



FIRESTOP 101: A LIFE SAFETY ISSUE

Bert Le Fire Protection Specialist SEPA/SNJ/DE



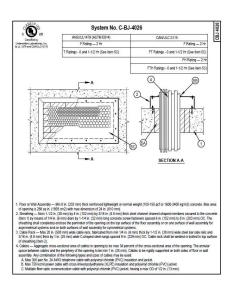
# WHAT IS THE AVERAGE HOURLY RATING OF ANY FIRESTOP PRODUCT?











Only Firestop Systems have ratings!

### **AGENDA**

### **Consequences of Building Fires**

- Fire Safe Building Construction & Code Requirements
- Firestop System Testing & Listings
- Beyond Fire Resistance Secondary Attributes of Firestop
- Specifying Firestop Systems
- Hilti Firestop

# HOW OFTEN DOES A FIRE DEPARTMENT RESPOND TO A FIRE IN THE US?



### CONSEQUENCES OF FIRES







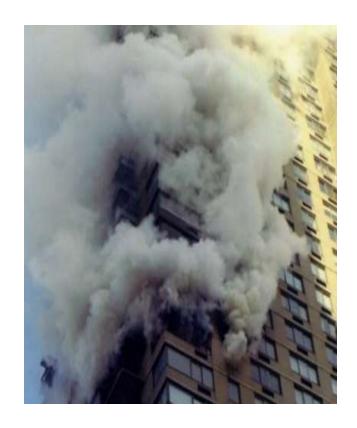
Source: NFPA Fire Loss Statistics 2018

# WHAT IS THE LEADING CAUSE OF DEATH IN STRUCTURE FIRES?



# SMOKE AND TOXIC GASES ARE THE LEADING CAUSE OF DEATH IN A FIRE

- Approximately 75% of all fire deaths are caused by smoke inhalation
  - Hall, Jr. John R. NFPA Fire Analysis & Research, Quincy, MA.
     "Burns, Toxic Gases, and other Hazards"
- Visibility: 47% of survivors caught in a fire could not see more than 12 feet
  - NFPA Fire Protection Handbook, 18th Ed. Table 1-1P. Pg.1-15
- Approximately 57% of people killed in fires are not in the room of the fire's origin
  - NFPA Fire Protection Handbook, 18th Ed. Table 8-1P. Pg. 8-17
- Smoke travels 120-420 feet per minute under fire conditions
  - Estimate based upon ceiling jet velocity calculations for typical ceiling heights and heat release rates





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# PROTECTING A BUILDING TAKES A BALANCED APPROACH, DETECTION AND SUPPRESSION ALONE ARE NOT ENOUGH



We cannot rely on any single action or safeguard to keep people safe



### **GRENFELL TOWER – 2017**

- 80 dead
- 4<sup>th</sup> floor freezer electrical short caused the fire
- Building Façade helped the blaze to spread quickly
- Fire-stopping material between Apartments and communal corridors had been removed during a renovation several years ago, allowing the blaze to spread





### **SMOKE BARRIERS IN HOSPITALS**

Real case: fire in a hospital and smoke propagation (A-Sairaala, Turku, Finnland, 02.Sep.2011): in less than 2 minutes the hallways in this hospital were full of toxic smoke ...











# WHEN COMPARTMENTATION WORKS

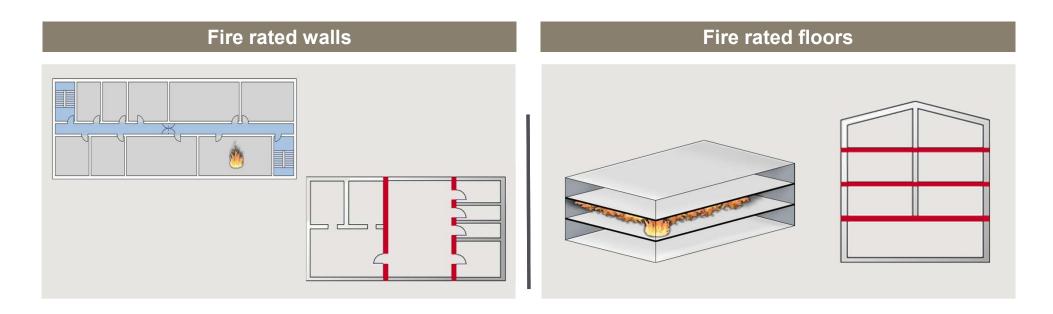
- Hell's Kitchen New York 2014
- Compartmentation worked to keep the blaze contained to its origin
- Started due to an overloaded power strip in an apartment on the 20<sup>th</sup> floor.
- Only one casualty due to smoke inhalation



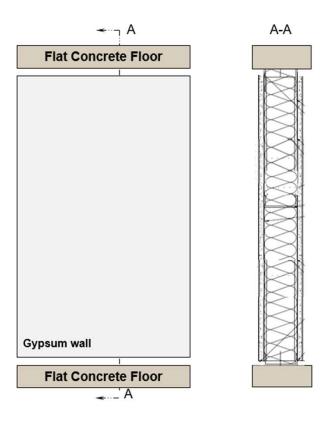


# ONE GLOBALLY APPLIED PRINCIPLE FOR FIRE SAFETY: COMPARTMENTATION (FIRE COMPARTMENTS)

The spread of fire can be restricted by dividing a building into separate compartments with fire-resistive walls and floors—increasing the availability of escape routes for occupants.



