underwriters Laboratories Inc.®

System No. W-L-7110

F Rating – 1 & 2 Hr (See Item 1)

T 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 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 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. Additional studs shall be used to completely frame opening.
   - B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as required in the individual Wall and Partition Design. Max diam of opening is 17 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. **Steel Duct –** Nom 16 in. (or smaller) No. 22 gauge (or heavier) steel duct to be installed either concentrically or eccentrically within the firestop system. The annular space between duct and periphery of opening shall be min 0 in. (point contact) to max 1 in. Duct to be rigidly supported on both sides of wall assembly.

3. **Firestop System –** The firestop system shall consist of the following:
   - A. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. or 1-1/4 in. thickness of fill material applied within annulus, flush with both surfaces of wall for 1 and 2 hr walls, respectively. At the point contact location between duct and gypsum board, a min 1/4 in. diam bead of sealant shall be applied at the gypsum board/duct interface on both surfaces of wall assembly.

     GRABBER CONSTRUCTION PRODUCTS INC – GrabberGard EFC
   - B. **Retaining Angles –** Min 16 gauge galv steel angles roll-formed and sized to lap duct a min of 1 in. and lap wall surfaces a min of 1 in. Angles attached to duct on both sides of wall with min 1/2 in. long, No. 10 (or larger) sheet metal screws spaced a max of 6 in. OC.

*Bearing the UL Classification Marking

FL0712

Underwriters Laboratories Inc.®

Safety Data Sheet (SDS)

OSHA Haz Com Standard 29 CFR 1910.1200

Revision Date: 03/05/2021 Version: 2.0 Replaces Version: 1.0

SECTION 1: PRODUCT AND COMPANY INDENTIFICATION

Product Name:	GrabberGard EFC	Product Code:	GGEFC10, GGEFC20, GGEFC29, GGEFC5
Product Type:	Endofhermic Sealant	Use:	Firestopping Sealant
Chemical Family:	Organic/Inorganic		

Supplier Address:
Grabber Construction Products
205 Mason Circle
Concord, CA 94520

Contact Information:
Telephone: 800.810.1788
MEDICAL EMERGENCY Phone: Poison Control Center
1-877-671-4608 (toll free) or 1-303-592-1711
TRANSPORT EMERGENCY Phone: CHEMTREC
1-800-424-9300 (toll free) or 1-703-527-3887
Internet: www.firestop.com

SECTION 2. HAZARDS IDENTIFICATION

GHS CLASSIFICATION

Physical Hazards:	None
Oral:	Not Classified
Dermal:	Not Classified
Inhalation:	Not Classified
Skin Corrosion / Irritation:	Not Classified
Serious Eye Damage / Eye Irritation:	Not Classified
Respiratory or Skin Sensitization:	Not Classified
Germ Cell Mutagenicity:	Not Classified
Carcinogenic:	Not Classified
Reproductive Toxicology:	Not Classified
Target Organ System Toxicity - Single Exposure:	Not Classified
Target Organ System Toxicity - Repeated Exposure:	Not Classified
Aspiration Toxicity:	Not Classified

ENVIRONMENTAL HAZARDS

Hazards to the Aquatic Enviroment:	Not Classified
Acute Aquatic Toxicity:	Not Classified
Chronic Aquatic Toxicity:	Not Classified
Bioaccumulation Potential:	Not Classified
Rapid Degradability:	Not Classified

Safety Data Sheet (SDS)

OSHA Haz Com Standard 29 CFR 1910.1200

Revision Date: 03/05/2021 Version: 2.0 Replaces Version: 1.0

GHS LABEL ELEMENTS, INCLUDING PRECAUTIONARY STATEMENTS:	
Hazard Symbols:	None
Precautionary Statements:	P102 - Keep Out Of Reach of Children P264 - Wash Hands Throughly After Handling

POTENTIAL HEALTH EFFECTS:	
Inhalation:	May cause irritation to nose and throat.
Skin contact:	May cause slight irritation to skin.
Eye contact:	May cause slight irritation to eyes on contact.
Ingestion:	Not expected to be harmful by ingestion. Ingestion of large amounts may produce gastrointestinal disturbances including irritation, nausea, and diarrhea.
Existing conditions aggravated by exposure:	None known This product is consisted hazardous under 29 CFR 1910.1200 (Hazard Communication). See Section 11 for additional toxicological information.

