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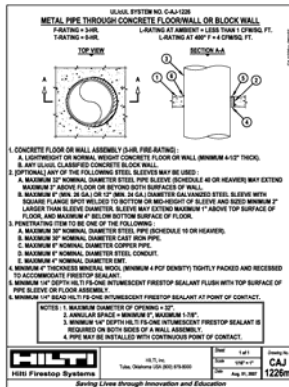
Agenda/Overview

- Fire Statistics
- Building Codes
- Test Methods
- Specification
- Firestop products
- Firestop Systems and Testing
- Jobsite Applications
- Installation
- Engineering Judgments
- Types of Products
- Limiting Liability
- How Hilti can help you



What is firestopping?

Firestop is a passive fire protection system of various components used to seal penetrations and joints in fire-resistant wall and/or floor assemblies, based on fire testing and certification listings



Who installs firestopping?

Trades:

- Plumber
- Electrician
- Drywaller
- Carpenter, etc.

Firestop Specialty Contractors (FSC):

Install firestop for other contractors more than 50% of the time AND..... they have someone dedicated in company to manage the FS business

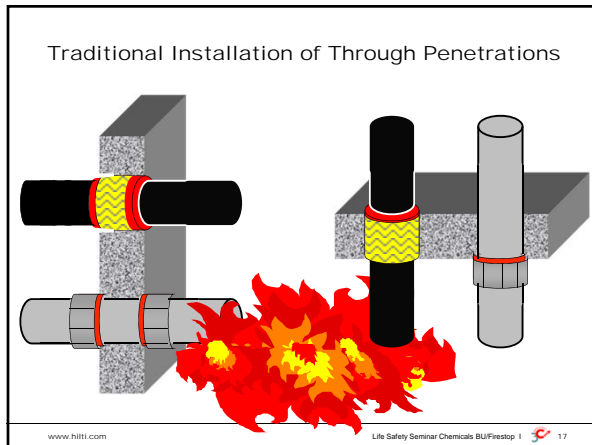
Types of Firestop products

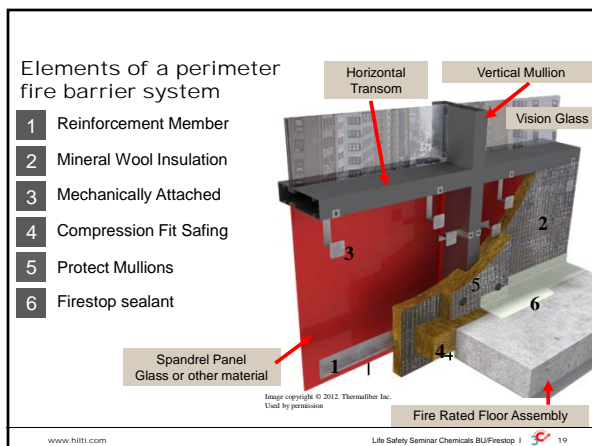
- Sealants
- Cast-in devices
- Boards
- Blocks
- Spray
- Putty products
- Collars / wraps
- Cable management devices











Recognized and accredited third party test facilities in the United States



Intertek (Omega Point) Listings



Underwriters Laboratories Inc.



Warnock Hersey



Factory Mutual Standards Laboratories

- Tests done to Code-required Standards – ASTM and UL

All "Nationally recognized Test Laboratories" are of equal status in regulations (code acceptance)
Each test lab publishes its own listing directory

[Testing Through Penetration Firestop Systems](#)

ASTM and UL Test Standards

ASTM E 814 / UL 1479 –
Test Standards for Through Penetration Firestop Systems

ASTM E 1966 / UL 2079 –
Test Standards for Joint Firestop Systems

In addition to furnace test and hose stream test, joint systems are cycled approx. 500 times through intended range of movement before furnace exposure

ASTM E2307 –
Standard test method for determining fire resistance of perimeter fire barriers system using intermediate scale multi-story test apparatus

ASTM and UL Test Ratings

F-Rating (integrity rating)

The duration of time in which flames do not pass through perimeter fire barrier system or around its boundaries

T-Rating (insulation rating)

The time it takes for the non-fire side to reach approximately 400 °F (325°F above ambient)

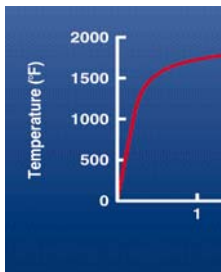
L-Rating (leakage rating)

The amount of air leakage through the firestop system at ambient and 400°F determines the system's ability to restrict the movement of Smoke measured in CFM/sq. ft. (the lower the number, the better)

W-Rating (water rating)

Determines the effectiveness of a firestop system to restrict the flow of Water. Class 1-rated firestops have been shown to resist up to 3 feet of water column.

