

### FCIA Webinar Series

### An Introduction to Firestop Systems Selection & Analysis

Bill McHugh, Technical Director of FCIA Rich Walke, CTI, Consultant to FCIA



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March 26, 2025

### FCIA's DIIM ™ Worldwide

- UL/ULC, FM 4991 Contractor Programs
- UL Qualified Fireproofing Contractor Pgm.
- ASTM Inspection Standards
- IAS AC 291 Inspection Agency Accreditation Program
- Firestop Education Program
  - Contractor, Inspection Agency, AHJ, Others
- **Specs, etc.** for Specifiers, AHJ's, Building Owners, Firestop Contractors & Inspection Agencies





### FCIA – Firestop Contractors International Association

- FCIA @ ASTM, ICC, NFPA, UL & ULC STP's, more...
- Advocacy....







### FCIA's DIIM ™ Worldwide

- FCIA's --
- Life Safety Digest
- Firestop Manual of Practice
- Firestop Education Program •\$1000/company/year...UNLIMITED USE
- Education for FM & UL Firestop Exams
- Code Development
- Standards Development
- Much more...







### FCIA's NEWEST PROGRAM -

• Education for Firestopping Careers!!

- FCIA's Firestop Education Program (FEP)
  - 3.5 Hours Level 1 LAUNCHED
  - 16.5 Hours Level 2 LAUNCHED
  - 4.0 Hours Level 3 LAUNCHED
  - ? Hours Level 0 Soon!
  - 3.5 Hours Level 1 Spanish Soon!
- 24+ Hours Education...
- 30++ Hours = Education & Exams
  - Members Unlimited Subscription
  - Non-Members Visit FCIA.org
  - SPECIFIERS, Code Officials, Fire Marshals FREE Level 1



#### **FREE RESOURCES**

- Info@FCIA.org REQUEST FREE STUFF
  - FREE Life Safety Digest
  - •FREE MOP, if you Qualify....
  - Firestopping DIIM<sup>™</sup> Story www.FCIA.org/About





### FCIA – Firestop Contractors International Association

- India
- United Arab Emirates
- Qatar Doha
- Canada
- Mexico –
- Saudi Arabia
- Australia/New Zealand–Far East







**FCIA** 

### **"TOTAL FIRE PROTECTION"**

- Effective Compartmentation
  - Fire Barriers, Fire Walls, Floors, Smoke Barriers
  - Firestopping, Fire Dampers, Swinging and Rolling Fire Doors, Fire-Rated Glazing
  - Fire-Resistive Protection for Ductwork
- Detection & Alarm Systems
- Sprinkler Suppression Systems
- Education & Egress
  - Building Owners & Managers, Building Occupants and Firefighters



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### **Building & Fire Code Requirements**

International Codes –

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- New and Existing Buildings International Building Code Chapter 7
- International Fire Code Chapter 7
- NFPA 5000 101 Chapter 8
- National Building Code of Canada
- UAE Fire and Life Safety Code Chapter 1, Section 21
- Other Worldwide Codes
- Minimum requirements Construction & Maintaining Protection

### **Barrier Continuity SYSTEMS**

- Products Become Systems Based on Testing
  - Fire & Smoke Barriers Fire Separations
    - •ASTM E119 / UL 263 / ULC-S101
  - Firestopping
    - •UL 1479 / ASTM E814 / ULC-S115, UL 2079 / E1966 / ULC-S115, E2307, E2837, E3037...test methods..."
  - Swinging/Rolling Fire Doors UL 10B & UL 10C / NFPA 252
  - Fire Rated Glazing UL 9 / NFPA 257, UL 263 / ASTM E119
  - Fire/Smoke Dampers UL 555, UL 555S, UL 555C
- SYSTEM Testing = Suitability Statement

#### Continuity

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#### **Effective Compartmentation Features**













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



1. Floor or Wall Assembly — Min 2-1/2 in. (64 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600 - 2400 kg/m<sup>3</sup>) concrete floors or min 3 in. (76 mm) thick reinforced lightweight or normal weight concrete walls. Wall may also be constructed of any UL Classified Concrete Blocks\*. Max diam of opening 9 in. (229 mm).

