

# FCIA Webinar

## Firestop & Fire Resistance DIIM

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# Outline

- FCIA – DIIM – Firestopping
  - Who is FCIA?
  - Total Fire Protection
  - Design - Specs, Codes, Testing, Products
  - Installation – FM, UL/ULC Programs
  - Inspection – ASTM Inspection Standards  
IAS AC 291, Inspector Qualifications
  - Maintenance – Fire Codes
  - Firestopping for Safety – A Quality Protocol
    - DIIM

# FCIA – Firestop Contractors International Association

- FCIA Members
  - Firestop Contractors
  - Firestop Manufacturers
  - Firestop Consultants
  - Firestop Distributors, Reps, Friends
- FREE MOP/Spec - Specifiers @ AE, Independent
- FREE Life Safety Digest
- 3<sup>rd</sup> Party Contractor/Inspection Company Accreditation Programs
- Chair, ASTM Inspection Standards
- Tools for Specifiers



# “TOTAL FIRE PROTECTION”

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

# Firestopping for Safety“DIIM”

- Properly *Designed* and Specified Firestopping FCIA  
- 07-84-00 - Specification
- *Tested and Listed Systems* - ASTM E 814 / UL  
1479 – ASTM E 1966/UL 2079, FM 4990, ULC-S-  
115, ASTM E2837, E2307, E3037, more
- Professional *Installation* – FCIA Member,  
FM 4991 Approved, UL/ULC Qualified Contractors
- Properly *Inspected* - ASTM E 2174 / 2393 Protocol  
by IAS AC 291 Accredited Inspection Agencies
- *Maintained & Managed* - Annually - FCIA  
Members – NFPA 1, 101, International Fire Code

