

# Development Services

## From Concept to Construction

Phone: 503-823-7300 Email: [bds@portlandoregon.gov](mailto:bds@portlandoregon.gov) 1900 SW 4th Ave, Portland, OR 97201

More Contact Info (<http://www.portlandoregon.gov/bds/article/519984>)



### APPEAL SUMMARY

**Status:** Decision Rendered

**Appeal ID:** 22225

**Project Address:** 5434 SE Milwaukie Ave

**Hearing Date:** 12/18/19

**Appellant Name:** Tom Jaleski

**Case No.:** B-013

**Appellant Phone:** 971-238-5266

**Appeal Type:** Building

**Plans Examiner/Inspector:** Joe Thornton

**Project Type:** commercial

**Stories:** 4 **Occupancy:** R-2 **Construction Type:** V-A

**Building/Business Name:**

**Fire Sprinklers:** Yes - Entire building

**Appeal Involves:** Erection of a new structure, Reconsideration of appeal

**LUR or Permit Application No.:** 17-267750-REV-03-CO

**Plan Submitted Option:** pdf [File 1] [File 2] [File 3] [File 4] [File 5]

**Proposed use:** Office

### APPEAL INFORMATION SHEET

#### Appeal item 1

**Code Section** 703.3

#### Requires

703.3 Methods for determining fire resistance. The application of any of the methods listed in this section shall be based on the fire exposure and acceptance criteria specified in ASTM E119 or UL 263. The required fire resistance of a building element, component or assembly shall be permitted to be established by any of the following methods or procedures:

Engineering analysis based on a comparison of building element, component or assemblies designs having fire-resistance ratings as determined by the test procedures set forth in ASTM E119 or UL 263.

#### Proposed Design

The proposed modified ceiling design is to be utilized for the 48 inch wide corridors due to conflicts with mechanical piping installed above the ceiling. The proposed floor/ceiling assembly consists of I joists placed on 16" centers with 2 x 4 wooden ceiling support blocking (placed on their sides) at 24" centers, fixed underneath across the corridor. The blocking is installed below the I-joists by approximately 6" creating a small void. This space along with the area between the joists will be completely filled with glass fiber insulation. The underside of the blocking will be protected by two layers of 5/8 inch type X gypsum wallboard. For the purpose of our analysis we have compared the proposed design to the listed assembly, GA file No FC 5240 [Figure 2]

An Engineering analysis as permitted by OSSC 703.3 prepared by an Oregon licensed Fire Protection Engineer is attached to establish equivalent protection using SFRM, wood and/or mineral wool insulation to protect the steel beam.

**Reason for alternative** As detailed above, the corridor ceiling assembly meets the minimum requirements of GA FC5120.

The RC Channel spacing will be reduced from 24" o/c to 16" o/c for the proposed design, while the

2x blocking will be installed at 24" o/c (20.5" between edges) to allow space for the installing of insulation. Sprinklers will not be required in the concealed space, as the void will be entirely filled with non-combustible insulation.

The proposed design will exceed the required 1-hour rating as compared and detailed in this letter with GA Assembly Design No. FC 5120.

Therefore, we urge you to approve this appeal.

---

## APPEAL DECISION

### **Alternate 1 hour floor / ceiling assembly: Granted as proposed.**

The Administrative Appeal Board finds that the information submitted by the appellant demonstrates that the approved modifications or alternate methods are consistent with the intent of the code; do not lessen health, safety, accessibility, life, fire safety or structural requirements; and that special conditions unique to this project make strict application of those code sections impractical.

Pursuant to City Code Chapter 24.10, you may appeal this decision to the Building Code Board of Appeal within 90 calendar days of the date this decision is published. For information on the appeals process, go to [www.portlandoregon.gov/bds/appealsinfo](http://www.portlandoregon.gov/bds/appealsinfo), call (503) 823-7300 or come in to the Development Services Center.





EJ#2

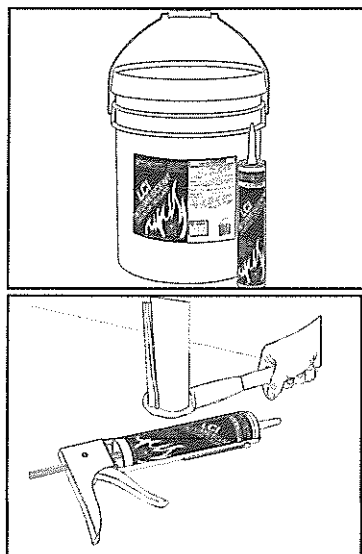




## SERIES LCI INTUMESCENT SEALANT

### APPLICATIONS

SpecSeal® LCI Sealant has a broad application base designed to seal a wide variety of common penetrations and construction joints. Penetrant types include insulated and non-insulated metallic pipes and tubes, non-metallic pipes and tubes, and common electrical service and power distribution, telephone, data, and TV cabling. This product is also used in conjunction with other SpecSeal® Products such as SpecSeal® Firestop Collars and Wrap Strips to protect larger plastic pipes. See Table A for a summary application list.



### PRODUCT DESCRIPTION

SpecSeal® LCI Sealant is a versatile and economical intumescent sealant that has excellent caulking properties as well as high build properties on vertical or overhead surfaces. This single grade may be caulked (standard cartridge or bulk loaded), knifed or troweled. In addition, SpecSeal® LCI Sealant does not contain PCB's or asbestos.

SpecSeal® LCI Sealant is storage stable (when stored according to the manufacturer's recommendations), and will not separate or shrink when dried. SpecSeal® Series LCI Sealant will adhere to all common construction and penetrant materials and contains no solvents that might adversely effect plastic pipes or cable jackets.

**EJ#1-Sealant**

#### FEATURES

- **Economical:** High performance without the high price!
- **Highly Intumescent:** Expands up to 8 times.
- **Excellent Smoke Seal**
- **Water Resistant :** Will not re-emulsify when dry.
- **Water-Based** for easy installation, cleanup, and disposal.
- **Acoustically Tested:** Reduces noise transmission
- **Safe...**Low VOC's, No Solvents, Non-Halogenated
- **Paintable**

### PERFORMANCE

SpecSeal® LCI Sealant is the basis for systems that meet the exacting criteria of ASTM E814 (UL1479) and ASTM E1966 (UL2079) as well as to the time-temperature requirements of ASTM E119 (UL263). LCI provides up to a 4-hour fire rating for typical service penetrations through concrete or wood floors, concrete or masonry walls, as well as gypsum board walls. SpecSeal® LCI Sealant meets Class A finish requirements for Flame Spread and Smoke Development when tested in accordance with ASTM E84 (UL723). Meets or exceeds the requirements of ASTM C834, Type C, Grade 0. SpecSeal® LCI Sealant is also acoustically tested, demonstrating excellent sound attenuation properties.

### PHYSICAL PROPERTIES

Properties	Series LCI
Color	Red
Odor	Mild Latex
Density	9.0 lb/gal (1.08 kg/L)
pH	9.0
Solids Content By Weight	80%
Solids Content By Volume	66.9%
In Service Temperature	≤ 185°F (85°C)
Flame Spread	0*
Smoke Developed	0*
STC Rating (ASTM E90/ASTM C919)	62
VOC Content (EPA Method 24/ASTM D3960)	327g/L
Shelf Life	2 yrs
Volume Expansion	10X Free Expansion
Storage Temp.	40°F (4°C) - 95°F (35°C)

\* Tested to ASTM E84 (UL723) at 14% surface coverage (modified test for sealants and caulks)



FBC™ System Compatible indicates that this product has been tested, and is monitored on an ongoing basis, to assure its chemical compatibility with FlowGuard Gold®, BlazeMaster® and Corzan® pipe and fittings. FBC, FlowGuard Gold, BlazeMaster and Corzan are licensed trademarks of The Lubrizol Corporation.



FILL, VOID OR CAVITY MATERIALS FOR USE IN JOINT SYSTEMS AND THROUGH-PENETRATION FIRESTOP SYSTEMS. SEE UL FIRE RESISTANCE DIRECTORY, 3L73



### SPECIFICATIONS

The firestopping sealant shall be a water-resistant, intumescent latex sealant. The sealant when exposed to high heat or flame shall exhibit a free expansion of up to 10 times its original volume. The firestopping sealant shall contain no water soluble nor hygroscopic ingredients and shall be acoustically tested. The sealant shall be UL Classified and/or FM approved and tested to the requirements of ASTM E814 (UL1479), CAN/ULC S115 and shall meet Class A finish requirements when tested in accordance with ASTM E84 (UL723).