See Concrete Blocks (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. Steel Sleeve — (Optional) - Nom 9 in. (229 mm) diam (or smaller) Schedule 10 (or heavier) steel sleeve cast or grouted into floor or wall assembly. Steel sleeve may be installed flush or may project max 2 in. (51mm) beyond the floor or wall surfaces. As an alternate, nom 9 in. (229 mm) diam (or smaller) sleeve fabricated from nom 0.019 in. (0.48 mm) thick galv steel cast or grouted into floor or wall assembly flush with floor or wall surfaces.

3. Through Penetrants — One metallic pipe to be installed concentrically or eccentrically within opening. Penetrant to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes may be used: A. Steel Pipe — Nom 4 in. (102 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.

- B. Iron Pipe Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.
- C. Copper Tubing Nom 2 in. (51 mm) diam (or smaller) Type L (or heavier) copper tubing.
- D. Copper Pipe Nom 2 in. (51 mm) diam (or smaller) Regular (or heavier) copper pipe.

#### F Rating is 2 Hr for Penetrants A and B. F Rating is 1 Hr for Penetrants C and D.

4. Pipe Covering\* — Nom 1-1/2 in. (38 mm) thick (or less) hollow cylindrical heavy density glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with product. Annular space between the pipe covering and periphery of opening or sleeve shall be min 1/2 in. (13 mm to 25 mm).

See Pipe and Equipment Covering - Materials - (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a smoke Developed Index of 50 or less may be used.

T Rating is 3/4 Hr for nom 1-1/2 in. (38 mm) thick pipe covering for penetrants A and B. T Rating is 1 Hr for nom 1-1/2 in. (38 mm) thick pipe covering for Penetrants C and D. T Rating is 0 Hr for all Penetrants when pipe coverings less than nom 1-1/2 in. (38 mm) thick.



- Code Defined Terms
  - Exterior Walls
  - Fire Walls
  - Fire Barriers
  - Fire Partitions (Not in NFPA)
  - Smoke Barriers
  - Smoke Partitions
  - Archaic Assemblies

### **Existing Buildings**

- Archaic Assemblies
  - Clay Tile Block
  - •Gypsum Block
  - Plaster
  - Clay Tile/Concrete
  - Unidentified Assemblies
- Tested ... Calculated ... Prescriptive

- Code Defined Terms
  - Fire Barrier, Fire Wall
  - Smoke Barrier –

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- IBC Hourly Rated, 'restrict' movement of smoke Quantified Firestop "L" Rating
  - < 5 cfm/sf (IBC 2006)
  - < 50 cfm, 100 sf of Wall Area (IBC 2009)

#### •NFPA – ... 'restricting' the passage of smoke

- Hourly Rated, Quantified Firestop L Rating Chapter 8
- NO quantified "L" Rating ... Healthcare Chapter
- Continuous, Barrier to Barrier, ... through concealed spaces
- Not always fire-resistance-rated

#### Smoke Partition –

- IBC Continuous barrier, not fire rated...'limit' the transfer of smoke
- NFPA Continuous membrane that is designed to form a barrier to '*limit' the transfer of smoke*

#### Fire-Resistance-Rated Assembly Penetrations, Fire-Resistive Joint Systems

• **714.2 Installation.** A *listed penetration firestop* system shall be installed in accordance with the manufacturer's installation instructions and the listing criteria.

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- **715.2 Installation.** Systems or materials protecting *joints* and voids shall be installed in accordance with Sections 715.2.1 and 715.2.2.
  - **715.2.1 List system installation.** *Listed fire-resistant joint systems,* perimeter fire containment systems and *continuity head-of-wall systems* shall be securely installed in accordance with the manufacturer's installation instructions and the listing criteria in or on the joint or void for its entire length so as not to dislodge, loosen or otherwise impair its ability to accommodate expected *building* movements and to resist the passage of fire and hot gases.
  - **715.2.2 Approved materials installation.** *Approved* materials protecting voids shall be securely installed in accordance with the manufacturer's installation instructions in or on the void for its entire length so as not to dislodge, loosen or otherwise impair its ability to accommodate expected *building* movements and to resist the passage of fire and hot gases. [2024 IBC 714, 715]]

- Wall or Floor/Horizontal Assembly Construction
  - Type of Construction
  - Thickness
  - Rating
  - "Breach"
    - •Type
    - •Size
    - •Round, Rectangle, Square
  - Sleeves



STI Graphic

- Penetrating Item(s)
  - Type
  - Size
    - •Diameter
    - •Separation when Multiple Penetrating Items
    - •Wall thickness
  - Angle
  - Quantity
  - Type Power, Communication