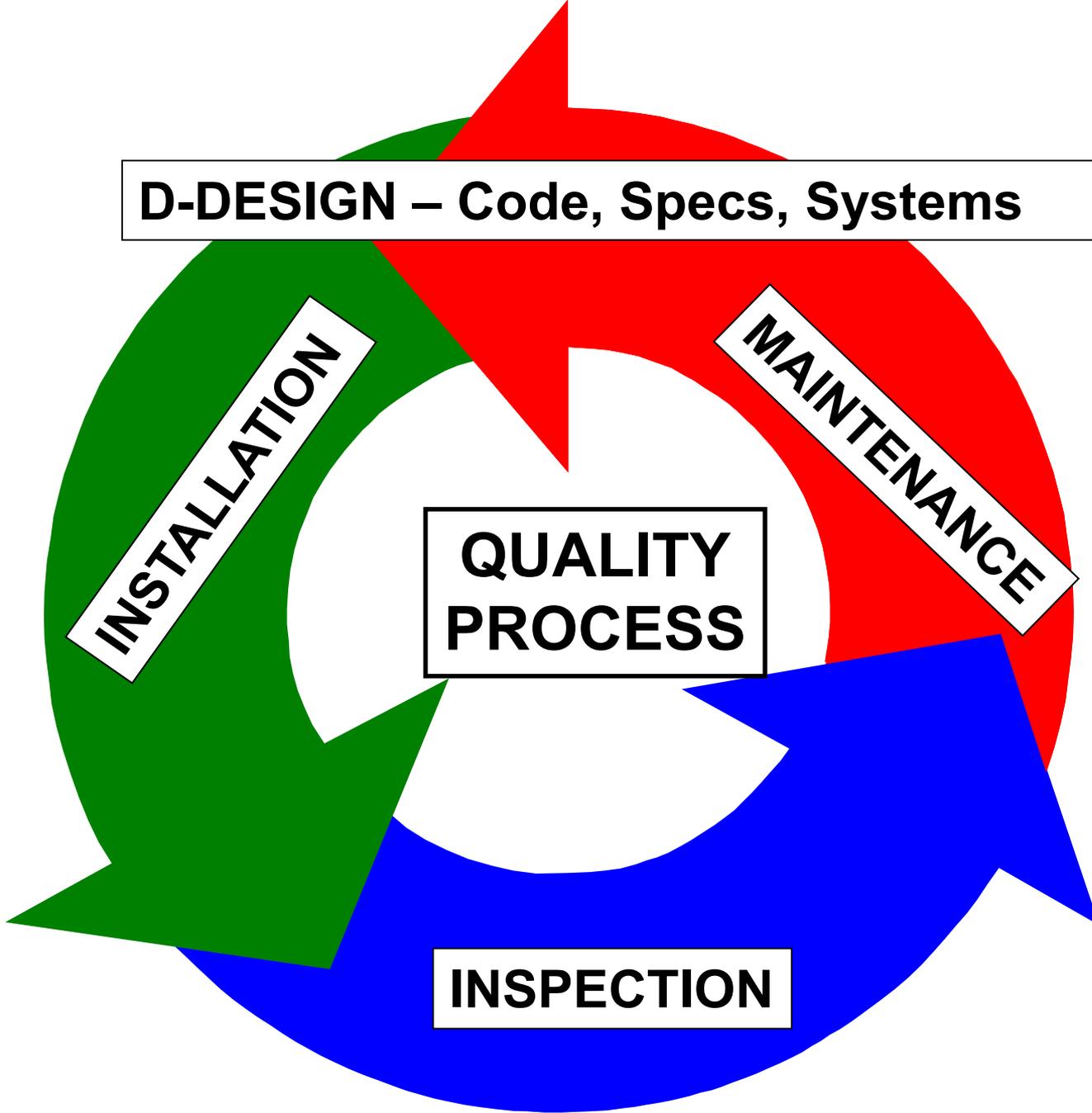
**D-DESIGN – Code, Specs, Systems**

**INSTALLATION**

**MAINTENANCE**

**QUALITY  
PROCESS**

**INSPECTION**



# Building & Fire Code Requirements

- International Codes –
  - New and Existing Buildings International Building Code – Chapter 7
  - International Fire Code – Chapter 7
- NFPA 5000 – 101- Chapter 8
- National Building Code – Canada
- UAE Fire and Life Safety Code – Chapter
- *Minimum requirements - Construction & Maintenance*

# Building & Fire Code Requirements

- Codes Define Fire Resistance ....
  - **Fire Resistance** – Time, in minutes or hours that materials or assemblies have withstood a fire exposure as determined by tests, methods based on tests, or this code ....
  - IBC, IFC Chapter 7
  - NFPA 101, 5000 - Ch 8.
  - NFPA 1 – Chapter 12
  - **ICC adds... “Systems” – *FCIA Submitted, Approved at ICC***

# Building & Fire Code Requirements

- Fire-Resistance Rated Barriers – Defined Terms
  - *Exterior Walls*
  - *Fire Walls*
  - *Fire Barriers*
  - *Fire Partitions (Not NFPA)*
  - *Smoke Barriers*
  - *Smoke Partitions*
  - *Archaic Assemblies*

# Building & Fire Code Requirements

- *Archaic Assemblies*
  - *Clay Tile Block*
  - *Gypsum Block*
  - *Plaster*
  - *Clay Tile/Concrete*
  - *Unidentified Assemblies*

# **Building & Fire Code Requirements**

- **Archaic Assemblies**
  - **ICC International Existing Building Code**
  - **NFPA Archaic Construction Book**
  - **Fire-Resistance Directories**
- **EJ/EFRRRA's Required**

# Building & Fire Code Requirements

- Smoke Barriers differ from Smoke Partitions?
  - **Smoke Barrier** –
    - **IBC – Hourly Rated, Quantified Firestop “L” Rating**
      - <5cfm/sf (IBC 2006)
      - < 50 cfm, 100sf 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...’retard’.
    - NFPA – Continuous membrane that is designed to form a barrier to *limit the transfer of smoke....*

# Building & Fire Code Requirements

- What Gets Used Where?
  - **Smoke Barrier** –
    - IBC - Firestop System With L Rating
    - NFPA – Firestop System with L Rating
  - **Smoke Partition**
    - IBC – Smoke and Sound OR Firestop System with L Rating
    - NFPA - Smoke and Sound OR Firestop System with L Rating

# Continuity – Barriers, Walls & Horizontal Assemblies

- Fire Walls and Floors –

- *Assemblies Consist of ....*

- Concrete
    - Concrete Block
    - Plaster
    - Gypsum Block
    - Gypsum Board / ‘Drywall’
    - Floor/Ceiling Assemblies

***“Tested & Listed Wall/Floor Systems”***



# Charging Language - General

**701.1 Scope.** The provisions of this chapter shall govern the materials, systems and assemblies used for **structural *fire resistance*** and fire-resistance-rated construction **separation of adjacent spaces** to safeguard against the spread of fire and smoke within a building and the spread of fire to or from buildings. [IBC 2018 701.1]

# Are Fire-Resistance Rated Assemblies to be Marked? YES

**703.7 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 located within 15 feet (4572 mm ) of the end of each wall and at intervals not exceeding 30 feet (9144 mm) measured horizontally along the wall or partition; and
3. Include lettering **not less than 3 inches (76 mm ) in height with a minimum 3/8 inch (9.5 mm) stroke** in a contrasting color 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.