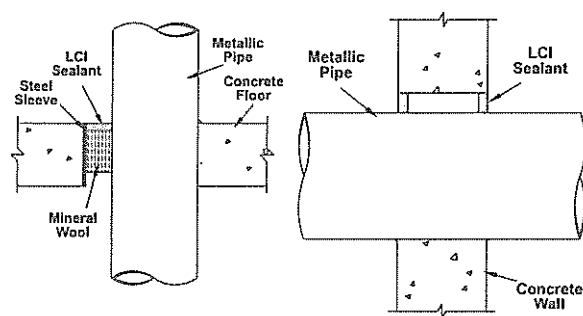
### SPECIFIED DIVISIONS

- DIV. 7 07840 Through-Penetration Firestopping
- DIV. 13 13900 Special Construction Fire Suppression & Supervisory Systems
- DIV. 15 15250 Mechanical Insulation – Fire Protection
- DIV. 16 16050 Basic Electrical Materials & Methods





**Fig 1: METALLIC PIPES - Concrete/Masonry Floors & Walls**



**UL System No. C-AJ-1353**

F Rating: 3 Hr • T Rating: 0 Hr

Steel or Iron Pipe: <12", Copper Pipe: <4"

Annulus: 0" to 2"

Sealant Depth: 1/4"

Forming Material: Nom 4 pcf mineral wool (2 1/4" Depth)

**UL System No. W-J-1098**

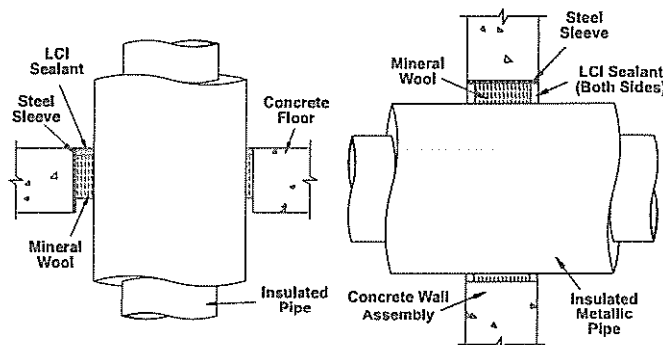
F Rating: 2 Hr • T Rating: 1/4, 3/4 & 1 Hr

Steel or Iron Pipe: <8", Copper Pipe: <4"

Annulus: 0" to 2"

Sealant Depth: 5/8"

**Fig 2: INSULATED METALLIC PIPES - Concrete/Masonry Floors & Walls**



**UL System No. C-AJ-5138**

F Rating: 2 Hr • T Rating: 3/4 or 1 Hr

Steel or Iron Pipe: 6", Copper Pipe: 4"

Pipe Covering: Max. 2" fiber glass or mineral wool pipe insulation.

Annulus: 1/4" to 1-5/8" • Sealant: 1/2"

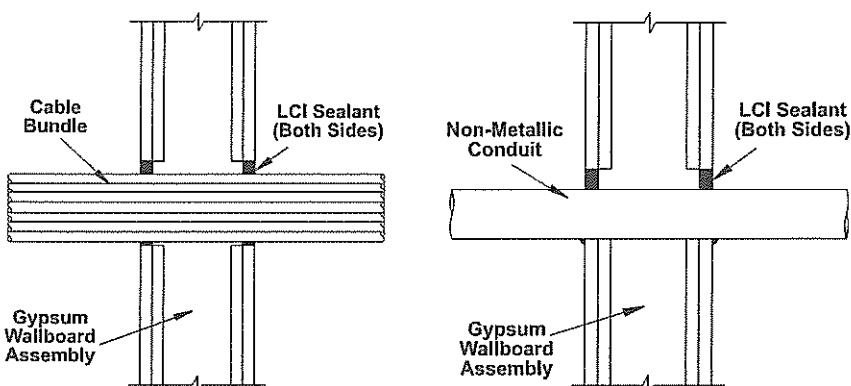
Forming: Nom. 4 pcf mineral wool (3" depth)

**SEALANT REQUIREMENTS IN CUBIC INCHES PER 1/4 INCH OF INSTALLED DEPTH\***

		Diameter of Opening - In. (mm)											
PIPE SIZE		1.5 (38)	2.0 (51)	3.0 (76)	4.0 (102)	5.0 (127)	6.0 (152)	7.0 (178)	8.0 (203)	10 (254)	12 (305)	14 (356)	26 (660)
Trade Size In. (mm)	Pipe O.D. In. (mm)												
0.5 (13)	0.840 (21)	0.3 (4.9)	0.6 (9.8)	1.6 (26.2)	3.0 (49.2)	4.8 (78.7)	6.9 (113.0)	9.5 (155.7)	12.4 (203.2)	19.5 (319.5)	28.1 (460.5)	38.3 (627.6)	132.6 (2173)
1.0 (25)	1.315 (33)	0.1 (1.6)	0.4 (6.6)	1.4 (22.9)	2.8 (45.9)	4.6 (75.4)	6.7 (109.8)	9.3 (152.4)	12.2 (200.0)	19.3 (316.3)	27.9 (457.2)	38.1 (624.3)	132.4 (2170)
1.5 (38)	1.900 (48)			1.1 (18.0)	2.4 (39.3)	4.2 (68.8)	6.4 (104.9)	8.9 (145.8)	11.9 (195.0)	18.9 (309.0)	27.6 (452.3)	37.8 (619.4)	132.0 (2163)
2.0 (51)	2.375 (60)			0.7 (11.5)	2.0 (32.8)	3.8 (62.3)	6.0 (98.3)	8.5 (139.2)	11.5 (188.4)	18.5 (309.7)	27.2 (445.7)	37.4 (568.6)	131.6 (2157)
2.5 (64)	2.875 (73)			0.1 (1.6)	1.5 (24.6)	3.3 (54.1)	5.4 (88.4)	8.0 (131.1)	10.9 (178.6)	18.0 (295.0)	26.7 (437.5)	36.9 (604.7)	131.1 (2148)
3.0 (76)	3.500 (79)				0.7 (11.5)	2.5 (41.0)	4.7 (77.0)	7.2 (118.0)	10.2 (167.1)	17.2 (281.9)	25.9 (424.4)	36.1 (591.6)	130.3 (2135)
3.5 (89)	4.000 (102)					1.8 (29.5)	3.9 (63.9)	6.5 (106.5)	9.4 (154.0)	16.5 (270.4)	25.1 (411.3)	35.3 (578.5)	129.6 (2124)
4.0 (102)	4.500 (114)					0.8 (13.1)	3.0 (49.2)	5.6 (91.8)	8.5 (139.3)	15.6 (255.6)	24.2 (396.6)	34.4 (563.7)	128.7 (2109)
6.0 (152)	6.625 (168)	*Different Sealant Depth? 1/2" (12.7) Multiply by 2 5/8" (15.9) Multiply by 2.5 1" (25.4) Multiply by 4 1-1/4" (31.8) Multiply by 5						1.1 (18.0)	4.0 (65.5)	11.1 (181.9)	19.7 (322.8)	29.9 (490.0)	124.2 (2035)
8.0 (203)	8.625 (219)								4.9 (80.3)	13.6 (222.9)	23.8 (390.0)	118.0 (1934)	
10.0 (254)	10.750 (273)									5.6 (91.8)	15.8 (259.0)	110.0 (1803)	
12.0 (305)	12.750 (324)										6.6 (108.1)	100.8 (1652)	
24.0 (610)	24.000 (610)												19.6 (321.2)

\*Different Sealant Depth?  
 1/2" (12.7) Multiply by 2  
 5/8" (15.9) Multiply by 2.5  
 1" (25.4) Multiply by 4  
 1-1/4" (31.8) Multiply by 5

**Fig. 3: ELECTRICAL, DATA OR COMMUNICATIONS - Gypsum Walls**



**UL System No. W-L-3169**

F Rating: 1, 2 Hr • T Rating: 1/4 and 3/4

Up to 4-1/2" cable bundle

Annulus: 0" to 1/2" • Sealant: 5/8"

**UL System No. W-L-2241**

F Rating: 1, 2 Hr • T Rating: 0, 1/4, 1, 1-3/4

<2" Rigid PVC or ENMT, CPVC, ABS

Annulus: 0-1" • Sealant 5/8"

**TABLE A: APPLICATIONS**

**TESTED AND CLASSIFIED FOR FIRE RESISTANCE**

- **Metallic Pipes** including steel, iron, or copper pipe and tubing.
- **Nonmetallic Pipes, Conduits & Tubing** including PVC, CPVC, ABS, and PEX.
- **Electrical & Electronic Cabling** including service entrance, power distribution, computer, telephone, and television.
- **Metal Ductwork** including HVAC, bath and dryer vents.
- **Insulated Pipes** including heating, cooling, and condensation applications.
- **Complete Wood Floor firestopping package** for electrical, plumbing, HVAC, telephone, and television.