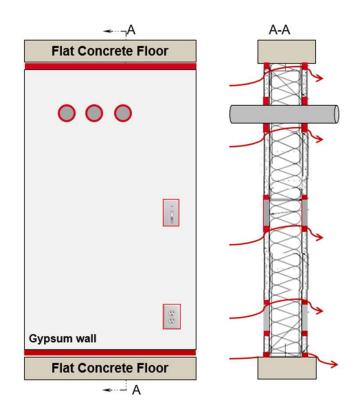
# NOW THAT THE WALL IS DESIGNED PROPERLY, WE MUST UNDERSTAND THE EFFECTS OF FIELD CONDITIONS



### **UL/cUL Design No. U419 listing addresses:**

- Fire rating (1-HR)✓STC rating (54)
- Wall dimensions
- # Gyp layers, etc.

# FIELD CONDITIONS PRESENT MULTIPLE JOINT AND PENETRATIONS THAT WILL REQUIRE PROPER PROTECTION

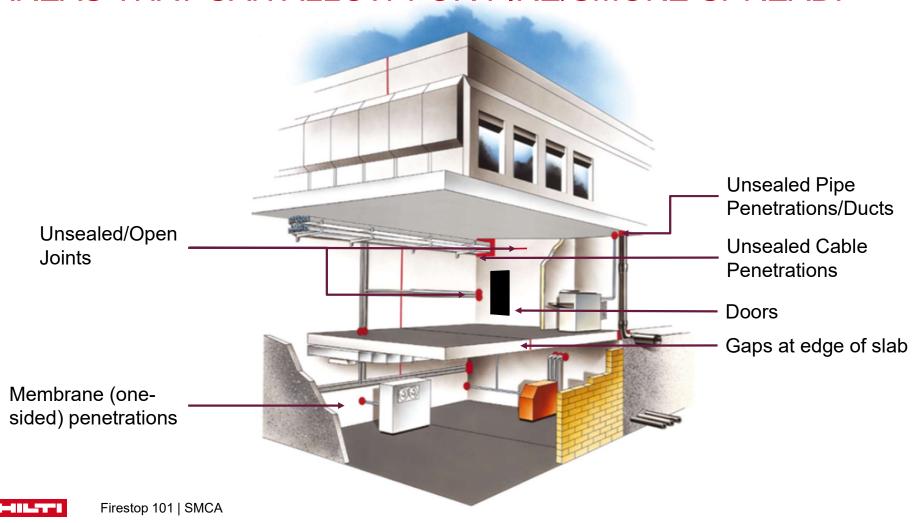


### UL/cUL Design No. U419 listing does not address:

- × Head and bottom of wall joints
- × MEP penetrations
- × Membrane penetrations
- Problem:
  - The integrity of the wall's fire and acoustical performance is breached
- Solution:
  - Firestop the gaps properly to restore the integrity of the wall assembly
  - Proper specification helps ensure that design intent is achieved by installers



### AREAS THAT CAN ALLOW FOR FIRE/SMOKE SPREAD:



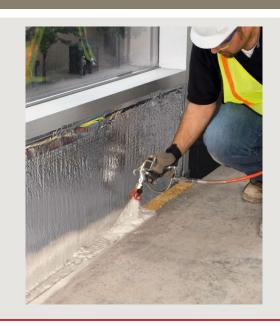
# FIRESTOP HELPS RESTORE THE INTEGRITY OF FIRE RATED ASSEMBLIES

Through penetrations

**Joints** 

**Membrane penetrations** 







Firestop is used to seal openings and joints in fire-resistance rated wall and/or floor assemblies

# FIRESTOPPING IS NOT NEW: REQUIRED BY ALL CURRENT AND LEGACY CODES









# INTERNATIONAL BUILDING CODE (2021) RELEVANT CODE SECTIONS AND FIRE TESTS

Code Section	Category	Referenced Test Standard		
714.4.1.2	Through Penetrations (Walls)	ASTM E814 or UL 1479		
714.5.1.2	Through Penetrations (Floors)	ASTM E814 or UL 1479		
714.4.2	Membrane Penetrations	ASTM E814 or UL 1479		
715.3.1	Fire Resistant Joints Systems	ASTM E1966 or UL 2079		
715.4.1	Exterior Curtain Wall/Floor Intersection (Perimeter Joint)	ASTM E2307		
1705.18	Special Inspections of Fire Resistant Penetration & Joints	Penetrations: ASTM E2174 Joints: ASTM E2393		
Ur	nderstanding the testing process is key to design	ning fire resistant systems		



# INTERNATIONAL BUILDING CODE (2021) FIRESTOP REQUIREMENTS

#### **Section 714.4.1.2 – Through-penetration firestop systems**

• "Through penetrations shall be protected by an approved penetration firestop system installed as tested in accordance with ASTM E 814 or UL 1479..."

#### **Section 715.3.1 – Fire resistant joint systems**

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

What is the key term in the code language above?



# INTERNATIONAL BUILDING CODE (2021) FIRESTOP REQUIREMENTS

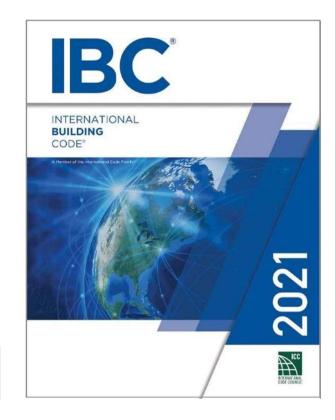
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"Fire-resistant joint systems shall be tested in accordance with the requirements of either ASTM E1966 or UL 2079..."