**Mark Walls with Code Defined Terms? NOT IBC; YES NFPA**

# International Building Code, Section 703.7

**FIRE AND/OR SMOKE BARRIER – PROTECT ALL  
OPENINGS**



**Heckler Slide**

# NFPA 101 - Life Safety Code, Section 8.2.2.5 (2018 edition)

**FIRE BARRIER – 1  
HOUR**

Identify the wall  
type and its fire  
resistance, as  
applicable

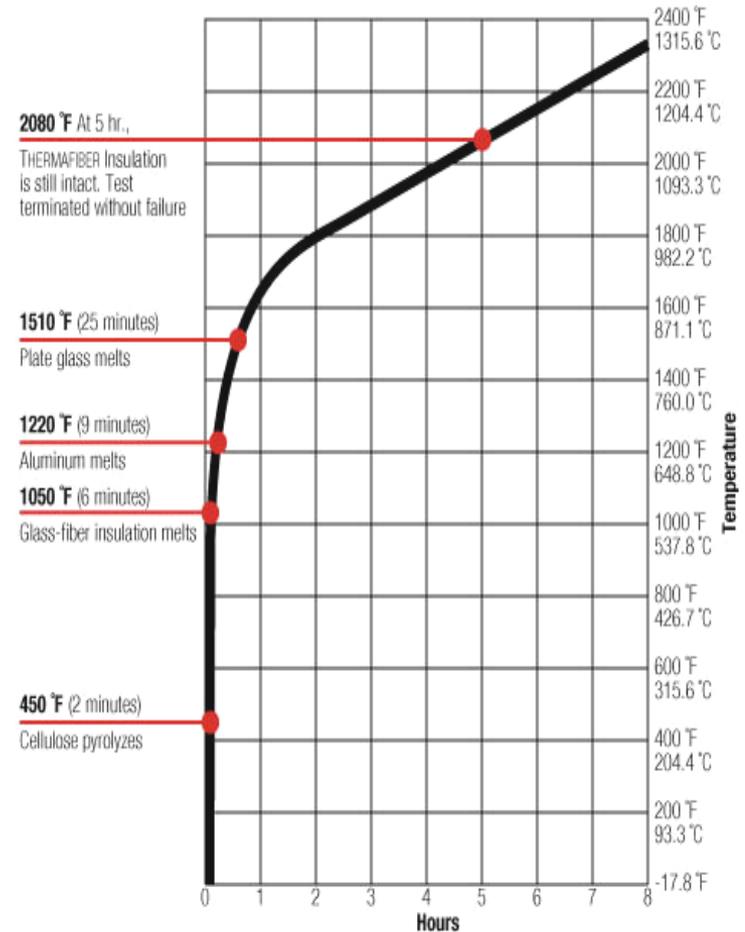


**Heckler Slide**

# IBC – Chapter 7

**703.2 Fire-resistance ratings.** The *fire-resistance rating* of building elements, components or assemblies shall be determined in accordance with the test procedures set forth in **ASTM E119 or UL 263** or in accordance with Section 703.3. The *fire-resistance rating* of penetrations and *fire-resistant joint systems* shall be determined in accordance Sections 714 and 715, respectively.

[IBC 2018 703.2]