## INSTALLATION INSTRUCTIONS

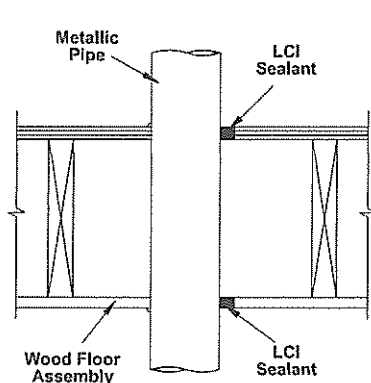
**GENERAL:** Areas to be protected must be clean and free of oil, loose dirt, rust or scale. Installation temperatures must be between 35°F (2°C) and 100°F (38°C). Allow product to dry a minimum of 24 hours before exposure to moisture.

**SYSTEM SELECTION:** Selection of an appropriate firestop system design is critical to the fire protection process. Space limitations preclude highly detailed information pertaining to individual application systems. Please consult the Product & Application Guide as well as the UL® Fire Resistance Directory for additional information.

**FORMING:** Some installations may require forming as either an integral part of the system or as an option to facilitate installation. In systems where forming is required, mineral wool batts with a minimum nominal density of 4 PCF (64 kg/m<sup>3</sup>) are generally required. Cut forming material oversize to allow for tight packing. Position forming material to allow for the proper depth of fill material.

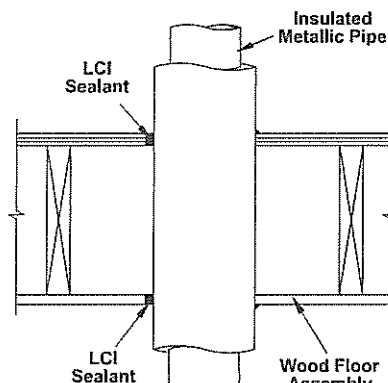
**FILL MATERIAL:** SpecSeal® LCI Sealant may be installed by caulking using a standard caulking gun or from bulk containers using a bulk loading caulk gun, or by manually troweling using a mason's trowel or putty knife. If the sealant tends to pull back from a surface, clean the surface with a damp rag or sponge and reapply. Work sealant into all areas exercising care to eliminate voids or seams. The surface of the sealant can be smoothed using a putty knife dipped in water. Adding water to the sealant itself is not recommended. Sealant (when dry) may be painted using most non-solvent based paints.

Fig. 4: BARE & INSULATED METALLIC PIPES - Wood Floor Assemblies



**UL System No. F-C-1074**

F Rating: 1 & 2 Hr • T Rating: 1/4, 1/2 and 1 Hr  
Steel, Iron or Copper: 4" • Chase wall optional.  
Annulus: 0" to 1" • Sealant: 5/8" bottom, 3/4" top



**UL System No. F-C-5043**

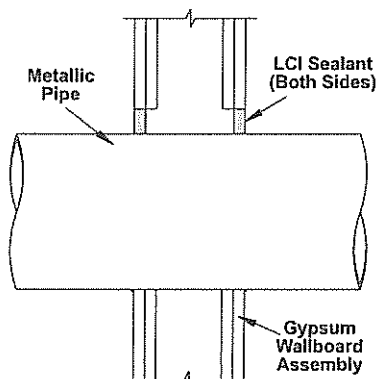
F Rating: 1 & 2 Hr • T Rating: 3/4 and 1 Hr  
Steel, Iron or Copper: 4"  
Pipe covering: 1" Fiber Glass, Mineral fiber or AB/PVC • Chase wall optional.  
Annulus: 0" to 1" • Sealant: 5/8" bottom, 3/4" top.

In gypsum wallboard penetrations, apply a minimum cove bead of 1/4" (6 mm) at the interface of the penetrant with both exterior wall surfaces.

**SMOKE SEALING:** In some applications including firestop collars, SpecSeal® LCI Sealant is recommended as a smoke seal. It is suggested in these applications that the sealant be applied to both sides of walls. In floor applications, a sealing bead is suggested top and bottom.

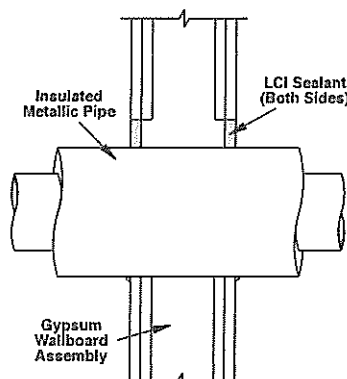
**LIMITATIONS:** SpecSeal® LCI Sealant is water-based and cures through the evaporation of water. Low temperatures as well as high humidity may retard drying. Non-porous or impermeable backing materials, plates, or coatings may retard the drying process. Do not paint or seal in any way that prevents contact with air until sealant has dried through completely. This product has been designed to be safe with plastics and has been used extensively and successfully with a variety of different types of plastic pipes, tubes, and plastic cable insulations. Variations in these materials however, make it impossible to guarantee compatibility. STI strongly recommends that the user consult with the manufacturer of the pipe, tubing, or cable in question regarding any known sensitivities or potential restrictions before applying this product.

Fig. 5: BARE & INSULATED METALLIC PIPES - Gypsum Walls



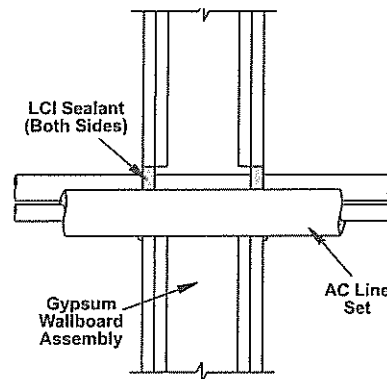
**UL System No. W-L-1222**

F Rating: 1, 2 Hr • T Rating: 1/4, 3/4, 1 Hr  
Steel or Iron pipe: 8", Copper pipe: 4"  
Annulus: 0" to 2" • Sealant: 5/8"



**UL System Nos. W-L-5121, W-L-5122**

F Rating: 1, 2 Hr • T Rating: 1 Hr & 1/4 Hr  
Steel or Iron pipe: 6", Copper pipe: 4"  
Pipe covering: Max. 2" fiber glass, 3/4" AB/PVC or 2" mineral fiber  
Annulus: 0" to 1-1/2" • Sealant: 5/8"



**UL System No. W-L-8025**

F Rating: 1, 2 Hr • T Rating: 1/4 Hr  
AC Line Set: Two copper tubes, one with 3/4" AB/PVC and thermostat wire  
Annulus: 0" to 1" • Sealant 5/8"





## MAINTENANCE

No maintenance is normally required, however a periodic inspection of rated barriers is recommended to make sure that any new openings, modifications of previously installed firestops, or areas exhibiting physical damage, have been properly sealed or repaired. Subsequent sealing or repairs should be accomplished using SpecSeal® products per the original approved design.

**RETROFIT:** When adding or removing penetrants, care should be taken to minimize damage to the seal. Reseal using SpecSeal® products per the approved design. **NOTE:** New penetrants of a different nature than the original design may require a totally new firestop design or extensive modifications to the existing design. Reseal all openings as per the requirements of the modified design.

## TECHNICAL SERVICE

Specified Technologies Inc. provides toll free technical support to assist in product selection and appropriate installation design. UL Systems, Material Safety Data Sheets and other technical information is available through the Technical Library at [www.stifirestop.com](http://www.stifirestop.com).

## PRECAUTIONARY INFORMATION

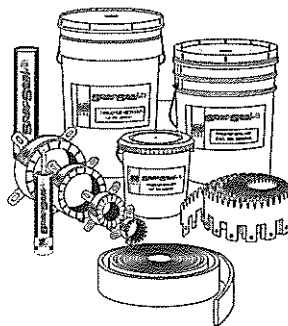
Consult Material Safety Data Sheet for additional information on the safe handling and disposal of this material.

## AVAILABILITY

SpecSeal® Series LCI Sealant is available from authorized STI distributors. Consult factory or website for the names and locations of the nearest sales representatives or distributors.