Firestopping is a system approach. The product and installation instructions specific to that product make the system



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### MANY FACTORS AFFECT FIRE PERFORMANCE, AND EACH ARE PARAMETERS IN THE TESTING OF A SYSTEM

#### **Through Penetrations**

- Size and type of penetrating item(s)
- Size and shape of opening
- Desired fire rating (hrs.)
- Floor or wall construction type and thickness
- Annular space
- Firestop products used

#### **Joints**

- Joint width
- Desired assembly rating (hrs.)
- Floor or wall construction type and thickness
- Movement requirements (%)
- Stud width for gypsum walls
- Firestop products used

Once a tested firestop system has achieved the desired fire ratings, then a "Firestop System" is issued (published) by the testing agency



# SYSTEMS FOR JOINTS & PENETRATIONS ARE TESTED TO ASTM E814/UL 1479, ASTM E1966/UL 2079

#### F-Rating

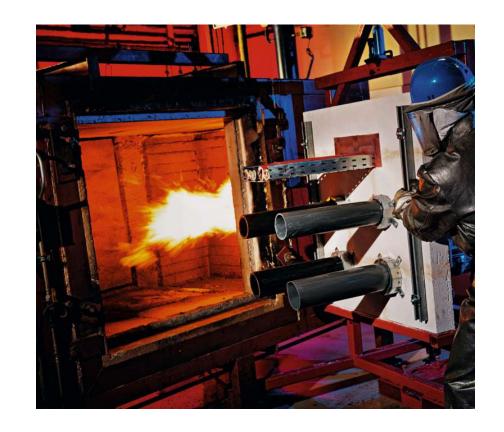
 The duration of time in which flames do not pass through the system

#### T-Rating / FT-Rating (Canada)

 The time period it takes for the non-fire side of the assembly rise by 325°F (181°C) above its initial ambient temperature

To receive either rating the firestop system must pass the hose stream test\*

\*Hose stream test not required in Canada



# HOSE STREAM TEST VERIFIES MECHANICAL INTEGRITY OF SYSTEM AFTER FIRE EXPOSURE

### Stream delivered through 2½ inch hose with a straight-bore nozzle at:

- 30 psi 1, 2 & 3-hour tests
- 45 psi 4-hour test

Time duration calculated based upon the area of the test assembly and the fire resistance period.

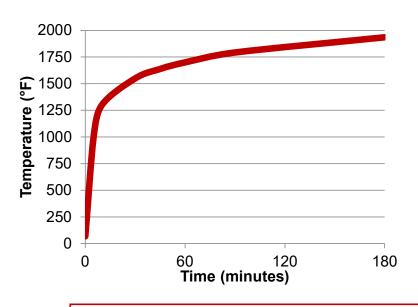
\*Hose stream test not required in Canada.



To pass test, must not produce any though-gaps in firestop system

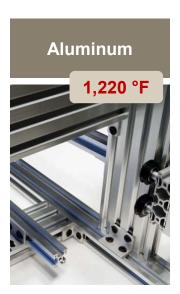
# BUILDINGS ON FIRE CAN REACH TEMPERATURES WELL IN EXCESS OF THEIR MELTING POINTS VERY QUICKLY

This temperature-time curve (from ASTM E119 Standard) is considered to represent a severe fire exposure. Compared to the melting temperatures of the products on the right, it's clear why firestop products and systems are so important, most of these materials will fail in the first hour, leaving the penetrations exposed.









Combustible penetrating items typically require specialized firestop products

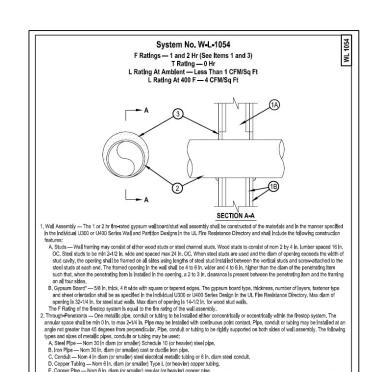
# FIRESTOP SYSTEMS IDENTIFY EACH COMPONENT REQUIRED TO ACHIEVE THE DESIRED FIRE RATING

- Fire rated assembly construction components
- Acceptable size and type of penetrating items
- Firestop materials needed to fill voids
- Specified limits for size of opening, annular space, etc.
- Each tested system is given their own Firestop System Number







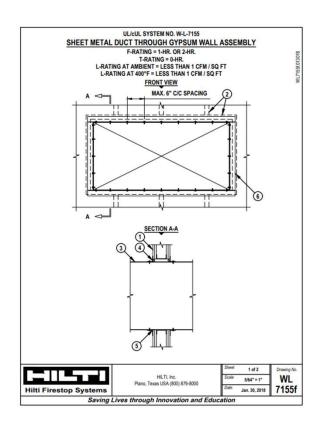


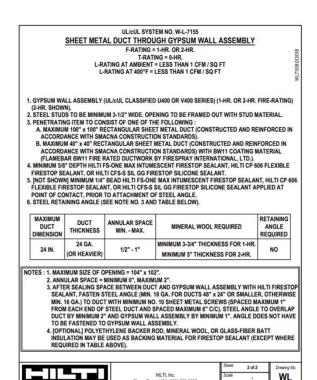
FIII, Void or Caylty Material" — Sealant — Min 5/5 in , thickness of fill material applied within the annulus, flush with both surfaces of wall. At the point or continuous contact locations between pipe and wall, a min 1/2 in, diam bead of fill material shall be applied at the pipe wall interface on

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC - FS-One Sealant



# UNDERSTANDING HOW TO READ A FIRESTOP SYSTEM IS THE FIRST STEP TO FIRESTOPPING





Plano, Texas USA (800) 879-8000

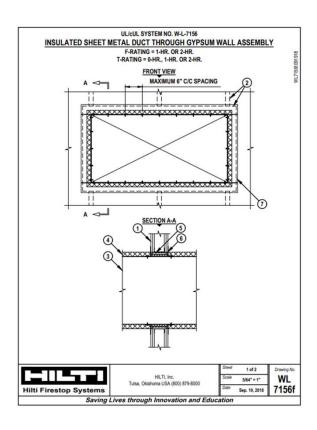
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Hilti Firestop Systems

Jan. 30, 2018

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### INSULATED RECTANGULAR DUCT



#### UL/cUL SYSTEM NO. W-L-7156

#### INSULATED SHEET METAL DUCT THROUGH GYPSUM WALL ASSEMBLY

F-RATING = 1-HR. OR 2-HR. T-RATING = 0-HR., 1-HR. OR 2-HR.