**Thermafiber Image**

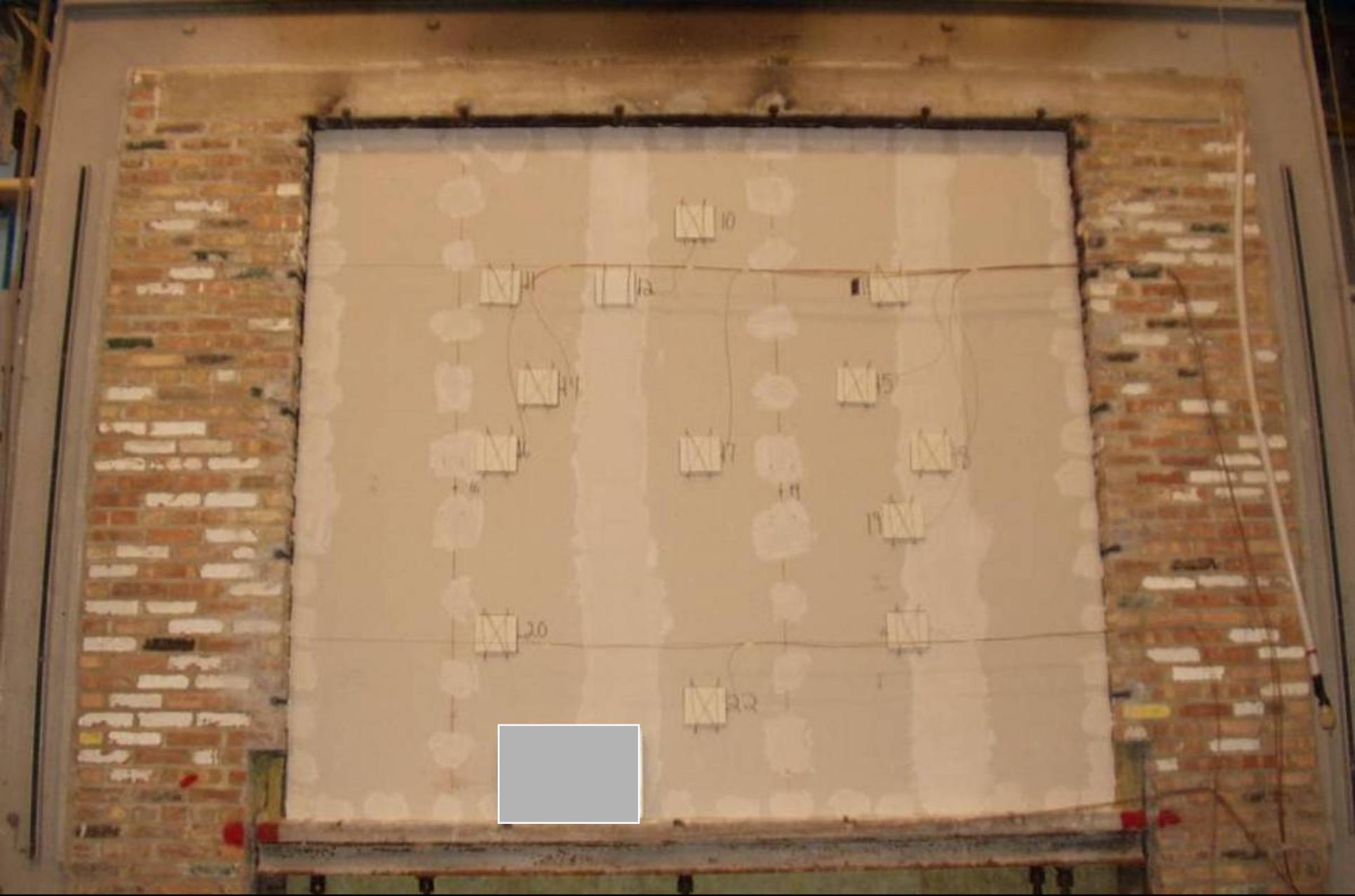
# Fire Testing

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- ANSI/UL 263 or ASTM E119
  - Large Scale – Structural – Compartmentation
  - Small Scale – Penetrations
  - Hourly = Time
  - 30 minutes to 4 hours
  - Restrict Temperature Rise of **Structural Element**
  - Compartmentation / Containment