## ORDERING INFORMATION

CAT. NO.	DESCRIPTION	
LCI300	Sealant 10.1 oz Tube	18.2 Cu In (300 ml)
LCI305	Sealant 5 Gal Pail	1,155 Cu In (19.0 L)
LCI320	Sealant 20 oz Sausage	36 Cu in. (592 ml)
LCI329	Sealant 29 oz Quart Tube	52 Cu in. (858 ml)



### Additional SpecSeal Products...

#### Series SSS Sealant

The industry's most versatile sealant provides the firestopping solutions for a wide range of combustible and noncombustible applications. Water-based intumescent sealant expands up to 8X!

#### Intumescent Wrap Strips

Three grades of intumescent wrap strips provide an unmatched combination of flexibility, economy, and expansion (up to 30X). Systems for plastic pipes including FR Polypropylene up to 8" trade size!

#### SSC & LCC Firestop Collars

Easy to install, economical protection for ABS and PVC pipes (both solid and foam core) as well as CPVC, PVDF, and FRPP. LCC Collars are available up to 4" and SSC Collars are available up to 6" trade size.

#### Firestop Mortar

Lightweight, versatile and economical! The best choice for large or complex installations.

#### SSP Firestop Putty

Available both in bar form and in pads, putty provides easy retrofit for through-penetrations and economical protection for electrical boxes.

#### SIL Silicones

Sealants and foam for through-penetrations and construction joints. Unexcelled aging characteristics and flexibility.

#### Elastomeric Joint Seals

Economical products for sealing construction joints. Choose caulk or spray applied products tested to UL2079.

**IMPORTANT NOTICE:** All statements, technical information, and recommendations contained herein are based upon testing believed to be reliable, but the accuracy and completeness thereof is not guaranteed.

**LIMITED WARRANTY:** STI warrants that its products will be free of defects for one year from the date of purchase. In the event a product does not conform to this warranty, the sole and exclusive remedy is, at STI's option, replacement of the product or refund of the purchase price. The warranty provided herein shall be void and of no effect in the event that the product is not installed in accordance with STI's published instructions, listed systems and applicable building and safety codes. **THIS WARRANTY IS IN LIEU OF ALL OTHER REPRESENTATIONS AND EXPRESSED OR IMPLIED WARRANTIES** (including the implied warranties of merchantability or fitness for a particular use) **AND UNDER NO CIRCUMSTANCES SHALL STI BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, INCLUDING, WITHOUT LIMITATION, ANY LOSS OF REVENUE, PROFIT OR USE.** Prior to use, the user shall determine the suitability of the product for its intended use, and the user assumes all risks and liability for subsequent use. No person other than an officer of STI is authorized to bind STI to any other warranty for any product for which this warranty is issued.

MADE IN THE USA – COPYRIGHT © 2014 SPECIFIED TECHNOLOGIES INC.



Specified  
Technologies  
Inc.

Specified Technologies Inc. • 210 Evans Way, Somerville, NJ 08876 USA • Phone: 800.992.1180 • Fax: 908.526.9523





## 5434 Apartments: EJ #2

### 2-Hour Stair Assembly

Client Name: Main Street Development

Client Address: 5331 SW Macadam Ave, Suite 258 Portland, Oregon 97239

Date: 12/5/2019



# Table of Contents

1	Project Overview .....	3
2	Applicable Codes, Standards, and Guides .....	3
3	Discussion .....	3
3.1	Approach .....	3
3.2	Proposed Design .....	3
4	Assembly Analysis .....	5
5	Conclusion .....	6

## 1 PROJECT OVERVIEW

---

The 5434 Apartments is a new Type V-A construction residential apartment building with an occupied basement and four above-grade floor levels. The design includes a stair bracket support required to maintain the membrane protection of the wall. The current proposed design does not meet a listed/tested fire resistive assembly.

Code Unlimited has been asked to provide an Engineering Judgments (EJ) letter and an Appeal for this condition.

## 2 APPLICABLE CODES, STANDARDS, AND GUIDES

---

- 2014 Oregon Fire Code 2014 Oregon Structural Specialty Code (OSSC) including Appendix N, which refers to International Fire Code

## 3 DISCUSSION

---

### 3.1 Approach

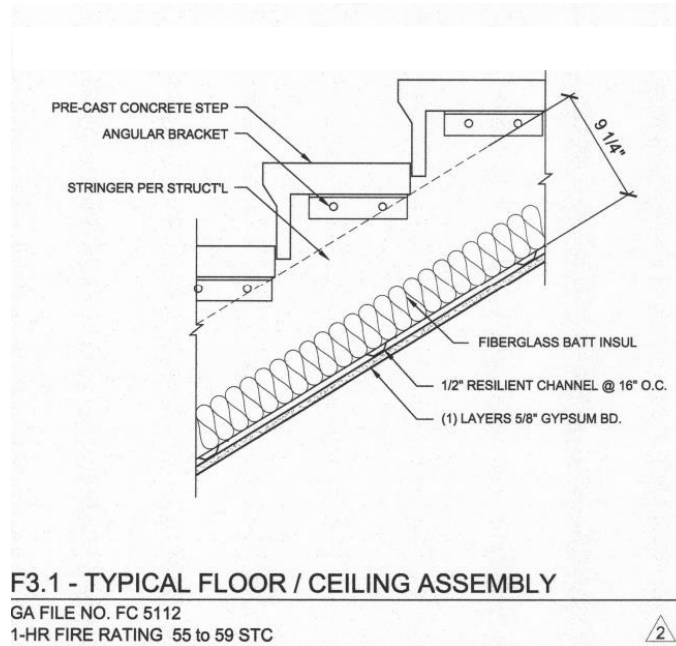
- The proposed floor assembly has been analyzed in accordance with 2014 OSSC §703.3 **Alternative Methods for Determining Fire Resistance**.
- The proposed member assembly is comparable to a listed assembly, GA file No FC 5240

### 3.2 Proposed Design

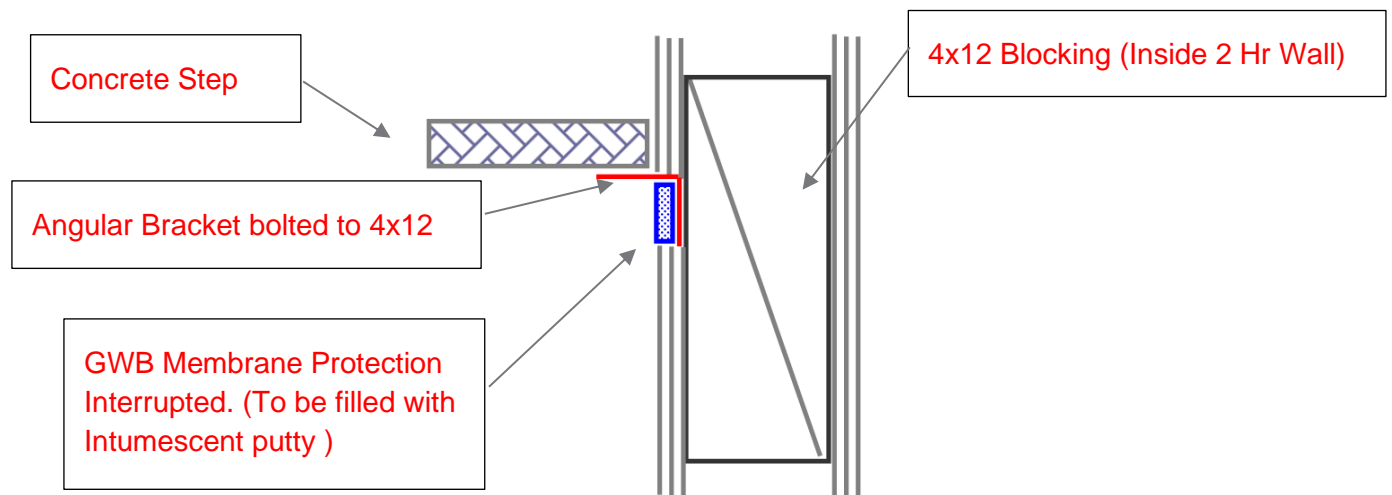
FLS Comment #2 (Summarized) Call out the intumescent caulking in details 6&7/A7.1.

The proposed design is to install steel brackets to support concrete stairs. The brackets are to be lag bolted to 4x12 (4" Walls) or 6x12 (6" Wall). For the purpose of our analysis we have focused on the thinner 4" wall. **[Figure 1b]**.





**Figure 1a:** Stair Section (Typical steel bracket location)



**Figure 1b:** Bracket (Transverse) Section

## 4 ASSEMBLY ANALYSIS

---

The proposed assembly is required to ensure 2-hour assembly is continuous, but the membrane protection has been interrupted by the steel bracket **[Figure 1b]**.