ASTM E-814 Time Temperature Curve



Temperature at 10 minutes = 1300 °F
Melting Points (approx.):

Aluminum – 1220 °F¹

PVC plastic pipe – 413 °F²

Mineral Wool – 2000 °F

Sources:

1. NFPA Fire Protection Handbook, 18th Ed. Table 4-16A. Pg 4-183.
2. SFPE Handbook of Fire Protection Engineering, 1st Ed. Table 1-12.1. Pg. 1-166.

Code Requirements:

Required by all current and legacy codes



Complying with code requirements

IBC 2006 Section 106.1.1 – Information on construction documents
 “Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it will conform to the provisions of this code and relevant laws, ordinances, rules and regulations, as determined by the building official.”

Suggested detail(s) that should be included in the construction documents for plan review process:

- Schedule of systems by assembly, penetration or joint
- Sample UL System details – most common applications
- Specifications to include current standards relative to issue date of the construction documents

Firestop Matrix / Schedule of UL systems on Plans

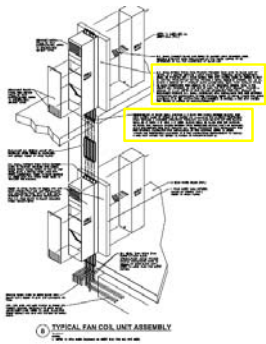
Description	Concrete Floor / Block Walls	Gypsum Walls	Wood Floors
Blank opening	CAJ-0090	WL-0040 WL-0012	FC-0002
Metal pipe	CAJ-1226	WL-1054	FC-1009 FC-1059
Plastic Pipe	CAJ-2218 CAJ-2293	WL-2078	FC-2020 FC-2030
Cable Bundle	CAJ-3284 CAJ-3070	WL-3220 WL-3304	FC-3012
Metal pipe with glass fiber insulation	CAJ-5061	WL-5029	FC-5066
Metal pipe with ABRPVC insulation	CAJ-5090	WL-5028	FC-5065
Sheet metal duct (rectangular)	CAJ-7111	WL-7040	FC-7043
Sheet metal duct (round)	CAJ-7094	WL-7153	FC-7095
Multiple penetrants	CAJ-8058 CAJ-8143	WL-8071 WL-8065	FC-8044

Firestop Matrix / Schedule of UL systems on Plans (magnified)

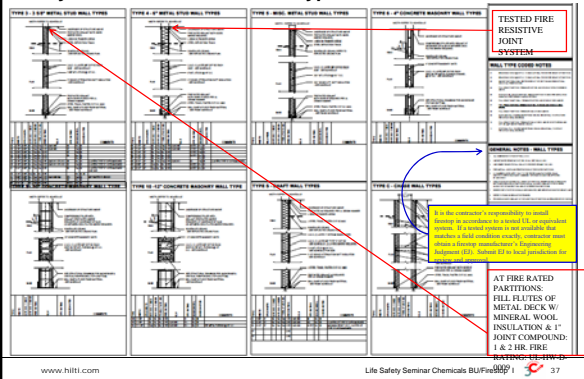
Basis of Design Systems for Through Penetrations*			
Description	Concrete Floor / Block Walls	Gypsum Walls	Wood Floors
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*Note: Systems provided are for guidance. Contractor to submit final UL system base
 **Note: refer to the "UL XHEZ Through Penetration Guidelines" for additional use of s

Firestop Detail on Plans – EJ & UL #



UL systems included on Wall Types / Partition Schedule



Through Penetrations

Section 712.3.1.2 (Walls) – Through-penetration Firestop systems (2006)

“Through-penetrations shall be protected by an approved penetration Firestop system installed as tested in accordance with **ASTM E 814 or UL 1479...**”

Section 712.4.1.1.2 (Floors) – Through-penetration firestop system (2006)

“Through penetrations shall be protected by an approved through-penetration firestop system installed and tested in accordance with **ASTM E 814 or UL 1479...**”

“The system shall have an F-rating and a T-rating of not less than 1 hour but not less than the required rating of the floor penetrated

EXCEPTIONS to T-Rating:

2006: Floor penetrations contained and located within the cavity of a wall

2012: Floor/ tub / shower drains, if in ceiling assembly

2015: Max. 4in dia floor pens going directly to switchgear boxes

Membrane Penetrations

Section 712.3.2 – Membrane penetrations (IBC 2006)

“...Outlet boxes on opposite sides of the wall shall be separated by a horizontal distance of not less than 24 inches...or other listed materials and methods”

- max. 2hr wall
- max. 16 square inches, steel electrical boxes
- max. 100 square inches in any 100 square feet of wall area

Section 712.3.2 – Membrane penetrations (IBC 2009)

Changes to code – “Non-Communicating Stud Activity”

If you have staggered studs (=zig zag path), regardless of dimensions, you NEED listed materials or methods (ie. firestop putty pad).