1. GYPSUM WALL ASSEMBLY (UL/cUL CLASSIFIED U300, U400 OR V400 SERIES) (1-HR. OR 2-HR. FIRE-RATING) (2-HR. SHOWN).

2. [NOT SHOWN] WOOD STUDS TO CONSIST OF NOMINAL 2" x 4" LUMBER. STEEL STUDS TO BE MINIMUM 3-1/2" WIDE. OPENING TO BE FRAMED OUT WITH STUD MATERIAL.

3. MAXIMUM 100" x 100" RECTANGULAR SHEET METAL DUCT (CONSTRUCTED AND REINFORCED IN

ACCORDANCE WITH SMACNA CONSTRUCTION STANDARDS).
4. NOMINAL 1-1/2" OR 2" THICKNESS GLASS-FIBER DUCT INSULATION (MIN. 3/4 PCF) WITH FOIL-SCRIM-KRAFT FACING. INSULATION TO BE SPLIT TO ALLOW STEEL ANGLE TO BE FASTENED

DIRECTLY TO DUCT (SEE NOTE NO. 3 BELOW).

5. MINERAL WOOL (MIN. 4 PCF DENSITY) TIGHTLY PACKED AND RECESSED TO ACCOMMODATE SEALANT. MINIMUM 3-5/8" OR 4-7/8" THICKNESS REQUIRED FOR 1-HR. OR 2-HR, RESPECTIVELY.

6. MINIMUM 5/8" DEPTH HILTI FS-ONE MAX OR FS-ONE INTUMESCENT FIRESTOP SEALANT. 7. STEEL RETAINING ANGLE (SEE TABLE NOTE NO. 4 BELOW).

MAXIMU M DUCT DIMENSI ON	DUCT THICKNES S	MAX. INSULATION THICKNESS (ITEM 4)	ANNULAR SPACE (MIN MAX.)	PACKING MATERIAL (ITEM 5) REQUIRED	ANGLE (ITEM 7 REQUIRED)	T-RATING
24 IN. **	24 GA. (OR HEAVIER)	1-1/2"	1/4" TO 1"	NO	NO	0
25" BY 45"	24 GA. (OR HEAVIER)	2"	1/4" TO 3-1/2"	YES	NO	1 OR 2 (SAME AS WALL RATING

NOTE \*\* INDICATES THAT WHEN MAX. 1-1/2" THICK INSULATION IS USED, STEEL ANGLES ARE OPTIONAL ON THOSE SIDES OF THE DUCT THAT DO NOT EXCEED THE DIMENSION SPECIFIED.

NOTES: 1. MAXIMUM SIZE OF OPENING [FOR WOOD STUDS] = 14-1/2" x 14-1/2".

2. MAXIMUM SIZE OF OPENING [FOR STEEL STUDS] = 105-1/2" x 104"

3. INSULATION TO BE COMPRESSED MINIMUM 50% SUCH THAT THE ANNULAR SPACE = MIN. 1/2", MAX. 3-1/2".

4. AFTER SEALING SPACE BETWEEN DUCT AND GYPSUM WALL ASSEMBLY WITH HILTI FIRESTOP SEALANT, FASTEN STEEL ANGLE (MIN. 16 GA.) TO DUCT WITH MINIMUM NO. 10 SHEET METAL SCREWS (SPACED MAXIMUM 1" FROM EACH END OF STEEL DUCT AND SPACED MAXIMUM 6" C/C). STEEL ANGLE TO OVERLAP DUCT BY MINIMUM 2" AND GYPSUM WALL ASSEMBLY BY MINIMUM 1". WHEN DUCT DIMENSION DOES NOT EXCEED 48" AND DUCT AREA DOES NOT EXCEED 1300 SQ. IN., ANGLES MAY BE MIN. 18 GA. ANGLE DOES NOT HAVE TO BE FASTENED TO GYPSUM WALL ASSEMBLY.



HILTL Inc. noma USA (800) 879-8000 Sep. 19, 2018

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### KEY TAKEAWAYS FOR INSTALLERS

#### Always match UL System to field condition

- Assembly = wall/floor type + rating
- Duct size and shape
- Insulation presence/type

#### **Uninsulated ducts**

- Mineral wool + sealant are main requirements
- Retaining angles required for larger ducts

#### **Insulated ducts**

- Same rules, but insulation must continue through penetration
- Annular space limits are different

#### **Framing out**

 Needed for larger/heavier ducts to support wall and firestop > 1 hourly rating

#### **Retaining angles**

- Required for ducts with max dimension >24"
- Always attached to duct, not wall

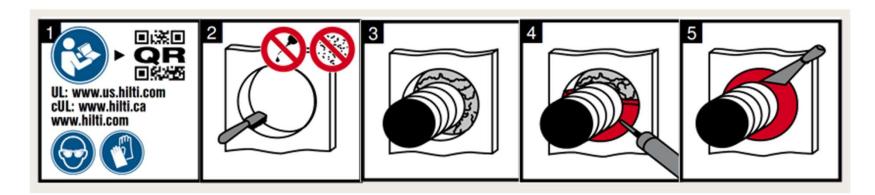
#### **Rectangular ducts**

- Can warp/collapse during fire
- Retaining angles stiffen the duct to hold shape
- Without angles, fire/smoke can pass through
- Firestop in plane of wall before retaining angle