Intumescent fire caulking can be troweled into this space to ensure a gap will not open during a fire. Solid wood blocking will contain a fire spread, but a potential gap membrane can be filled with expanding fire caulking as detailed in Fig. 1b.

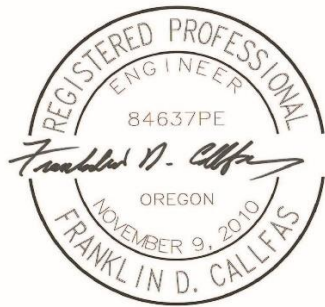


## 5 CONCLUSION

---

I have reviewed the proposed stair wall assembly. As detailed above, the membrane protection of the listed wall will be interrupted, Fire Caulking will be installed to close the gap and ensure continuity.

The proposed design will meet the requirement of OSSC 714.



EXPIRES 12-31-19

Franklin Callfas

Principal/Fire Protection Engineer

Code Unlimited



# 5434 Apartments: EJ #1

## 1-hour Corridor Ceiling Assembly

Client Name: Main Street Development

Client Address: 5331 SW Macadam Ave, Suite 258 Portland, Oregon 97239

Date: 12/5/2019

# Table of Contents

1	Project Overview .....	3
2	Applicable Codes, Standards, and Guides .....	3
3	Discussion.....	3
3.1	Approach.....	3
3.2	Proposed Design.....	3
4	Assembly Analysis.....	4
5	Summary.....	5
6	Conclusion .....	6

## 1 PROJECT OVERVIEW

---

The 5434 Apartments is a new Type V-A construction residential apartment building with an occupied basement and four above-grade floor levels. The design includes 4-foot-wide corridors with a proposed alternate/modified fire-rated floor/ceiling assembly. The current proposed design does not meet a listed/tested fire resistive assembly.

Code Unlimited has been asked to provide an Engineering Judgments (EJ) letter and an Appeal for this condition.

## 2 APPLICABLE CODES, STANDARDS, AND GUIDES

---

- 2014 Oregon Fire Code 2014 Oregon Structural Specialty Code (OSSC) including Appendix N, which refers to International Fire Code

## 3 DISCUSSION

---

### 3.1 Approach

- The proposed floor assembly has been analyzed in accordance with 2014 OSSC §703.3 **Alternative Methods for Determining Fire Resistance**.
- The proposed member assembly is comparable to a listed assembly, GA file No FC 5240

### 3.2 Proposed Design

The proposed modified ceiling design is to be utilized for the 48 inch wide corridors due to conflicts with mechanical piping installed above the ceiling. The proposed floor/ceiling assembly consists of I joists placed on 16" centers with 2 x 4 wooden ceiling support blocking (placed on their sides) at 24" centers, fixed underneath across the corridor. The blocking is installed below the I-joists by approximately 6" creating a small void. This space along with the area between the joists will be completely filled with glass fiber insulation. The underside of the blocking will be protected by two layers of 5/8 inch type X gypsum wallboard. For the purpose of our analysis we have compared the proposed design to the listed assembly, GA file No FC 5240 **[Figure 2]**.



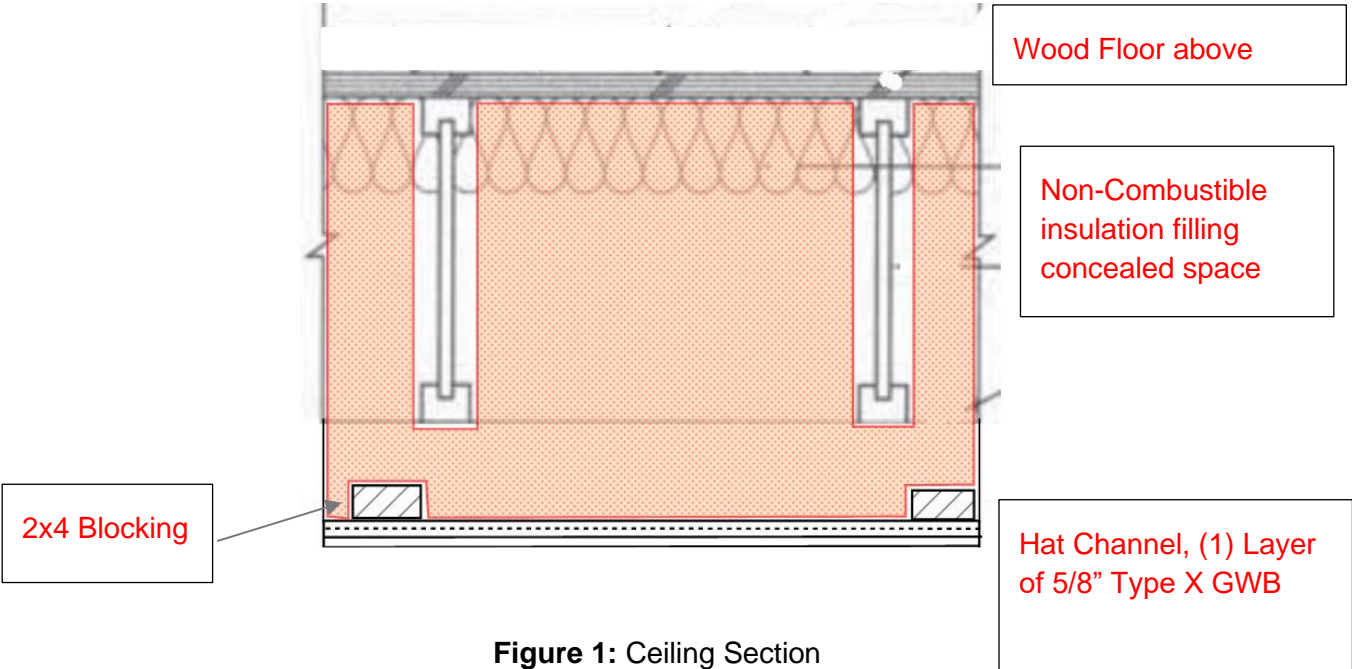


Figure 1: Ceiling Section

4 ASSEMBLY ANALYSIS

The proposed assembly includes 2x4 wood blocking with one layer of 5/8" Type X gypsum wallboard. The key protection property identified is the increase in the thickness of the Gypsum wallboard from 1/2 inch Type X gypsum wallboard, the introduction of a large insulated cavity. The proposed floor assembly provides for a minimum 1-hour rated equivalent protection per GA-FC5120.

GA FILE NO. FC 5120	GENERIC	1 HOUR FIRE	50 to 54 STC SOUND
WOOD JOISTS, GYPSUM WALLBOARD, RESILIENT CHANNELS, GLASS FIBER INSULATION			
One layer 1/2" type X gypsum wallboard or gypsum veneer base applied at right angles to resilient furring channels 24" o.c. with 1" Type S drywall screws 8" o.c. at ends and 12" o.c. at intermediate furring channels. Gypsum board end joints located midway between continuous channels and attached to additional pieces of channel 64" long with screws 8" o.c. Resilient furring channels applied at right angles to 2 x 10 wood joists 18" o.c. with 6d coated nails, 17/8" long, 0.085" shank, 1/4" heads, two per joist. Wood joists supporting 5/8" interior plywood with exterior glue subfloor and 3/8" particle board, 1.5 psf. 3 1/2" glass fiber insulation batts, 0.7 pcf, friction fit in joist cavities supported alternately every 12" by wire rods and resilient furring channels.			
Sound tested with carpet and pad and with insulation stapled to joists.		Approx. Ceiling Weight: 2 psf Fire Test: FM FC-181, 8-31-72 Sound Test: G&H OC-3MT, 10-13-71 IIC & Test: (73 C & P) G&H OC-3MT, 10-13-71	

Figure 2: GA System No 5120

**Table 1: Assembly Comparison Table**

<b>Element</b>	<b>GA Assembly Design No. FC 5120</b>	<b>Proposed Assembly</b>
1. Joists	2 x 10 wood joists 16" on center.	2x4 ceiling support spaced 24" on center with glass fiber insulation filling the joist spaces.
2. Gypsum Board	One 1/2" inch Type X gypsum wallboard at right angles to resilient furring channels 24" on center.	One layer of 5/8" Type X gypsum wallboard at right angles to 1/2" resilient furring channels, <b>16" on center</b>  Ceiling provides one-hour fire resistance protection for framing
3. Ceiling cavity	No ceiling cavity is provided,	A <b>maximum</b> 2-inch deep gap between insulation and floor above will be allowed in an unsprinklered cavity per NFPA 13.
<b>Fire-Resistance Rating</b>	<b>1-Hour</b>	<b>1-Hour (minimum)</b>

## 5 SUMMARY

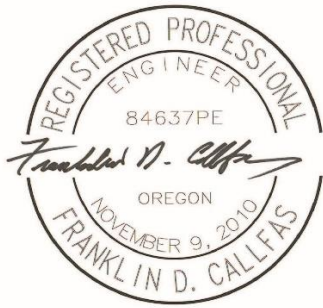
As detailed above, the corridor ceiling assembly meets the minimum requirements of GA FC5120. The RC Channel spacing will be reduced from 24" o/c to 16" o/c for the proposed design, while the 2x blocking will be installed at 24" o/c (20.5" between edges) to allow space for the installing of insulation. Sprinklers will not be required in the concealed space, as the void will be entirely filled with non-combustible insulation.