STI Graphic



Hilti Graphic

3M Graphic

- Pipe Coverings
  - Type
  - Manufacturer
  - Product Identification
  - Thickness
- Annular Space
  - Min and Max between Penetrating Item and Periphery of Opening
  - Min and Max between adjacent Penetrating Items



STI Graphic

- Packing/Damming/Backing Materials
  - Type
  - Thickness
  - Compression
- Fill Material(s)
  - Type
  - Manufacturer
  - Product Identification
  - Location



**KBS** Graphic

- Fill Materials, cont'd.
  - Thickness
  - Attachment Method
  - Gaps allowed
  - Spiral wrap, Butt Wrap
  - Bag, Brick Orientation
  - Etc.
- "Firestop Systems Protect Fire-Resistance Continuity"





### **Firestopping for Continuity – Firestop Products**

- Sealants
  - Silicone, Latex, Intumescent
- Wrap Strips
  - "Thick, Thin, Wide, Less Wide"
- Putties
- Pillows
- Composite Sheets
- Bricks / Plugs
- Pre Fabricated Kits
- Mortar
- Spray Products
- Tapes



### **Firestopping for Continuity – Firestop Products**

#### Key is using the right Product(s) AND SYSTEM for the right application!!!



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- Rating Based on Code and/or Specs
  - F, T, L, W and/or M Rating
- Product Physical Properties Matching Environmental Conditions
- *= Rated Firestop System when Installed To Manufacturer's Instructions, and Tested and Listed Designs*



STI Graphic

### Firestopping for Continuity Products become SYSTEMS Based on Testing

- 'Field Erected Construction...Tested to...'
  - Standards UL 1479 / ASTM E814 / FM 4990, UL 2079 / ASTM E1966, ASTM E2837, ASTM E2307
  - F Rating Flame
  - T Rating Temperature
  - •L Rating Smoke
  - W Rating Water
  - M Rating Movement



### Conditions of Acceptance F Rating

- Passage of Flame
- Hose Stream

### Conditions of Acceptance T Rating

- Passage of Flame
- 325°F (180°C) Temperature Rise
- Hose Stream

### L Rating (Optional)

- Air Leakage Rate at Ambient Temperature
- Air Leakage Rate at 400°F (204°C)

### W Rating (Optional)

- Optional program, applicable to incidental water
- 3 Ft. WC (0.91 M WC) Pressure Head / 72 Hr Exposure
- Firestop subjected to water exposure, followed by standard fire and hose stream tests
- Firestop systems assigned a W Rating

### M Rating (Optional)

- Applicable to movement of penetrating item/Assembly
- Penetrating item moved perpendicular to and/or in plane of barrier - ASTM E3037
- After movement, fire and hose stream test
- Firestop systems M Rating
  - Rating within plane based on percentage of annular space
  - Rating perpendicular to barrier based on dimension

### M Rating (Optional – ASTM Image)





### Barrier Continuity Products become SYSTEMS

- Fire Rated Systems Directories
  - FM Approvals
  - Intertek

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UL/ULC Product iQ Online Directory

Systems Selection & Analysis...Not as easy as it looks...

UL Product <b>iQ</b> ™		SEARCH	MY SEARCHES M
Dashboard / Search / THROUGH-PENETR	ATION FIRESTOP SYSTEMS   UL Product iQ		
XHEZ.C-AJ-8038 - THROUGH-PENETRATION FIRESTOP SYSTEMS			
DETAILS	RESOURCES	TAG	s



INTERTEK DIRECTORY OF BUILDING PRODUCTS

Listed Products, Code Compliance Research Reports (CCRRs),


## **System Selection Using the UL Directories**

## **UL Product iQ**



#### Organization of Listing information for Fire Resistance, and Firestop, Joint and Perimeter Fire Cont. Systems

- Guide information
- Designs, systems or assemblies
- Product categories (indexed by manufacturer's names)

# **Guide Information**

- Equipment, materials or systems included in the category
- Intended use, restrictions or supplemental information that apply
- Standard(s) used to evaluate products under the category
- Listing or Classification Mark information for the category

# **Designs or Systems**

- Each fire resistance design, firestop system, joint system and perimeter fire containment system contains specific construction features and ratings
- Many designs and systems contain various options and various ratings
- Must be followed exactly for rating to apply