SECTION 3. COMPOSITION /INFORMATION ON INGREDIENTS

Hazardous Components	CAS Number	Precentage %*
Calcuim Carbonate	1314-65-3	< 50
Vinyl Acetate Polymers	Not disclosed	< 40
Water	7732-18-5	< 25
Auxiliary Chemicals	None known	< 5
Color Pigment	1309-37-1	< 0.5

* Exact percentage is a trade secret. Concentration range is provided to assist users in providing appropriate protection.

SECTION 4. FIRST AID MEASURES

Inhalation:	Move to fresh air in case of accidential inhalation of vapours.
Skin contact:	Wash affected area immediately with soap and water.
Eye contact:	Immediatel flush eyes with plenty of water for at least 15 minutes. If symptoms develop and persist, get medical attention.
Ingestion:	Consult a physician if necessary.
Symptoms:	See Section 11.

SECTION 5. FIRE FIGHTING MEASURES

Flash point:	Not applicable
Autoignition temperature:	Not available
Flammable / Explosive limits - lower:	Not available
Flammable / Explosive limits - upper:	Not available
Extinguishing media:	All standard firefighting procedures
Special firefighting procedures:	Do not breathe combustion gases. Wear protective equipment
Unusual fire or explosion hazards:	None known
Hazardous combustion products:	Carbon Dioxide (CO_2), Carbon Monoxide (CO), Fragmented Hydrocarbons

Safety Data Sheet (SDS)

OSHA Haz Com Standard 29 CFR 1910.1200

Revision Date: 03/05/2021 Version: 2.0 Replaces Version: 1.0

SECTION 6. ACCIDENTAL RELEASE MEASURES

Use personal protection recommended in Section 8, isolate the hazard area and deny entry to unnecessary and unprotected personnel.

Environmental precautions:	Do not allow to enter drains, surface or ground water.
Clean-up methods:	Wipe up spills to prevent footing hazard. Scrape up spilled material and place in a closed container for disposal. Wear appropriate protective equipment and clothing during clean-up.

SECTION 7. HANDLING AND STORAGE

Handling:	Avoid contact with eyes, skin and clothing. Keep out of the reach of children.
Storage:	Store between 4°C (40°F) and below 32°C (90°F). Keep from freezing. Store in accordance with local regulations. Store in original container protected from direct sunlight, in a cool, dry area. Keep containers closed when not in use. Do not store in unlabeled containers.

For information on product shelf life, please review labels on containers or check the Technical Data Sheet.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Employers should complete an assessment of all workplaces to determine the need for, and selection of, proper exposure controls and protective equipment for each task performed.

Hazardous Components	ACGIH TLV	OSHA PEL	AIHA WEEL	OTHER
Calcuim Carbonate	10 mg/m^3 TWA (total dust)	5 mg/m^3 PEL (respirable fraction) 15 mg/m^3 PEL (total dust)	None	None
Color Pigment	5 mg/m^3 TWA (respirable fraction)	10 mg/m^3 TWA (fume)	None	None

Engineering controls:	Use general ventilation and use local exhaust, where possible, in confined or enclosed space.
Respiratory protection:	Not normally required. Use NIOSH approved respirator if there is potential to exceed exposure limit(s).
Eye / Face protection:	Safety goggles or safety glasses with side shields.
Skin protection:	Chemical resistant, impermeable gloves; Neoprene, Butyl-rubber, or Nitrile-rubber gloves.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state:	Pasty
Color:	Red
Odor:	Mild, aromatic
Odor threshold:	Not available
pH:	8.0 - 9.0
Vapor pressure:	18.52 mm Hg
Boiling point/range:	> 100°C (> 212°F)
Melting point/range:	Not available
Specific gravity:	1.40 - 1.50 at 25°C (77°F)
Vapor density:	Heavier than air, (Air = 1)
Flash point:	Not applicable
Flammable / Explosive limits - lower:	Not applicable
Flammable / Explosive limits - upper:	Not applicable
Autoignition temperature:	Not applicable
Evaporation rate:	< 1

Safety Data Sheet (SDS)

OSHA Haz Com Standard 29 CFR 1910.1200

Revision Date: 03/05/2021 Version: 2.0 Replaces Version: 1.0

Solubility in water:	Not applicable
Partition coefficient (n-octanol/water):	Not applicable
VOC content:	32.5 g/l (calculated)