### PROCESS FOR INSTALLING FIRESTOP MATERIAL

- 1. Read and understand the details of the firestop system or Engineering Judgement to be used
- 2. Clean the opening of debris, dirt, oil, wax and grease; ensure the surface is free of moisture and frost
- Insert mineral wool or backer, as required
- 4. Apply firestop sealant; ensure the correct minimum depth of sealant is installed
- 5. Smooth the firestop sealant with a trowel





### THROUGH-PENETRATIONS: NON-COMBUSTIBLE

#### POOR FIRESTOP INSTALLATION EXAMPLES



No firestop around penetrant



- · Multiple materials/sealants are overlapping
- Firestop has not been tooled
- Visible gaps in sealant

### THROUGH-PENETRATIONS: NON-COMBUSTIBLE

#### POOR FIRESTOP INSTALLATION EXAMPLES



- Multiple fill/backing materials are used to fill the opening around the pipe; the fill material does not appear to be compliant
- The firestop sealant does not cover the exposed backing material



- Multiple sealants have been used
- Firestop sealant has not been applied all the way around the penetrants
- Firestop sealant not properly tooled

### THROUGH-PENETRATIONS: CABLES THROUGH CONDUIT

#### POOR FIRESTOP INSTALLATION EXAMPLES



- Gap in firestopping around outside of conduit
- · Inside of conduit has not been firestopped



- Outside of one penetrant has not been firestopped
- Inside of two conduits have not been firestopped

### THROUGH-PENETRATIONS: CABLES THROUGH CONDUIT

#### POOR FIRESTOP INSTALLATION EXAMPLES



A non-firestop foam has been used inside the conduits



· A non-firestop foam has been used inside the conduits

# MINERAL WOOL ORIENTATION AND COMPRESSION IS KEY TO CORRECT FIRESTOP INSTALLATION



- Edge of slab joints: Mineral wool grain should run vertical
- The width of mineral wool to cut can be determined by the following equation:

Thickness = 
$$\frac{\text{(Width of joint)} \times 100}{100 - \text{(Compression \%)}}$$



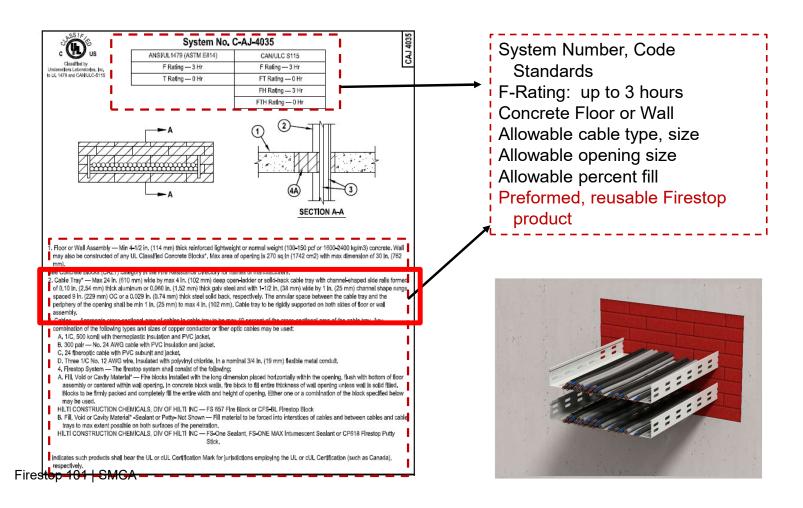
· Head of wall joints: Mineral wool grain should run horizontal

## HOW TO ADDRESS THIS APPLICATION?



Cable Trays Through 2HR Fire-Rated Concrete Floor or Wall Assembly

### HOW DO YOU ADDRESS THIS APPLICATION?



## HOW DO YOU ADDRESS THIS APPLICATION?



Not all firestop applications are tested

# WHEN A TESTED FIRESTOP SYSTEM DOES NOT MATCH A FIELD CONDITION, ENGINEERING JUDGMENTS NEEDED

# Engineering Judgments (EJ) are issued in accordance with the guidelines established by the International Firestop Council.

- Not to be used in lieu of available tested systems
- Must be issued by qualified technical personnel
- Based upon previously tested system(s)
- Based upon assumption that the recommended system (EJ) would pass if tested for the required rated period of time
- Issued only for a single job, location and application





## FIRESTOP SPECIAL INSPECTION MANDATED FOR HIGH-RISES AND RISK CATEGORY III & IV BUILDING

Buildings that require a Special Inspection of the installed firestopping have been defined in the IBC to be high-rise buildings, as well as Risk Category III, Substantial hazard to human life in event of failure and Risk Category IV buildings considered Essential facilities (IBC 2021 -1705.18)

 High-rise: Occupied floor > 75 ft. above lowest level of FD access

- Risk category III building:
   Substantial hazard to human life in event of failure (IBC 1604.5)
   Examples:
  - Elementary school > 250 occupants
  - Public assembly > 300 occupants
- Risk Category IV building:
   Essential facilities (IBC 1604.5)
   Examples:
  - Medical facilities (I-2) having surgery or emergency treatment
  - Buildings containing highly toxic materials that may endanger public



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# FIRESTOP PRODUCTS CAN PROVIDE ADDITIONAL BENEFITS TO MEET YOUR PROJECT NEEDS