Joints and Curtain Wall Firestop Systems

Section 713.3 – Fire resistant joint systems (2006)

“Fire resistant joint systems shall be tested in accordance with the requirements of either **ASTM-E1966** or **UL 2079**...”

Section 713.4 – Exterior Curtain wall/floor intersection (2006)

“...Shall be sealed with an approved material or **system** to prevent the interior spread of fire...installed and tested in accordance with **ASTM E2307**”

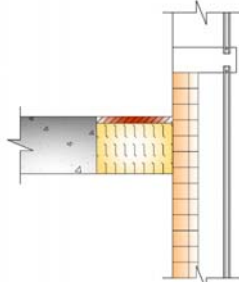
EXCEPTIONS:

2006: Has exception to ASTM E2307 that materials used are tested to ASTM E119 (time / temp curve) = material used must have proven test data

2009: No exception. Must use an ASTM E 2307 system.

2012: Allows exception with only floor to ceiling vision glass

Perimeter fire barrier extends the fire rating of the floor to the exterior wall



MANDATORY!

L- Ratings (2006 IBC)

Section 712.5 – Through-penetration Firestop Systems

Through-penetration firestop systems in smoke barriers shall provide an L-rating of 5 cfm/square foot or less

Section 713.6 – Construction Joint Firestop Systems

Fire-resistive joint system in smoke barriers shall provide and L-rating of 5 cfm/lineal foot or less

Labeling of rated walls (IBC 2009)

703.6 Marking and identification. Fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions or any other wall required to have protected openings or penetrations shall be effectively and permanently identified with signs or stenciling. Such identification shall:

1. Be located in accessible concealed floor, floor-ceiling or attic spaces;
2. Be repeated at intervals not exceeding 30 feet (914 mm) measured horizontally along the wall or partition; and
3. Include lettering not less than 0.5 inch (**2012 = 3 inches**) in height, incorporating the suggested wording: "FIRE AND/OR SMOKE BARRIER—PROTECT ALL OPENINGS," or other wording.

Exception: Walls in Group R-2 occupancies that do not have a removable decorative ceiling allowing access to the concealed space.



3rd Party Inspection Mandatory in 2012 IBC

Chapter 17: Special Inspections and tests

1705.16 Fire Resistant penetrations and joints. "In high-rise buildings or in buildings assigned to Risk Category III or IV in accordance with Section 1604.5, special inspections for through-penetrations, membrane penetrations firestops, fire resistant joint systems, and perimeter fire barrier systems...."

- Independent
- Qualified
- ASTM E2174 Standard Practice for On-Site Inspection of Installed Fire Stops

What is the hourly rating of any Firestop product?



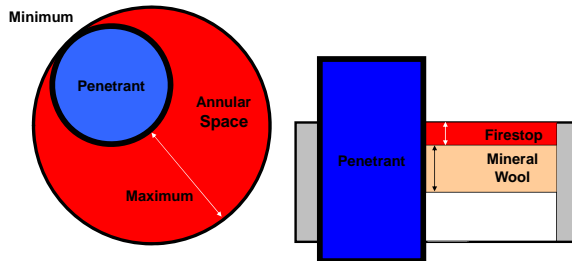
ZERO
Only
Firestop Systems
have ratings!

Factors Affecting Firestop Performance

- Floor or wall construction type and thickness
- Size and type of penetrating item(s)
- Size and shape of opening
- Percent fill
- Fire severity and duration
- Annular space
- Joint width
- Joint movement



Annular Space - Through Penetrations



WHERE DO YOU FIND FIRESTOP SYSTEMS ?

Manufacturer's Technical Literature

- Contains UL listings for fire-resistance-rated systems such as:
- Through Penetration Systems
 - Construction Joint Systems

UL Fire Resistance Directory

Volumes 2A & 2B

- Contains UL listings for fire-resistance-rated systems such as:
- Through Penetration Systems
 - Construction Joint Systems

Fire-rated systems are identified by an alpha-numeric system

Industry Standard Alpha-Numeric system:

Penetrations

F = Floor	A = Concrete < or = 5"	0000-0999 = blank
W = Walls	B = Concrete > 5"	1000-1999 = metal
C = Floors or Walls	C = Framed firs	2000-2999 = plastic
	D = Steel deck	3000-3999 = cables
	J = conc or masonry, <8"	4000-4999 = cable trays
	K = conc or masonry, >8"	5000-5999 = ins. pipes
	L = Framed walls, gypsum	6000-6999 = misc. elec
	M = bulkheads	7000-7999 = misc. mech