SECTION 10. STABILITY AND REACTIVITY

Stability:	Stable under normal conditions of storage and use.
Hazardous reactions:	Not applicable
Hazardous decomposition products:	Carbon dioxide, carbon monoxide
Incompatible materials:	Strong alkalis, and mineral acids.
Reactivity:	Not applicable
Conditions to avoid:	Do not freeze

SECTION 11. TOXICOLOGICAL INFORMATION

Relevant Routes of Exposure:	Inhalation, Skin Contact, Eyes, Ingestion

Potential Health Effects / Symptoms

Inhalation:	May cause irritation to nose and throat
Skin contact:	May cause slight irritation of skin.
Eye contact:	May cause slight irritation to eyes on contact.
Ingestion:	Not expected to be harmful by ingestion. Ingestion of large amounts may produce gastrointestinal distrubances including irritation, nausea and diarrhea.

Hazardous Components	NTP Carcinogen	IARC Carcinogen	OSHA Carcinogen (Specifically Regulated)
Calcuim Carbonate	No	No	No
Color Pigment	No	No	No

Hazardous Components	Health Effects / Target Organs
Calcuim Carbonate	No Data
Color Pigment	No Data

SECTION 12. ECOLOGICAL INFORMATION

Ecological information:	Not applicable

SECTION 13. DISPOSAL CONSIDERATIONS

Information provided is for unused product only:

Recommend method of disposal:	Dispose should be in accordance with applicable regional, national, Federal, State and local governmental regulations.

Safety Data Sheet (SDS)

OSHA Haz Com Standard 29 CFR 1910.1200

Revision Date: 03/05/2021 Version: 2.0 Replaces Version: 1.0

Waste disposal:	The generation of waste should be avoided or minimized wherever possible. Empty containers may retain some product residues. This material and its containers must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product should at all times must comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.
Hazardous waste number:	It is the responsibility of the user to determine if an item is hazardous as defined in the Resource Conservation and Recovery Act (RCRA) at the time of disposal. Product uses, transformations, mixtures, processes, etc., may render the resulting material hazardous, under the criteria of ignitability, corrosivity, reactivity and toxicity characteristics of the Toxicity Characteristics Leaching Procedure (TCLP) 40 CFR 261.20-24.

SECTION 14. TRANSPORT INFORMATION

Regulatory Information	UN Number	Proper Shipping Name	Classes	PG*	Label	Additional Information
DOT Classification	Not regulated	-	-	-	-	-
TDG Classification	Not regulated	-	-	-	-	-
Mexico Classification	Not regulated	-	-	-	-	-
ADR / RID Class	Not regulated	-	-	-	-	-
IMDG Class	Not regulated	-	-	-	-	-
IATA-DGR Class	Not regulated	-	-	-	-	-

U.S. Department of Transportation Ground (49 CFR)

Proper shipping name:	Not regulated
Hazard class or division:	None
Identification number:	None
Packing group:	None

International Air Transportation (ICAO/IATA)

Proper shipping name:	Not regulated
Hazard class or division:	None
Identification number:	None
Packing group:	None

Water Transportation (IMO/IMDG)

Proper shipping name:	Not regulated
Hazard class or division:	None
Identification number:	None
Packing group:	None

SECTION 15. REGULATORY INFORMATION

United States Regulatory Information

TSCA 8 (b) Inventory Status:	All components are listed or are exempt from listing on the Toxic Substances Control Act Inventory
TSCA 12 (b) Export Notification:	None above reporting de minimus
CERCLA / SARA Section 302 EHS:	None above reporting de minimus
CERCLA / SARA Section 311/312:	Immediate health
CERCLA / SARA 313:	None above reporting de minimus

Safety Data Sheet (SDS)

OSHA Haz Com Standard 29 CFR 1910.1200

Revision Date: 03/05/2021 Version: 2.0 Replaces Version: 1.0

California Proposition 65:	No California Proposition 65 listed chemicals are known to be present. No California Proposition 65 listed chemicals are know to be present

Canada Regulatory Information

CEPA DSL / NDSL Status:	All components are listed on or exempt from listing on the Canadian Domestic Substances List.
WHMIS hazard class:	Not controlled

SECTION 16. OTHER INFORMATION

This material safety data sheet contains changes from the previous version in sections:

Prepared by:	Chemical Laboratory
Issue date:	June 1, 2015

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CAULKING INSTRUCTIONS - GRABBERGARD EFC

Equipment and Caulking Installations Instructions Using Caulking Applicator Guns

There are different types of caulking applicator guns available. The recommended procedure when using the different styles will be described in Sections A and B. Section C will then describe the recommended procedures to follow to install the caulk and finish the job.