**UL Slide**



**UL Slide**



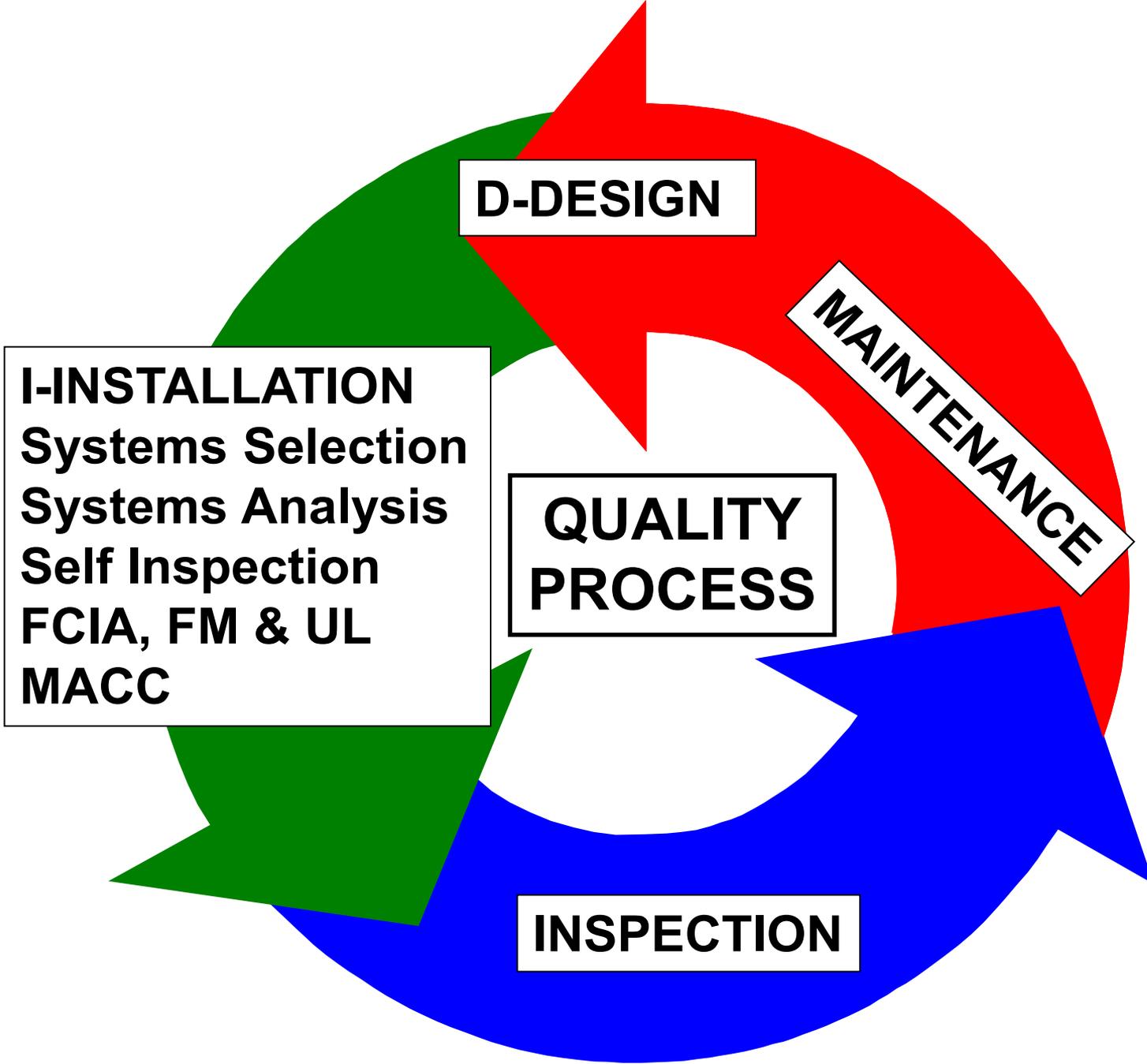
**UL Slide**



UL Image

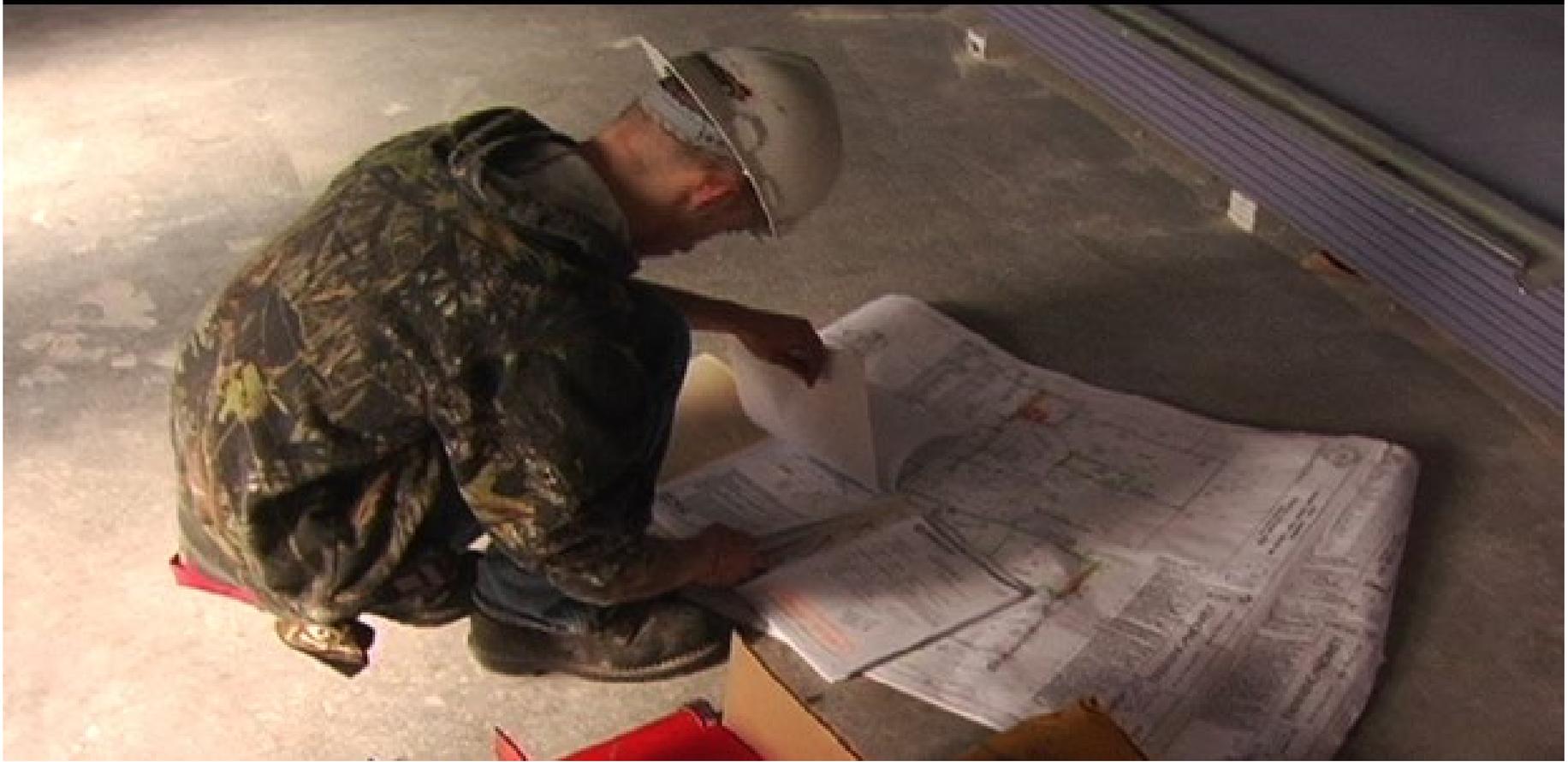
# Fire Resistance SYSTEMS

- **Products Become Systems Through....**
- **Test Standard References**
  - **Structural Elements & Assemblies-** ASTM E 119, UL 263
  - **Fire & Smoke Barriers** - ASTM E 119, UL 263
  - **Firestopping** - ASTM E 814 / UL 1479, ULC-S-115, UL 2079, E-1966, E-2307, **E-2837**, ...test method...”
  - **Fire/Smoke Dampers** - UL 555, UL 555S
  - **Swing/Rolling Fire Doors** - UL 10B, 10C
  - **Fire Rated Glazing** - UL 9, NFPA 252
- **SYSTEM Testing = Suitability statement for use of a product in a specific system/design application**



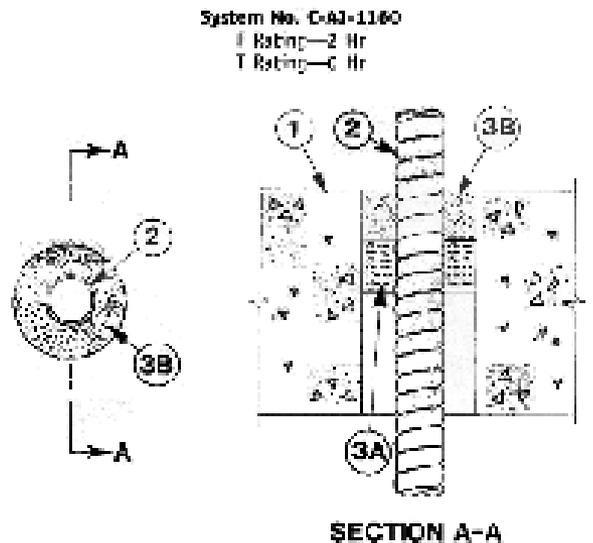
# Firestopping for Continuity

## I – Listed Systems



# Firestopping for Continuity

## I – Classified Systems



- Floor or Wall Assembly**—Min. 4-1/2 in. thick lightweight or normal weight (100 to 150 pcf) concrete. Will may also be constructed of any UL Classified Concrete Block\*. Diam. of circular through opening in floor or wall assembly to be 1/8 in. to 1-1/2 in. larger than diam. of flexible metal conduit (Item 2) installed in through opening. Max. diam. of opening is 6 in. See Concrete Block (CAC) category in the Fire Resistance Directory for names of manufacturers.