## 6 CONCLUSION

---

I have reviewed the proposed floor assembly against GA FC 5120 listed assembly.

The proposed design will exceed the required 1-hour rating as compared and detailed in this letter with GA Assembly Design No. FC 5120.



EXPIRES 12-31-19

Franklin Callfas

Principal/Fire Protection Engineer

Code Unlimited





EJ#2

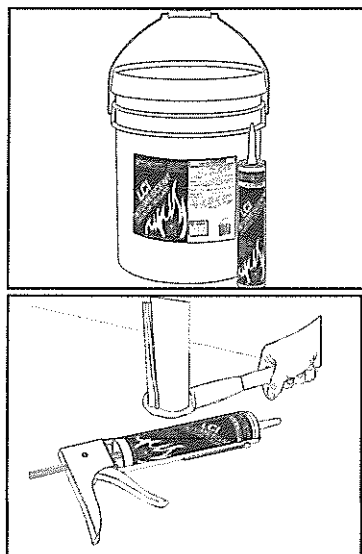




## SERIES LCI INTUMESCENT SEALANT

### APPLICATIONS

SpecSeal® LCI Sealant has a broad application base designed to seal a wide variety of common penetrations and construction joints. Penetrant types include insulated and non-insulated metallic pipes and tubes, non-metallic pipes and tubes, and common electrical service and power distribution, telephone, data, and TV cabling. This product is also used in conjunction with other SpecSeal® Products such as SpecSeal® Firestop Collars and Wrap Strips to protect larger plastic pipes. See Table A for a summary application list.



### PRODUCT DESCRIPTION

SpecSeal® LCI Sealant is a versatile and economical intumescent sealant that has excellent caulking properties as well as high build properties on vertical or overhead surfaces. This single grade may be caulked (standard cartridge or bulk loaded), knifed or troweled. In addition, SpecSeal® LCI Sealant does not contain PCB's or asbestos.

SpecSeal® LCI Sealant is storage stable (when stored according to the manufacturer's recommendations), and will not separate or shrink when dried. SpecSeal® Series LCI Sealant will adhere to all common construction and penetrant materials and contains no solvents that might adversely effect plastic pipes or cable jackets.

**EJ#1-Sealant**

#### FEATURES

- **Economical:** High performance without the high price!
- **Highly Intumescent:** Expands up to 8 times.
- **Excellent Smoke Seal**
- **Water Resistant :** Will not re-emulsify when dry.
- **Water-Based** for easy installation, cleanup, and disposal.
- **Acoustically Tested:** Reduces noise transmission
- **Safe...**Low VOC's, No Solvents, Non-Halogenated
- **Paintable**

### PERFORMANCE

SpecSeal® LCI Sealant is the basis for systems that meet the exacting criteria of ASTM E814 (UL1479) and ASTM E1966 (UL2079) as well as to the time-temperature requirements of ASTM E119 (UL263). LCI provides up to a 4-hour fire rating for typical service penetrations through concrete or wood floors, concrete or masonry walls, as well as gypsum board walls. SpecSeal® LCI Sealant meets Class A finish requirements for Flame Spread and Smoke Development when tested in accordance with ASTM E84 (UL723). Meets or exceeds the requirements of ASTM C834, Type C, Grade 0. SpecSeal® LCI Sealant is also acoustically tested, demonstrating excellent sound attenuation properties.

### PHYSICAL PROPERTIES

Properties	Series LCI
Color	Red
Odor	Mild Latex
Density	9.0 lb/gal (1.08 kg/L)
pH	9.0
Solids Content By Weight	80%
Solids Content By Volume	66.9%
In Service Temperature	≤ 185°F (85°C)
Flame Spread	0*
Smoke Developed	0*
STC Rating (ASTM E90/ASTM C919)	62
VOC Content (EPA Method 24/ASTM D3960)	327g/L
Shelf Life	2 yrs
Volume Expansion	10X Free Expansion
Storage Temp.	40°F (4°C) - 95°F (35°C)

\* Tested to ASTM E84 (UL723) at 14% surface coverage (modified test for sealants and caulks)



FBC™ System Compatible indicates that this product has been tested, and is monitored on an ongoing basis, to assure its chemical compatibility with FlowGuard Gold®, BlazeMaster® and Corzan® pipe and fittings. FBC, FlowGuard Gold, BlazeMaster and Corzan are licensed trademarks of The Lubrizol Corporation.



FILL, VOID OR CAVITY MATERIALS FOR USE IN JOINT SYSTEMS AND THROUGH-PENETRATION FIRESTOP SYSTEMS. SEE UL FIRE RESISTANCE DIRECTORY, 3L73



### SPECIFICATIONS

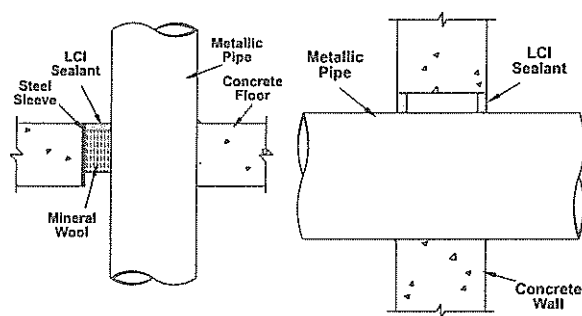
The firestopping sealant shall be a water-resistant, intumescent latex sealant. The sealant when exposed to high heat or flame shall exhibit a free expansion of up to 10 times its original volume. The firestopping sealant shall contain no water soluble nor hygroscopic ingredients and shall be acoustically tested. The sealant shall be UL Classified and/or FM approved and tested to the requirements of ASTM E814 (UL1479), CAN/ULC S115 and shall meet Class A finish requirements when tested in accordance with ASTM E84 (UL723).

### SPECIFIED DIVISIONS

- |         |       |   |
|---------|-------|---|
| DIV. 7  | 07840 | Through-Penetration Firestopping                            |
| DIV. 13 | 13900 | Special Construction Fire Suppression & Supervisory Systems |
| DIV. 15 | 15250 | Mechanical Insulation – Fire Protection                     |
| DIV. 16 | 16050 | Basic Electrical Materials & Methods                        |



**Fig 1: METALLIC PIPES - Concrete/Masonry Floors & Walls**



**UL System No. C-AJ-1353**

F Rating: 3 Hr • T Rating: 0 Hr

Steel or Iron Pipe: <12", Copper Pipe: <4"

Annulus: 0" to 2"

Sealant Depth: 1/4"

Forming Material: Nom 4 pcf mineral wool (2 1/4" Depth)

**UL System No. W-J-1098**

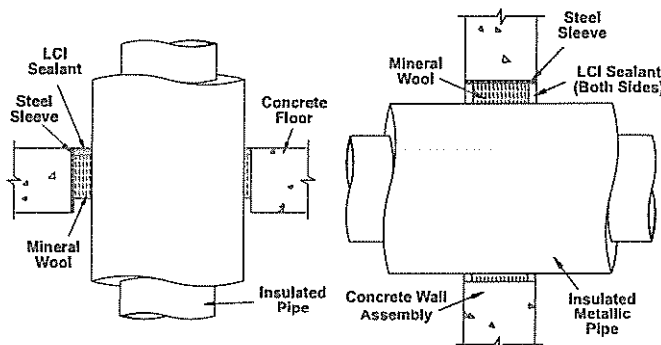
F Rating: 2 Hr • T Rating: 1/4, 3/4 & 1 Hr

Steel or Iron Pipe: <8", Copper Pipe: <4"

Annulus: 0" to 2"

Sealant Depth: 5/8"

**Fig 2: INSULATED METALLIC PIPES - Concrete/Masonry Floors & Walls**



**UL System No. C-AJ-5138**

F Rating: 2 Hr • T Rating: 3/4 or 1 Hr

Steel or Iron Pipe: 6", Copper Pipe: 4"

Pipe Covering: Max. 2" fiber glass or mineral wool pipe insulation.