Section A – Applying Caulk in Plastic and Cardboard Fiber Foil Wrapped Cartridges

There are variety of applicator caulking guns available to do firestopping. We recommend using a smooth rod style rather than the less expensive ratchet rod type. When dispensing caulk from a 29 ounce-size cartridge, we recommend a rod type gun with at least a 12:1 thrust ratio. The higher thrust ratio means less hand fatigue since firestopping caulks are usually high viscous caulkings. The higher thrust ratio will also help when the product becomes stiffer in the colder temperatures. (12:1 ration generates approximately 300 pound thrust)

For manual single component cartridge applicator guns.

Select the correct size manual drive frame-style cartridge gun for either the 10-ounce (300ml) or the larger 29-ounce (850ml) plastic or cardboard fiber foil wrapped tube type

Using a utility knife cut off the end of the plastic tip/nozzle to the desired opening size. The cut can be either straight across (90°) or angled (45°). Cutting too small of an opening will restrict the flow of material and a smaller bead size will result. The smaller the opening the higher the trigger action (pressure) required to move the material out of the tube.

On the 29 fl. oz. tubes, insert either a screwdriver or other pointed utensil into the plastic nozzle to puncture the membrane; which will allow the caulk material to flow.

CAULKING INSTRUCTIONS - GRABBERGARD EFC

Pull back the push rod of the frame-style caulking gun to its full extension.

Drop the cartridge into the frame insuring that the plastic nozzle of the cartridge is place through the opening in the end plate.

Repeatedly pull the trigger of the applicator guns until the push rod is advanced to the end of the cartridge. The caulk will begin to flow when some resistance is felt.

When the desired amount of material has been advanced, stop triggering; release the pressure by pressing the lever (tab) located at the back of the handle with your thumb. This causes the push rod to slip back stopping the flow of material.

REFER TO SECTION C TO COMPLETE THE INSTALLATION PROCEDURE.

CAULKING INSTRUCTIONS - GRABBERGARD EFC

Section B- Applying Caulk with Refillable Bulk Loading Applicator Gun

The caulking to be used is shipped in 5-gallon (18.9 liter) plastic tapered pails.

Advance the plunger and push the rod down to the end of the barrel.

To begin the loading process, remove the front cap containing the nozzle.

With a utility knife, cut an opening in the plastic nozzle (cut can be straight across (90°) or angled (45°)).

Coat the threads at the end of the barrel with a solvent (oil) or water to prevent the accumulation of material.

Immerse the open end of the barrel into the material to a depth of approximately 1-inch.

Move the immersed gun slightly around so the material will adhere and form an air seal.

CAULKING INSTRUCTIONS - GRABBERGARD EFC

Hold the barrel steady, grip the T-pull and slowly pull the push rod back drawing the material into the barrel. Pulling the rod back to quickly may result in air pockets and an incomplete fill.

Remove the gun from the pail of material and scrape off the excess amount that has accumulated on the barrel.

Replace the front cap and nozzle.

To stop the flow or product, stop triggering and depress the pressure and release tab on the handle.

Now you are ready to install the material into the openings and joints.

REFER TO SECTION C TO COMPLETE THE INSTALLATION PROCEDURE.

Section C – Installing Firestop Caulk

General Information

All firestopping installations must be performed in compliance with a tested and listed firestop system design. The testing laboratories like Underwriters Laboratories (UL) or Intertek (Warnock Hersey) publish these listings.

For the appropriate listing, consult the manufacturer's literature or the testing laboratories Fire Protection Directories and/or their web sites.

The manufacturer recommends an individual who has been properly trained in the correct procedures should perform all firestop installations. The individual must be able to read and understand a tested firestop listing design.

The applicator should have the following materials and equipment to correctly and safely install firestop caulking.

- Safety Glasses
- Gloves
- Utility (box) knife
- Stainless Steel Spatula
- Cleaning rags
- Plastic spray water bottle (quart/liter) with finger pump trigger/nozzle
- be clean, free from: water, excessive dirt, dust, debris and grease. For the best results, the ideal atmospheric temperatures and environment would be:
- Dry, 60°-75°F (15°C -24°C) & R.H. 50 %.