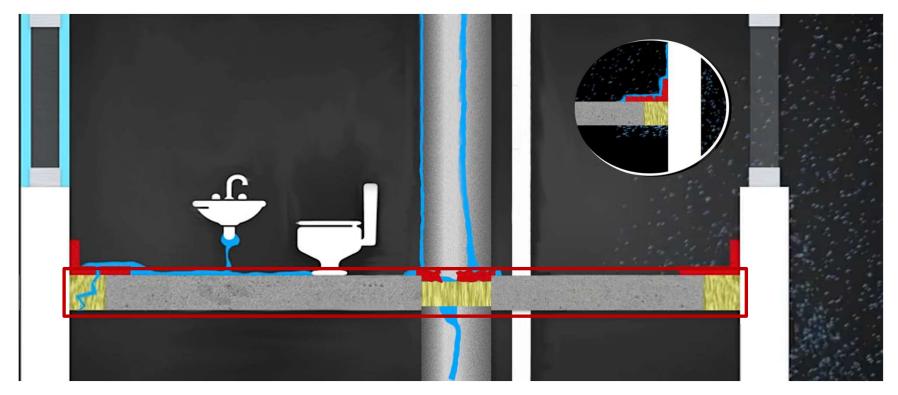




Proper Installation	Air Tightness	Movement	Water Resistance	Sound Attenuation
System Selection	Smoke & Toxic Gas	TOW (Vertical Loads)	Constructability	Privacy
Product Selection	Infection Control	EOS (Horizontal & Vertical Loads)	Containment	Health and Safety
Training/ Certification	Energy Savings	Penetrations (Expansion/Contraction)	Contamination (mold)	
Inspection	Pressure (+/-) Control	Seismic		

# WATER RESISTANCE HELPS COMBAT DAMAGE DUE TO RAIN OR PLUMBING DISASTERS





The impact of water damage can have a significant effect on the building, during or after construction

# FIRESTOP SYSTEM ARE SPECIFICALLY DESIGNED AND TESTED FOR WATER RESISTANCE



- W-Rating (optional test) determines effectiveness of a firestop system to restrict flow of water.
- Tested to resist up to 3 feet of water column for 72 hours
- Specify for floor penetration
- ASTM D6904 "Standard Practice for Resistance to Wind Driven Rain…"
- Specify for perimeter fire barrier system







# MOLD/MILDEW RESISTANT SEALANTS PROVIDE A HEALTHIER ENVIRONMENT

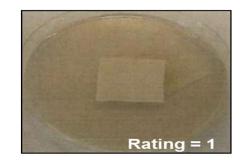
#### **Strengthen your Div. 078400 Specifications:**

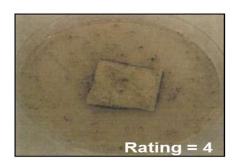
 Provide firestopping with mold and mildew resistance rating of 1 or less as determined by ASTM G21

#### **ASTM G21 Rating Scale**

Rating	Observed growth on specimen*		
0	None		
1	Trace of growth (< 10%)		
2	Light Growth (10% - 30%)		
3	Medium Growth (30% - 60%)		
4	Heavy Growth (60% - full coverage)		

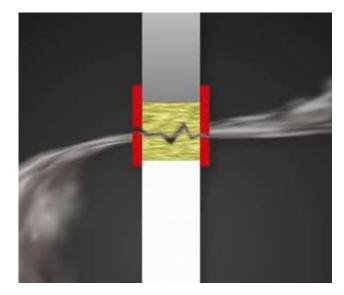
#### After 4 weeks



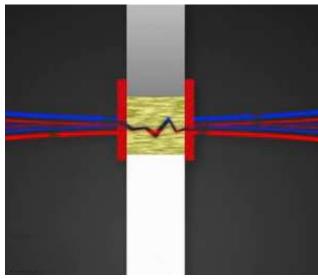


A rating of 0 is the best possible score per ASTM G21

# AIR RESISTANT SEALANTS CAN RESTRICT THE MOVEMENT OF SMOKE, AIRBORNE PATHOGENS, AND SOUND

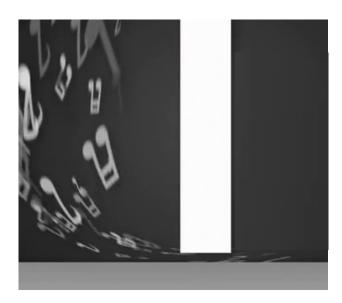


**Smoke penetration** 



Air Leakage results in:

- Moisture damage
- Hot/Cold spots
- Disease transmission

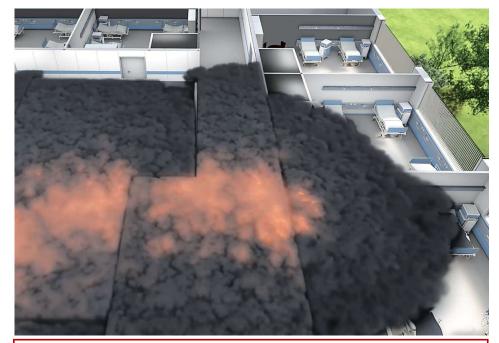


**Sound transmission** 

# LEAKAGE RATING (L-RATING) DETERMINES SUITABILITY TO RESTRICT PASSAGE OF SMOKE

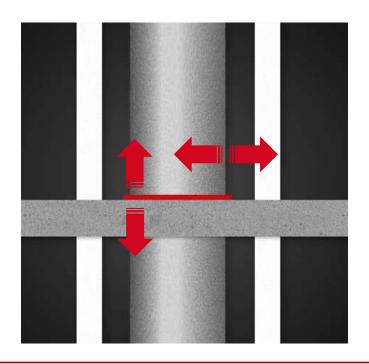


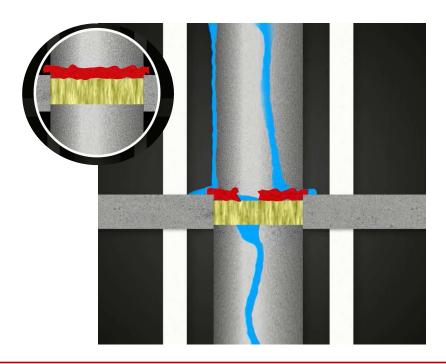
- Optional test per UL 1479. Required on smoke barriers (healthcare, prisons, etc.)
- Smoke Barrier is a continuous membrane, either vertical or horizontal, such as a wall, floor, or ceiling assembly that is designed & constructed to restrict the movement of smoke
- Measures amount of air leakage through the firestop system
- Test conducted at two temperature ranges:
  - Ambient temperature (simulates cold smoke away from fire origin)
  - 400°F (simulates warm smoke near fire origin)
- Measured in CFM: the lower the number, the better the L-Rating



Even with smoke as the leading killer in fires, this rating varies greatly from one system to another

# DYNAMIC MOVEMENT OCCURS WITH JOINTS AND PIPE PENETRATIONS





A new test method for measuring movement capabilities of through-penetration firestop systems is available with ASTM E3037 (published November 2016)

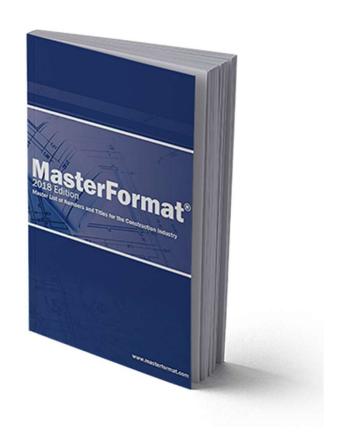
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### CSI MASTERFORMAT™ SPECIFICATION DIVISIONS

### **Specification Divisions**

- Division 7 Thermal & Moisture Protection
- Division 21 Fire Suppression
- Division 22 Plumbing
- Division 23 HVAC
- Division 26 Electrical
- Division 27 Communications
- Division 28 Electronic Safety & Security



# ENGAGE AN EXPERIENCED INSTALLER WHO IS QUALIFIED TO PERFORM THE FIRESTOP WORK

#### Part 1 General > Installer Qualifications

- Firestop Manufacturer Training
- FM 4991 Approved Firestop Contractor
- UL Qualified Firestop Contractor Program
- Manufacturer Accredited Firestop Specialty Contractor





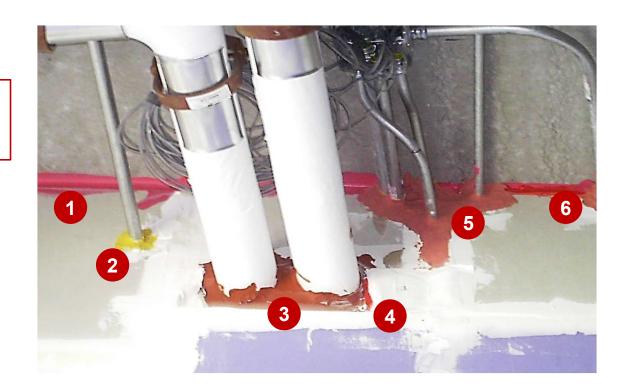




# SINGLE SOURCE MANUFACTURER OF FIRESTOP PRODUCTS HELPS ENSURE CONSISTENCY AND COMPATIBILITY

### Part 2 Products > Firestopping

Common error:
Six (6) different firestop products by three
(3) different manufacturers



## FIRESTOP PRODUCTS TYPES FOR PENETRATIONS/JOINTS

Part 2 Products > Materials

### **Traditional Sealants and Sprays**







### **Pre-formed firestop**







### TRADITIONAL VS. PRE-FORMED FIRESTOP SOLUTIONS

#### Part 2 Products > Materials

#### **Traditional Sealants and Sprays**

- Correct installation highly dependent on installer
- Surface cleaning/ tooling is required (and often neglected)
- Depth of fill material varies per installation/installer
- Shelf life and storage issues
- Prone to waste

#### Pre-formed firestop

- Easy fast installation
- Surface cleaning not required
- Depth of fill material always correct
- Pre-cured. No shelf life.
- Some devices can be re-penetrable
- Easy to inspect



# LABELING AND DOCUMENTATION OF EACH FIRESTOP APPLICATION IMPROVES QUALITY ASSURANCE

#### **Part 3 Execution > Identification and Documentation**



Label and record



**Create report** 



Cloud storage



Inspections

Software programs available to make tracking and documentation easier



### **AGENDA**

- Consequences of Building Fires
- Fire Safe Building Construction & Code Requirements
- Firestop System Testing & Listings
- Beyond Fire Resistance Secondary Attributes of Firestop
- Specifying Firestop Systems
- Hilti Firestop



# HILTI HAS A RANGE OF INNOVATIVE SOLUTIONS TO ADDRESS KEY FIRESTOP APPLICATIONS

### Standard

Hilti quality at economical price

#### **Premium**

Premium performance for a wide range of applications

#### **Ultimate**

Ultimate performance for demanding applications

Through-Penetrations















Joints







Edge of Slab







## HILTI'S BEST IN CLASS FIRESTOP SOLUTIONS





### HILTI FIELD ENGINEERING SUPPORT SERVICES

### **Technical Support Services**

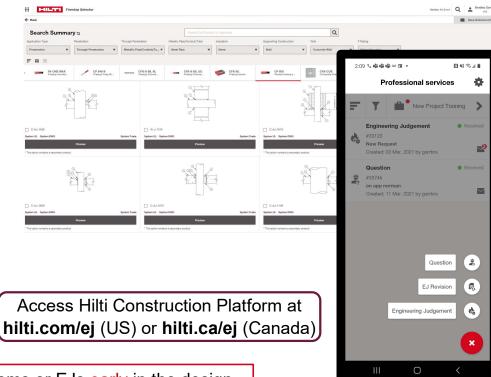
- Specifications updates
- Façade reviews during design (Firestopping + CW attachment options)
- Firestop system selection
- Continuing education courses and seminars
- Installer training
- Software training
- Engineering Judgment support
- Onsite testing and job consultation