Annulus: 1/4" to 1-5/8" • Sealant: 1/2"

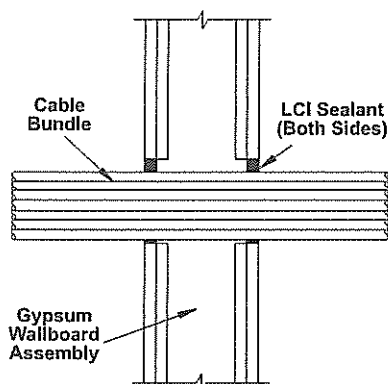
Forming: Nom. 4 pcf mineral wool (3" depth)

**SEALANT REQUIREMENTS IN CUBIC INCHES PER 1/4 INCH OF INSTALLED DEPTH\***

		Diameter of Opening - In. (mm)											
PIPE SIZE		1.5 (38)	2.0 (51)	3.0 (76)	4.0 (102)	5.0 (127)	6.0 (152)	7.0 (178)	8.0 (203)	10 (254)	12 (305)	14 (356)	26 (660)
Trade Size In. (mm)	Pipe O.D. In. (mm)												
0.5 (13)	0.840 (21)	0.3 (4.9)	0.6 (9.8)	1.6 (26.2)	3.0 (49.2)	4.8 (78.7)	6.9 (113.0)	9.5 (155.7)	12.4 (203.2)	19.5 (319.5)	28.1 (460.5)	38.3 (627.6)	132.6 (2173)
1.0 (25)	1.315 (33)	0.1 (1.6)	0.4 (6.6)	1.4 (22.9)	2.8 (45.9)	4.6 (75.4)	6.7 (109.8)	9.3 (152.4)	12.2 (200.0)	19.3 (316.3)	27.9 (457.2)	38.1 (624.3)	132.4 (2170)
1.5 (38)	1.900 (48)			1.1 (18.0)	2.4 (39.3)	4.2 (68.8)	6.4 (104.9)	8.9 (145.8)	11.9 (195.0)	18.9 (309.0)	27.6 (452.3)	37.8 (619.4)	132.0 (2163)
2.0 (51)	2.375 (60)			0.7 (11.5)	2.0 (32.8)	3.8 (62.3)	6.0 (98.3)	8.5 (139.2)	11.5 (188.4)	18.5 (309.7)	27.2 (445.7)	37.4 (568.6)	131.6 (2157)
2.5 (64)	2.875 (73)			0.1 (1.6)	1.5 (24.6)	3.3 (54.1)	5.4 (88.4)	8.0 (131.1)	10.9 (178.6)	18.0 (295.0)	26.7 (437.5)	36.9 (604.7)	131.1 (2148)
3.0 (76)	3.500 (79)				0.7 (11.5)	2.5 (41.0)	4.7 (77.0)	7.2 (118.0)	10.2 (167.1)	17.2 (281.9)	25.9 (424.4)	36.1 (591.6)	130.3 (2135)
3.5 (89)	4.000 (102)					1.8 (29.5)	3.9 (63.9)	6.5 (106.5)	9.4 (154.0)	16.5 (270.4)	25.1 (411.3)	35.3 (578.5)	129.6 (2124)
4.0 (102)	4.500 (114)					0.8 (13.1)	3.0 (49.2)	5.6 (91.8)	8.5 (139.3)	15.6 (255.6)	24.2 (396.6)	34.4 (563.7)	128.7 (2109)
6.0 (152)	6.625 (168)	*Different Sealant Depth? 1/2" (12.7) Multiply by 2 5/8" (15.9) Multiply by 2.5 1" (25.4) Multiply by 4 1-1/4" (31.8) Multiply by 5						1.1 (18.0)	4.0 (65.5)	11.1 (181.9)	19.7 (322.8)	29.9 (490.0)	124.2 (2035)
8.0 (203)	8.625 (219)								4.9 (80.3)	13.6 (222.9)	23.8 (390.0)	118.0 (1934)	
10.0 (254)	10.750 (273)									5.6 (91.8)	15.8 (259.0)	110.0 (1803)	
12.0 (305)	12.750 (324)										6.6 (108.1)	100.8 (1652)	
24.0 (610)	24.000 (610)												19.6 (321.2)

\*Different Sealant Depth?  
 1/2" (12.7) Multiply by 2  
 5/8" (15.9) Multiply by 2.5  
 1" (25.4) Multiply by 4  
 1-1/4" (31.8) Multiply by 5

**Fig. 3: ELECTRICAL, DATA OR COMMUNICATIONS - Gypsum Walls**

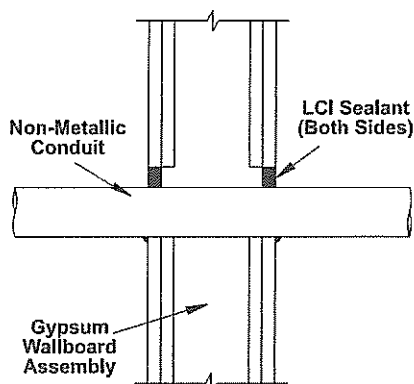


**UL System No. W-L-3169**

F Rating: 1, 2 Hr • T Rating: 1/4 and 3/4

Up to 4-1/2" cable bundle

Annulus: 0" to 1/2" • Sealant: 5/8"



**UL System No. W-L-2241**

F Rating: 1, 2 Hr • T Rating: 0, 1/4, 1, 1-3/4

<2" Rigid PVC or ENMT, CPVC, ABS

Annulus: 0-1" • Sealant 5/8"

**TABLE A: APPLICATIONS**

**TESTED AND CLASSIFIED FOR FIRE RESISTANCE**

- **Metallic Pipes** including steel, iron, or copper pipe and tubing.
- **Nonmetallic Pipes, Conduits & Tubing** including PVC, CPVC, ABS, and PEX.
- **Electrical & Electronic Cabling** including service entrance, power distribution, computer, telephone, and television.
- **Metal Ductwork** including HVAC, bath and dryer vents.
- **Insulated Pipes** including heating, cooling, and condensation applications.
- **Complete Wood Floor firestopping package** for electrical, plumbing, HVAC, telephone, and television.

## INSTALLATION INSTRUCTIONS

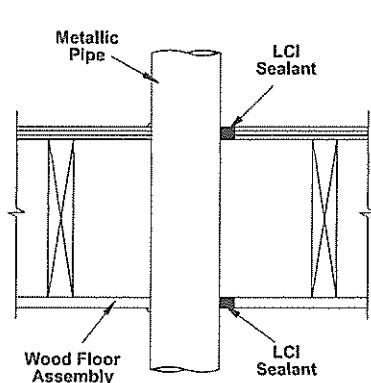
**GENERAL:** Areas to be protected must be clean and free of oil, loose dirt, rust or scale. Installation temperatures must be between 35°F (2°C) and 100°F (38°C). Allow product to dry a minimum of 24 hours before exposure to moisture.

**SYSTEM SELECTION:** Selection of an appropriate firestop system design is critical to the fire protection process. Space limitations preclude highly detailed information pertaining to individual application systems. Please consult the Product & Application Guide as well as the UL® Fire Resistance Directory for additional information.

**FORMING:** Some installations may require forming as either an integral part of the system or as an option to facilitate installation. In systems where forming is required, mineral wool batts with a minimum nominal density of 4 PCF (64 kg/m<sup>3</sup>) are generally required. Cut forming material oversize to allow for tight packing. Position forming material to allow for the proper depth of fill material.

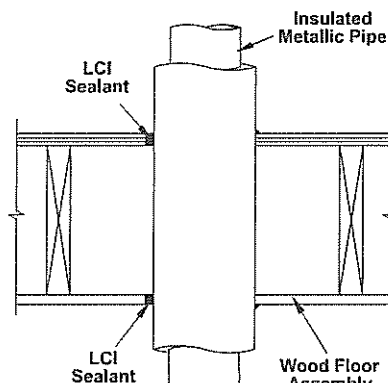
**FILL MATERIAL:** SpecSeal® LCI Sealant may be installed by caulking using a standard caulking gun or from bulk containers using a bulk loading caulk gun, or by manually troweling using a mason's trowel or putty knife. If the sealant tends to pull back from a surface, clean the surface with a damp rag or sponge and reapply. Work sealant into all areas exercising care to eliminate voids or seams. The surface of the sealant can be smoothed using a putty knife dipped in water. Adding water to the sealant itself is not recommended. Sealant (when dry) may be painted using most non-solvent based paints.