CAULKING INSTRUCTIONS - GRABBERGARD EFC

When the damming or fire insulation material is required, the following information should be considered before commencing.

- Backer rod used as a damming or support material should be installed into the opening in a thickness and compressed sufficiently as to not dislodge and fall out under normal building movement. Wrap the backer rod completely around the penetration(s) and recess it to accommodate the required amount of firestop caulk.

- Mineral wool when required, as an insulation material, it should be installed into the opening compressed to a thickness as to not dislodge nor fall out under normal building movement. The mineral wool, usually 4 pcf, should be installed to the compression required by the firestop listing. The orientation of the mineral wool is also very important and maybe the difference of the system being in compliance or not. For construction joints or through penetration in floor (horizontal) rated assemblies, the mineral wool or similar fibrous material should be installed with the lamination in a vertical orientation assemblies. The opposite is the rule of joints and through penetrations in wall (vertical) assemblies. Here the laminations should be placed in a horizontal orientation. Installing the mineral wool in these different lamination directions allows the material to be compressed to the density required for the fire rating and building movement.

- Do not install mineral wool that is or has become wet i.e. exposure to water, rain, or snow.

Water base caulks adhere to some construction materials better than others. Applying a light mist of water to these surfaces can in some instances, help the bonding process. Mineral wool, is one of these materials, especially when it is in a vertical orientatation.

Tooling the installed material can be done in several ways:

- Dry tooling: After the material is put in place, using a spatula or other tool that has not been wetted with water, smooth it out.

- Wet tooling: After the material has been put in place, using a spatula or other tool that has been wetted with water, smooth it out.

- Wet tooling: After the material has been installed, lightly mist the material with water. Use a plastic water spray bottle, turn the nozzle to a mist spray orifice, hold the bottle approximately 10-12 inches (255-305mm) from the area. DO NOT APPLY WATER TO THE MATERIAL IN A CONCENTRATED JET SPRAY. This will apply too much water, causing the material to dilute and run out.

Caulking Penetrations

Install the correct amount of caulk material into the opening (annular space) around the service penetration to the depth/ thickness required. Make sure that caulking is in intimate contact with the substrate and the penetrating item. Once the caulk is in place, tool the material with a tooling utensil (spatula) to a smooth finish. This will push the installed material into areas not covered in the initial caulking procedure. It will also help to ensure a better bond with mating construction materials.

CAULKING INSTRUCTIONS - GRABBERGARD EFC

Caulking Construction Joints

Some construction joints do not require damming material or mineral wool to be used to affect a firestop system. When filler caulk material is the only component required, the installation must be installed in accordance with the listing being used. This usually requires the filler material to be installed into the gap/joint. Once the caulking has been trowelled or gunned in place, the installed material should be tooled into a smooth finish. Work the material to ensure no voids and air holes are left. This is particularly important when caulking to fireproofing materials. Cured fireproofing is very porous and the caulking must be tooled to it to ensure a tight seal and a secure mating surface system, refer to the procedures described above for the proper installation before applying the filler caulking material.

Note: *All installation procedures of firestop caulk materials outlined in the proceeding information are* ***water-based compounds.***

NOTES

Grabber Branch Locations

Grabber Atlanta
Duluth, Georgia
770-813-1332

Grabber California
Concord, California
925-687-6606

Grabber Canada
Langley, BC, Canada
604-856-1444

Grabber Frederick
Frederick, Maryland
301-371-0701

Grabber Ft. Myers
Fort Myers, Florida
239-278-1888

Grabber Houston
Houston, Texas
713-460-2716

Grabber Jacksonville
Jacksonville, Florida
713-460-2716

Grabber Kona
Kailua, Kona, Hawaii
808-329-5110

Grabber Miami
Hialeah, Florida
305-820-0975

Grabber Midwest
Maumee, Ohio
419-794-8212

Grabber Missouri
Kansas City, Missouri
816-931-8816

Grabber Northeast
Pennsauken, New Jersey
856-662-2525

Grabber Northwest
Clackamas, Oregon
503-654-5234

Grabber Los Angeles
Santa Fe Springs, California
562-696-5122

Grabber Ohio
Fairfield, Ohio
513-874-9027

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808-836-1161

Grabber San Diego
San Diego, California
856-662-2525

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San Francisco, Califfornia
415-550-7273