- Through Penetrating Product**—Max. 4 in. diam. (or smaller) pipe, or max. 3/4 in. diam. (or smaller) aluminum Flexible Metal Conduits. Max. one flexible metal conduit to be installed near center of circular through opening in floor or wall assembly. Flexible metal conduit to be rigidly supported on both sides of floor or wall assembly.
- Packing Material**—Max. 1 in. thickness of organic (plum tree silk) fiber Marled or mineral wool batt insulation. Insulation to be secured into 1 in. from top surface of floor or from both surfaces of wall.
- FILL Void or Cavity Material**—CAULK—Applied to fill the annular space around the flexible metal conduit. In floors, a min. 2 in. depth of fill material to be installed flush with top surface of floor. In walls, a min. 1 in. depth of fill material to be installed flush with wall surface on both sides of wall assembly.

Minnesota Mining & Mfg. Co.—TF 2500H  
 \*Bearing the UL Classified Marking  
 (Bearing the UL Listing Mark)



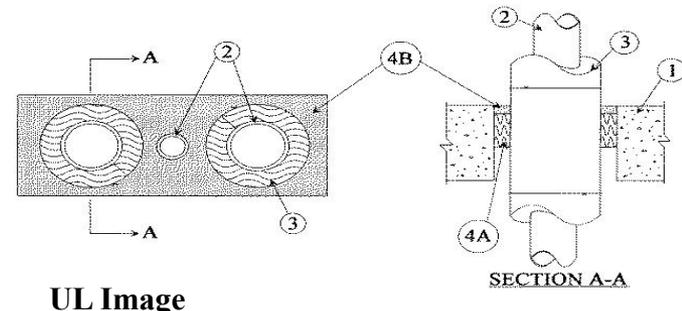
Pro-Firestop Image

# Firestopping for Continuity

- **Firestop Products Become Firestop Systems --**
  - “A Specific field erected construction, consisting of an assemblage of materials to prevent the spread of fire through openings in fire rated walls and floors using ASTM E 814 / UL 1479 / **FM 4990**, UL 2079, **E-2307 E-2837**, ULC-S-115, as the test method...”
  - **Testing = Suitability statement for use of a firestop product in a specific system application**