Fig. 4: BARE & INSULATED METALLIC PIPES - Wood Floor Assemblies



**UL System No. F-C-1074**

F Rating: 1 & 2 Hr • T Rating: 1/4, 1/2 and 1 Hr  
Steel, Iron or Copper: 4" • Chase wall optional.  
Annulus: 0" to 1" • Sealant: 5/8" bottom, 3/4" top



**UL System No. F-C-5043**

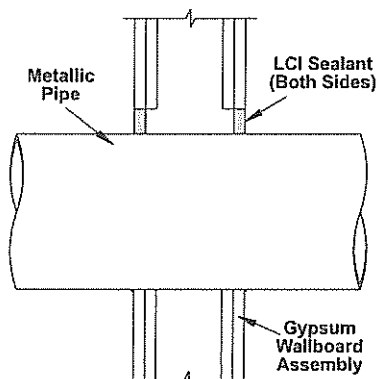
F Rating: 1 & 2 Hr • T Rating: 3/4 and 1 Hr  
Steel, Iron or Copper: 4"  
Pipe covering: 1" Fiber Glass, Mineral fiber or AB/PVC • Chase wall optional.  
Annulus: 0" to 1" • Sealant: 5/8" bottom, 3/4" top.

In gypsum wallboard penetrations, apply a minimum cove bead of 1/4" (6 mm) at the interface of the penetrant with both exterior wall surfaces.

**SMOKE SEALING:** In some applications including firestop collars, SpecSeal® LCI Sealant is recommended as a smoke seal. It is suggested in these applications that the sealant be applied to both sides of walls. In floor applications, a sealing bead is suggested top and bottom.

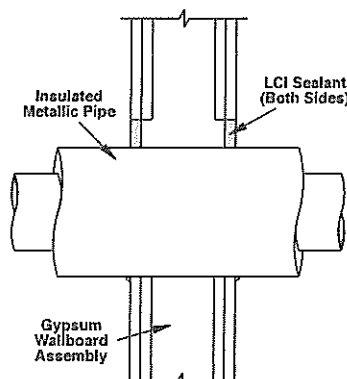
**LIMITATIONS:** SpecSeal® LCI Sealant is water-based and cures through the evaporation of water. Low temperatures as well as high humidity may retard drying. Non-porous or impermeable backing materials, plates, or coatings may retard the drying process. Do not paint or seal in any way that prevents contact with air until sealant has dried through completely. This product has been designed to be safe with plastics and has been used extensively and successfully with a variety of different types of plastic pipes, tubes, and plastic cable insulations. Variations in these materials however, make it impossible to guarantee compatibility. STI strongly recommends that the user consult with the manufacturer of the pipe, tubing, or cable in question regarding any known sensitivities or potential restrictions before applying this product.

Fig. 5: BARE & INSULATED METALLIC PIPES - Gypsum Walls



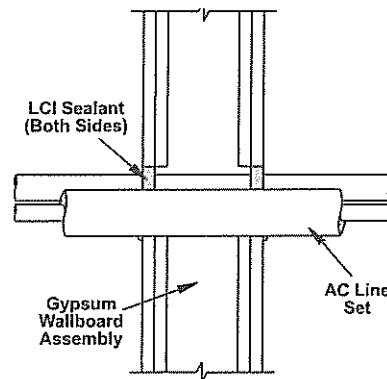
**UL System No. W-L-1222**

F Rating: 1, 2 Hr • T Rating: 1/4, 3/4, 1 Hr  
Steel or Iron pipe: 8", Copper pipe: 4"  
Annulus: 0" to 2" • Sealant: 5/8"



**UL System Nos. W-L-5121, W-L-5122**

F Rating: 1, 2 Hr • T Rating: 1 Hr & 1/4 Hr  
Steel or Iron pipe: 6", Copper pipe: 4"  
Pipe covering: Max. 2" fiber glass, 3/4" AB/PVC or 2" mineral fiber  
Annulus: 0" to 1-1/2" • Sealant: 5/8"



**UL System No. W-L-8025**

F Rating: 1, 2 Hr • T Rating: 1/4 Hr  
AC Line Set: Two copper tubes, one with 3/4" AB/PVC and thermostat wire  
Annulus: 0" to 1" • Sealant 5/8"



## MAINTENANCE

No maintenance is normally required, however a periodic inspection of rated barriers is recommended to make sure that any new openings, modifications of previously installed firestops, or areas exhibiting physical damage, have been properly sealed or repaired. Subsequent sealing or repairs should be accomplished using SpecSeal® products per the original approved design.

**RETROFIT:** When adding or removing penetrants, care should be taken to minimize damage to the seal. Reseal using SpecSeal® products per the approved design. **NOTE:** New penetrants of a different nature than the original design may require a totally new firestop design or extensive modifications to the existing design. Reseal all openings as per the requirements of the modified design.

## TECHNICAL SERVICE

Specified Technologies Inc. provides toll free technical support to assist in product selection and appropriate installation design. UL Systems, Material Safety Data Sheets and other technical information is available through the Technical Library at [www.stifirestop.com](http://www.stifirestop.com).

## PRECAUTIONARY INFORMATION

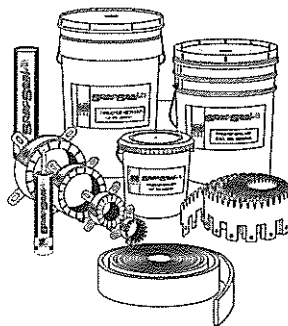
Consult Material Safety Data Sheet for additional information on the safe handling and disposal of this material.

## AVAILABILITY

SpecSeal® Series LCI Sealant is available from authorized STI distributors. Consult factory or website for the names and locations of the nearest sales representatives or distributors.

## ORDERING INFORMATION

CAT. NO.	DESCRIPTION	
LCI300	Sealant 10.1 oz Tube	18.2 Cu In (300 ml)
LCI305	Sealant 5 Gal Pail	1,155 Cu In (19.0 L)
LCI320	Sealant 20 oz Sausage	36 Cu in. (592 ml)
LCI329	Sealant 29 oz Quart Tube	52 Cu in. (858 ml)



### Additional SpecSeal Products...

#### Series SSS Sealant

The industry's most versatile sealant provides the firestopping solutions for a wide range of combustible and noncombustible applications. Water-based intumescent sealant expands up to 8X!

#### Intumescent Wrap Strips

Three grades of intumescent wrap strips provide an unmatched combination of flexibility, economy, and expansion (up to 30X). Systems for plastic pipes including FR Polypropylene up to 8" trade size!

#### SSC & LCC Firestop Collars

Easy to install, economical protection for ABS and PVC pipes (both solid and foam core) as well as CPVC, PVDF, and FRPP. LCC Collars are available up to 4" and SSC Collars are available up to 6" trade size.

#### Firestop Mortar

Lightweight, versatile and economical! The best choice for large or complex installations.

#### SSP Firestop Putty

Available both in bar form and in pads, putty provides easy retrofit for through-penetrations and economical protection for electrical boxes.

#### SIL Silicones

Sealants and foam for through-penetrations and construction joints. Unexcelled aging characteristics and flexibility.

#### Elastomeric Joint Seals

Economical products for sealing construction joints. Choose caulk or spray applied products tested to UL2079.

**IMPORTANT NOTICE:** All statements, technical information, and recommendations contained herein are based upon testing believed to be reliable, but the accuracy and completeness thereof is not guaranteed.

**LIMITED WARRANTY:** STI warrants that its products will be free of defects for one year from the date of purchase. In the event a product does not conform to this warranty, the sole and exclusive remedy is, at STI's option, replacement of the product or refund of the purchase price. The warranty provided herein shall be void and of no effect in the event that the product is not installed in accordance with STI's published instructions, listed systems and applicable building and safety codes. **THIS WARRANTY IS IN LIEU OF ALL OTHER REPRESENTATIONS AND EXPRESSED OR IMPLIED WARRANTIES** (including the implied warranties of merchantability or fitness for a particular use) **AND UNDER NO CIRCUMSTANCES SHALL STI BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, INCLUDING, WITHOUT LIMITATION, ANY LOSS OF REVENUE, PROFIT OR USE.** Prior to use, the user shall determine the suitability of the product for its intended use, and the user assumes all risks and liability for subsequent use. No person other than an officer of STI is authorized to bind STI to any other warranty for any product for which this warranty is issued.

MADE IN THE USA – COPYRIGHT © 2014 SPECIFIED TECHNOLOGIES INC.



Specified  
Technologies  
Inc.

Specified Technologies Inc. • 210 Evans Way, Somerville, NJ 08876 USA • Phone: 800.992.1180 • Fax: 908.526.9523