Grabber Seattle
Kirkland, Washington
425-828-0570

Grabber Southeast
Pompano Beach, Florida
954-971-4730

Grabber Tampa
Tampa, Florida
813-249-2281

Grabber Texas
Dallas, Texas
972-470-9044

Grabber Treasure Coast
Port St Lucie, Florida
772-878-2680

Grabber Utah
Murray, Utah
801-266-4151

Grabber Virginia
Chantilly, Virginia
703-631-8770

Grabber Washington
Capitol Heights, Maryland
301-808-5100

Grabber/Scorpion Fasteners
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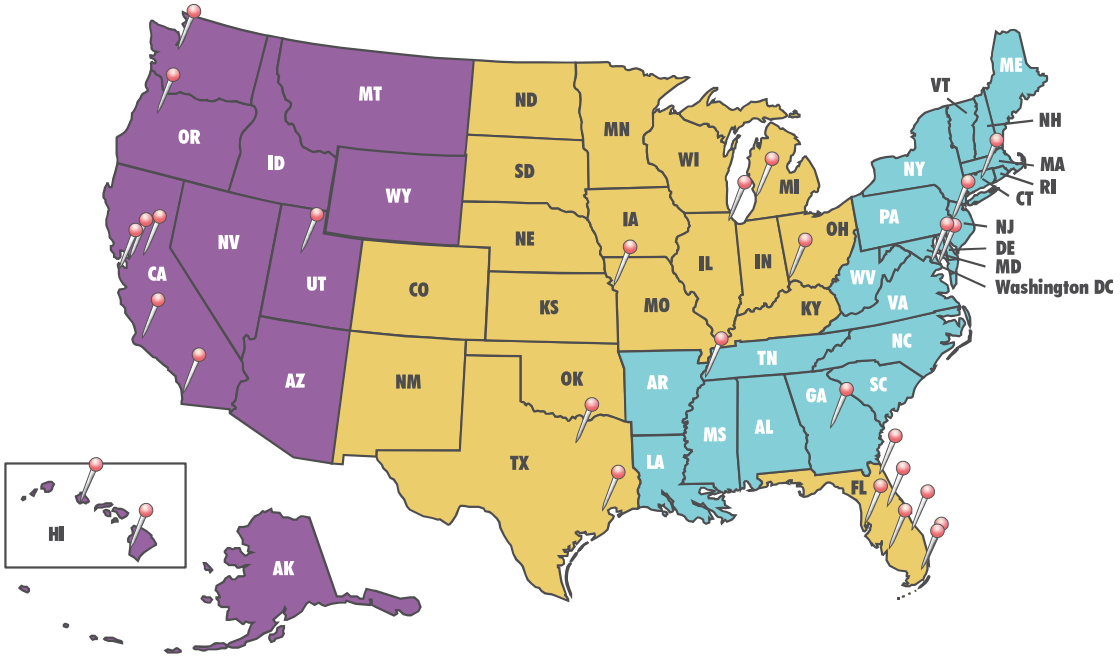

Pacific Division
Phone: 808.836.1161
Fax: 808.833.4291

Gulf Division
Phone: 800.925.0320
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Metal Framinig Screws
Concrete Anchors
Pneumatic Nails

Fasten it

Grabber has a full line of fasteners for just about any application. From drywall screws to heavy gauge framing screws Grabber has what you need. Grabber invented the drywall screw and changed an entire industry. For the past 40 years Grabber has been the name you can trust for professional grade fasteners.

SuperDrive
Screw Guns
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Grabber's SuperDrive tool is designed to make driving screws faster and more accurate. Along with SuperDrive, Grabber offers many other tools that make your work easier including chop saws, routers, lasers and more.

Subfloor Adhesives
Drywall Adhesives
Acoustical Sealants
Fire Stopping Caulks

Caulk it

Grabber offers a complete line of caulks including sound control sealants, subfloor adhesives, drywall adhesives, insulation foam and more. Grabber also offers EFC and IFC fire stopping caulks and sealants.

NO-COAT® Stick Products
NO-COAT® ULTRAFLEX
Drywall Tape
Finishing Tools

Finish it

Grabber has everything you need for finishing your drywall projects. From fiberglass mesh tape and spark perforated drywall tape to NoCoat's innovative structural drywall system, Grabber has what you need to do the job right

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GRABBER

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