SFS Image



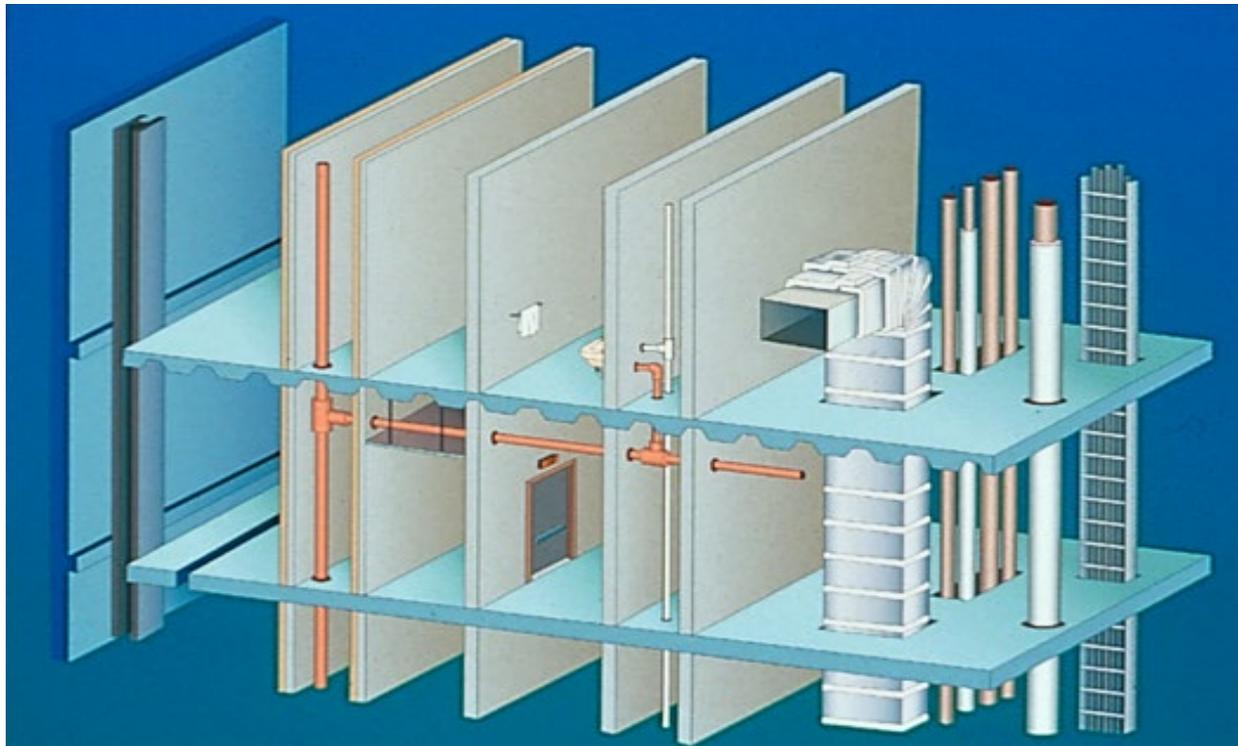
UL Image

# I- Installation

## SYSTEMS SELECTION

## SYSTEMS ANALYSIS

Who's Responsible, How to Choose???



# Firestopping for Continuity

## Products become SYSTEMS

- After Installation...
- **‘Field Erected Construction...Tested to...’**
  - Standards - ASTM E814/UL 1479–UL 2079, ASTM E 1966, ASTM E 2307, ULC S-115, FM 4990
  - **F Rating - Flame**
  - T Rating – Temperature
    - H Rating – Hose
  - **L Rating – Smoke**
  - **W Rating – Water**



# Firestopping for Continuity

## Products become SYSTEMS

- After Installation...
- **‘Field Erected Construction...Tested to...’**
  - Movement
  - Exposure
    - Water
    - Salt
    - Chemicals
    - Temperature
    - “Expectations”

# 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**



# Products become Systems

## Hose Stream = Shock Test



# Firestopping for Continuity Products become Systems

- Firestop Systems Directories –
  - UL
  - Intertek
  - FM Approvals

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



A screenshot of the UL Product iQ website. The header is red with "UL Product iQ™" on the left and "SEARCH MY SEARCHES M" on the right. Below the header, there is a breadcrumb trail: "Dashboard / Search / THROUGH-PENETRATION FIRESTOP SYSTEMS | UL Product iQ". The main content area displays "XHEZ.C-AJ-8038 - THROUGH-PENETRATION FIRESTOP SYSTEMS". At the bottom, there are three tabs: "DETAILS", "RESOURCES", and "TAGS".