Example:

WL-1054 = Wall (W).....Gypsum (L).....metal pipe (1000's)

FA-2093 = Floor (F).....Concrete < or = 5" (A).....plastic pipe (2000's)

Industry Standard Alpha-Numeric system:

Joints:

FF = Floor to Floor	S = No Movement	0000-0999 = Less than or equal to 2"
WW = Wall to Wall	D = Allows Movement	1000-1999 = Greater than 2" and less than or equal to 6"
FW = Floor to Wall		2000-2999 = Greater than 6" and less than or equal to 12"
HW = Head of Wall		3000-3999 = Greater than 12" and less than or equal to 24"
BW = Bottom of Wall		4000-4999 = Greater than 24"
CW = Curtain Wall*		

*Note: Intertek CW systems are CEJ or HI/HP

Example:

HWD-0042 = Head of Wall (HWD).....Joint width less than or equal to 2" (0042)

What are Engineering Judgments?

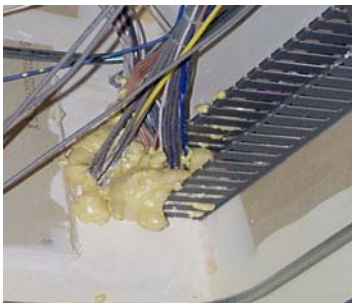
- For applications that have no recognized laboratory (i.e., UL, OPL, etc.) tested system.
- EJ drawings are generated by the manufacturer's Fire Protection Engineers
- EJs are based on the closest recognized laboratory tested system
- All EJs are project specific
- All EJs generated are based on the requirements set forth by the International Firestop Council (IFC)



Common Non-Tested Products Used

- Drywall mud and tape or "fire tape"
- Filler foam (i.e. 'Great Stuff') or orange foam used in residential construction
- Combustible materials (i.e. newspaper, styrofoam)
- Nothing at all

Firestop Installation - Correct or Incorrect?



Firestop Installation - Correct or Incorrect?



Firestop Installation - Correct or Incorrect?



Firestop Installation - Correct or Incorrect?



Firestop Installation – Correct or Incorrect?



Clarifications.....

Dampered ducts – firestop manufacturers do not have tested systems; firestop according to damper manufacturers written instructions (UL 555)

LEED – all of our products are LEED compliant for VOC

“Smoke Walls” – IBC does not recognize this term
per IBC - smoke barrier = min. 1hr rating and has an L-rtg req
per NFPA – smoke barrier = min. 1hr rating and has **NQ** L-rtg req
per IBC - smoke partition has no fire rating

Labels – availability / requirement / Hilti inspection

T-rating – not required for walls

Clarifications.....

Acoustic Sealant – Unless contractor submits current tested firestop system, acoustic sealant is NOT acceptable for use as FS System (double check your wall partition details)

Exposed Firestop - alternate “red” color is available; communicate to contractor on plans.

For TOW joints – pay attention to the movement needed; firestop systems and acoustic sealant have movement limitations

Wall assembly details – review and remove vague and incorrect references such as “FS sealant”, “backing material”, “acoustic sealant”

FSC Installer Quality Assurance:

FM 4991 Accreditation and UL Approval Program

Objectives:

Increase confidence in the installation Contractor that materials are installed to requirements

Requirements:

Demonstrate knowledge of selection and installation of firestop systems as evidenced by passing a written exam

Management System (MS) specifically focused on the proper selection and installation of firestop systems so that knowledge is applied throughout the Contractor firm as evidenced by audit of Contractor's MS

Firestop Specialty Contractors

- Professional, accurate installation
- Experts in Life Safety and Code Compliance
- Single point of contact for project
- Consultation – design through construction
- No other scope of work to distract from – FS is ONLY focus
- Industry trend
- Allow trades to focus on primary tasks
- Peace of mind

Limiting Liability - What can the design community do? Project Specifications and Coordination

- Keep **specifications** up to date and adhere to them – avoid “poorly worded documents”
- **Single, qualified installer:** FM 4991 approved contractor or UL approved contractor – accuracy substantially increases in field
- **Manufacturer's direct representative** (not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures
- Firestop contractor is to supply **documentation that tracks all installed firestop systems:** installation log, UL systems, utilized products, and all other relevant documentation
- Set expectations early in project that a tested system must be used. During walk-throughs, simply ask: **“What tested system are you using?”**

Hilti offers solutions for designers for.....



Firestopping	Acoustical Sealant
Anchors	BIM Libraries
Cable Management	Technical resource
Code consultation	Specification review