## **Product Categories**

- Each product category describes some generic family of products (e.g. Gypsum Board)
- Each product category covers products used in fire resistance designs, firestop systems, joint systems, perimeter fire containment systems
- Each product category contains manufacturers and designations of products tested for each of these uses and as specified in the designs or systems

# **Product iQ – UL's New Online Directory**

- Replaces the old Online Certifications Directory which was developed in 1999
- Identifies Certified products, designs, systems, assemblies and constructions
- Helps you achieve code compliance
- Is continuously updated
- Requires registration to create user account
- Basic Service no charge for use

# **Product iQ – UL's New Online Directory**

- Paid Subscription Service provides more features
  - Save Searches
  - Tags and Groups
  - Confirmation Letters
- https://iq.ulprospector.com/en/
- Vanity addresses
  - www.ProductiQ.UL.com
  - www.UL.com/ProductiQ
  - www.UL.com/PiQ

## UL Product iQ – www.ul.com





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Product iQ is a commercial pla This registration form is tailore please read the information pr regarding free accounts.	tform for product information, including UL's safety certifications. ed to industry professionals. If you are a non-commercial user, compts for help completing certain fields. Additional information	
Upon submission of this form, receive immediate access to Pr please check your spam folder.	you will receive an email with an activation link. Click the link and roduct iQ. If you do not receive the email within a few minutes,	
	CREATE YOUR ACCOUNT	Helpful Hints
First Name*	CREATE YOUR ACCOUNT Last Name*	Helpful Hints Read the information
First Name*	CREATE YOUR ACCOUNT Last Name* Last Name	Helpful Hints Read the information prompts for help completing certain fields.
First Name * First Name Company Email * ?	CREATE YOUR ACCOUNT Last Name* Last Name	Helpful Hints Read the information prompts for help completing certain fields. After submitting this form,
First Name * First Name Company Email *  user@yourcompany.com	CREATE YOUR ACCOUNT Last Name* Last Name Q	Helpful Hints Read the information prompts for help completing certain fields. After submitting this form, check your inbox for an email with your activation
First Name * First Name Company Email *  user@yourcompany.com Company Name *	CREATE YOUR ACCOUNT Last Name* Last Name Q	Helpful Hints Read the information prompts for help completing certain fields. After submitting this form, check your inbox for an email with your activation link to access this site.
First Name* First Name Company Email *   user@yourcompany.com Company Name *  Company Name	CREATE YOUR ACCOUNT Last Name* Last Name Q	Helpful HintsRead the information prompts for help completing certain fields.After submitting this form, check your inbox for an email with your activation link to access this site.If you are missing the activation email, look in
First Name* First Name Company Email *   user@yourcompany.com Company Name *   Company Name Job Title *	CREATE YOUR ACCOUNT Last Name* Last Name Q	Helpful Hints Read the information prompts for help completing certain fields. After submitting this form, check your inbox for an email with your activation link to access this site. If you are missing the activation email, look in your email spam folder.



## UL Product iQ Cont. Smart Search

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## UL Product iQ Cont. iQ Plus Search

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UL Product <b>iQ</b> ™			SEARCH	MY SEARCHES	MY TAGS	RICH 🖨	(4)
	Thermal Barrier System This category covers ther for installation as protect These systems are investion	ems (XCLF) mal barrier systems consisting of components ion for electrical wiring systems specified in the gated with respect to heat transmission	and materials intended e individual systems.				
	UL Evaluation Repor	ts					
	Ventilation Duct Asso This category covers the assemblies are investigat compartment to another Windstorm Rated Bu This category covers wind exterior envelope of struct	Ventilation Duct Assemblies This category covers the fire-resistive performance of ventilation duct assemblies. These assemblies are investigated with respect to their ability to resist the spread of fire from one compartment to another without the aid of fire dampers. Windstorm Rated Building Products This category covers windstorm-rated exterior building products intended to protect the exterior envelope of structures in the event of hurricanes or tornadoes.					
	Other		>				
	PIQ DATABASE INFO						
	2	C					
	229327 Document Count	15 Jan, 2019 Last Update	68474 Companies Listed				