# FIND FIRESTOP LISTINGS AND REQUEST ENGINEERING JUDGMENTS ON THE HILTI CONSTRUCTION PLATFORM

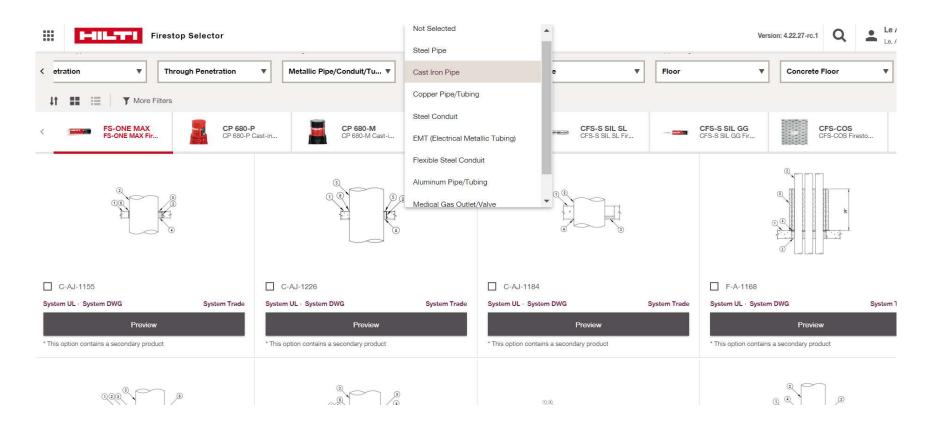
# The Hilti Construction Platform and Firestop Selector Mobile App enable users to efficiently:

- Create and submit Engineering Judgment requests
- Receive email notifications
- Check status of requests on the app
- Communicate with the Fire Protection Design Team
- Find firestop systems through direct, guided, and advanced search options
- Filter firestop systems by product

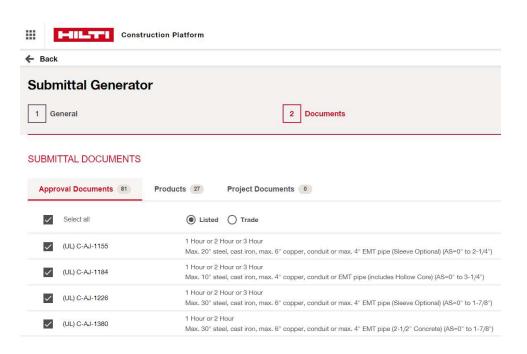


Secure tested firestop systems or EJs early in the design phase to ensure constructability and help prevent problems.

## FILTERING FOR DIFFERENT TYPES OF CONDITIONS



### **GENERATE SUBMITTALS**



#### **Penetration Firestopping Schedule**

System	Penetration Type	Barrier Construction	Description	F Rating	T-Rating	Product	Page #
C-AJ-1155	Metallic Pipe/Conduit/Tube	Concrete Floor; Concrete Wall	Max. 20" steel, cast iron, max. 6" copper, conduit or max. 4" EMT pipe (Sleeve Optional) (AS=0" to 2-1/4")	1 Hour; 2 Hours; 3 Hours	0 Hour	FS-ONE MAX	7
C-AJ-1575	Metallic Pipe/Conduit/Tube	Concrete Floor; Concrete Hollow Core Floor; Concrete Over Metal Deck; Concrete Wall; Minimum 2-1/2" Concrete Floor	Max. 30" steel, cast iron, max. 6" steel conduit, max. 4" EMT and copper (sleeve optional) (min. 2-1/2" concrete) (bottom of top access) (with and without backer)	1 Hour; 2 Hours; 3 Hours	0 Hour	FS-ONE MAX	9
C-AJ-5091	Metallic Pipe/Conduit/Tube	Concrete Floor; Concrete Wall	Max. 12" steel, cast iron, max. 6" copper pipe with nom. 2" glass fiber or max. 2" thick calcium silicate insulation (Steel sleeve optional) (AS=1/2" to 2-1/4")	1 Hour; 2 Hours	1 Hour	FS-ONE MAX	11
F-A-1016	Metallic Pipe/Conduit/Tube	Concrete Floor; Concrete Over Metal Deck; Minimum 2-1/2" Concrete Floor	Max. 6" steel, cast iron, copper, conduit, or max. 4" EMT pipe (2-1/2" Concrete)	1 Hour; 2 Hours	0 Hour	CP 680-M; CP 680-P	13
F-A-5017	Metallic Pipe/Conduit/Tube	Concrete Floor; Concrete Over Metal Deck; Minimum 2-1/2" Concrete Floor	Max. 4" steel or copper pipe with max. 2" thickness glass-fiber insulation (2-1/2" concrete)	1 Hour; 2 Hours	1 Hour	CP 680-M; CP 680-P	17



## **THANK YOU**

### Hilti can help you find technical solutions for your projects

#### US:

1-800-879-8000 – Customer Service usfirestopeng@hilti.com www.hilti.com/firestop

#### Canada:

1-800-363-4458 – Customer Service CAFireStop@hilti.com www.hilti.ca/firestop

#### Ask Hilti:

https://ask.hilti.com