#### Smart Search for a firestop system if system number is known

• System No. C-AJ-1014



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UL Product <b>iQ</b> ™			SEARCH MY SEARCH	S MY TAG	s RICH 🏟 🕕
REFINE RESULTS	Dashboard /	Search			Product iQ
Build or filter your results by keyword and/or adding criteria like document type, file number and country name.	▶ 2 Results :: System Number: C-AJ-1014				tip
Keyword     Filter by Keyword     Search	Document Name ≎	Company Name <b>≑</b>	UL CCN Description \$	My Tags ≎	Guided Keyword
System Number	XHEZ.C- AJ-1014	3M Company	THROUGH-PENETRATION FIRESTOP SYSTEMS		Search Intuitive
• Add Filter	XHEZ7.C- AJ-1014	BEELE ENGINEERING B V	THROUGH-PENETRATION FIRESTOP SYSTEMS CERTIFIED FOR CANADA		suggestions to expedite your search
Cancel Reset Save Search	« <b>1</b> »			1 of 1	

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iQ Plus Search under Building Materials and Systems for firestop systems based on specific parameters

- 4-1/2 in. concrete slab floor assembly
- 3 hr T rating
- 4 in. diam vented ABS plastic pipe
- Firstopping material supplied by the Specified Technologies Inc.



## UL Product iQ Cont. iQ Plus Search



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UL Product <b>iQ</b> ™				SEARCH MY SEARCHES MY	TAGS RICH 🗢 🕕
REFINE RESULTS Build or filter your results by keyword a adding criteria like document type, file and country name.	and/or number	Dashboard / Search 13802 Results :: Bole	Template: Firestop Systems :: No Search Criteria		
Search Template Firestop Systems	0	Document Name \$	UL CCN Description \$	Related Images ≎	My Tags \$
Keyword		XHEZ.C-AJ-0003	THROUGH-PENETRATION FIRESTOP SYSTEMS		
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washers.

4. Firestop Device\* — (Not Shown) As an option to the wrap strip and the steel collar (Item Nos. 3B and 3C), a firestop device consisting of steel collar lined with an intumescent material sized to fit the specific diam of the nonmetallic through penetrant may be used. Device shall be installed in accordance with the in chall be installed on the bottom side of the concrete floor. In wall assemblies, the device shall b diam steel fender

ar side of the concrete wall. Device shall be secured to concrete surface with 1/4 in. (6 mm) diam by min 1-1/4 in. (32 mm) long steel concrete screws in conjunction

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

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

Last Updated on 2012-11-26

iQ Plus Search under Building Materials and Systems for firestop systems based on specific parameters

- 2 hr gypsum board steel stud wall assembly
- 2 hr F rating
- Steel pipe sleeve
- 6 in. diam copper tube
- Firstopping material supplied by the Hilti



iQ Plus Search under Building Materials and Systems for firestop systems based on specific parameters

- 2 hr gypsum board steel stud wall assembly
- 2 hr F rating
- Sheet metal sleeve
- 4 in. diam copper tube
- 1 in. thick fiberglass pipe covering
- Firstopping material supplied by the 3M



## Barrier Continuity I – Installation – Listed Systems



- Variances to Systems at Site? Now What...
  - First Action in Process
    - •Find another system Same Manufacturer
    - •Find another system Different Manufacturer
    - •If no system exists in either case....
  - Second Action
    - Engineering Judgment "EJ"
    - •Equivalent Fire Resistance Rated Assembly "EFRRA"
  - Based on engineering, IFC Protocol

International Firestop Council – Manufacturers – www.firestop.org

IFC Guidelines for Evaluating Engineering Judgment Guidelines

<sup>6</sup>Construction industry professionals, building officials, fire officials, firestop contractors and other stakeholders need appropriate guidelines for evaluating and using such judgments.<sup>2</sup>

As such, IFC developed Recommended IFC Guidelines for Evaluating Firestop Systems in Engineering Judgments.

#### IFC EJ Guidelines for the Evaluation ...

#### **Engineering Judgments for firestop systems should:**

- Not a substitute for existing designs
- Emphasizes importance of tested designs
- Should be issued only by those who know the components
- Based on sound engineering practices and knowledge of performance of the designs
- Based on interpolation of previous testing
- Issued only for a specific jobsite
- Presented in clear detail



#### **Engineering Judgments/EFRRA's – More Thoughts:**

- Manufacturer Involved
  - ONLY Manufacturer, or
  - Manufacturer in Conjunction with...
- Based on Similar Testing
- Do not 'expand' listing too far
- AHJs' Approve, based on 104.2.3
- Might require Professional Engineer's Stamp
- Require Manufacturer Statement,

"WILL PASS if Subjected to ...."



## **Questions??**





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#### **Thanks for Attending!!!**

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