A screenshot of the Intertek website showing a search results page for "Warnock Hersey Mark Directory". The page includes a search bar with "Enter Search Terms:" and fields for "Company", "Listing Section", "CSI Code", and "Standard". Below the search bar, there is a table with columns for "Company", "Title", and "Standard". The table lists several products from Minnesota Mining and Manufacturing, including "3M Fire Barrier Duct Wrap E15", "3M Fire Barrier Duct Wrap E15-CCES AC208", "3M Fire Barrier™ 1000 MS Silicone Joint Sealant", "3M Fire Barrier™ 1003 SL Silicone Joint Sealant", "3M Fire Barrier™ 2000 and 2003 Silicone Joint Sealant", and "3M Fire Barrier™ 2000 Silicone Joint Sealant". Each row lists the corresponding ASTM standards. At the bottom of the table, there is a "Run Report" button and a "Public Listing for Product" dropdown menu.

# How do Contractors Select Systems & Inspection Agencies Analyze?

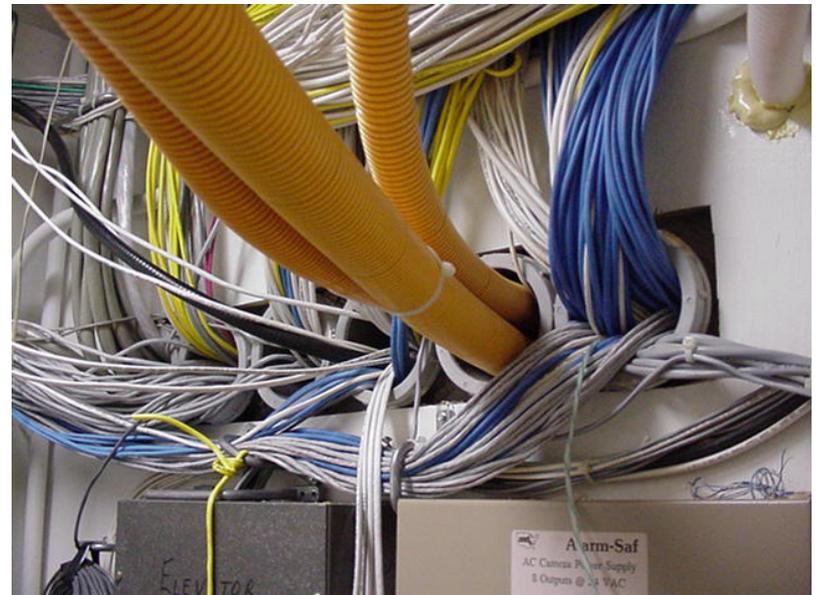
- Wall or Floor Construction Type, Rating
- Wall or Floor Thickness
- Penetrating Item, Coverings
- Size, Type, Thickness
- Annular Space Sizes
- Joint / Gap Sizes
- Backing Materials
- Fill Material(s)

= *Rated Firestop System*



# Engineering Judgments/EFRRRA

- Field or other Variances to Tested and Listed Systems?
  - No System Exists, period....
- Why???
  - Lack of Planning
  - Unique Conditions



Fire Stop  
Technologies,  
Inc.

# Engineering Judgments/EFRRA

- **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*
- *Inspection Agency?*

**IFC Guidelines for Evaluating Engineering Judgment  
Guidelines**

‘Construction industry professionals, building officials, fire officials, firestop contractors and other stakeholders need appropriate guidelines for evaluating and using such judgments.

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

# IFC EJ Presentation Guidelines – What's Seen?

## *f• Continuity Head-of-Wall Joints*

- Joint Width, (installed width, nominal)*
- Movement Capability*
- Movement Class – (thermal, wind sway, seismic)*
- Accessory Item(s) (i.e. insulation type, thickness, compression, etc.)*

*IFC recommends that these guidelines be considered when evaluating whether any firestop system engineering judgment meets minimal requirements. Questions concerning the EJ request should be addressed to the initiator of the judgment.*

*FCIA's NOTE: Manufacturer needs to state the EJ / EFRRRA will pass a fire test if subjected...*

# INSTALL Firestop Sealant, Mineral Wool to Tested and Listed System Limits = Firestop System



Pack

1



Apply Sealant

2



Tool/Smooth

3

**Walls - BOTH SIDES**

# Properly Tooled/Smoothed Firestop Sealants – Variance?



# Sleeved Pipes



# Firestop Joint Systems Definition

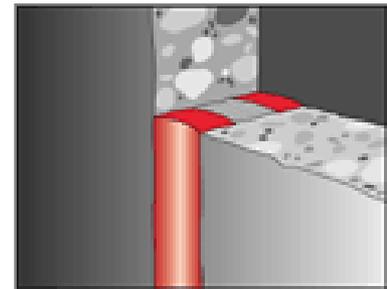
- UL 2079, ASTM E 1966, ULC-S-115
  - “A joint system is a **specific construction** consisting of adjacent **wall and floor assemblies**, *and* the materials designed to prevent the spread of fire through a linear opening between the wall and / or floor assemblies”
  - Definition
    - Joint?
    - Breach?
    - Opening?



# Firestopping for Safety

- **Firestop Joint Systems Definition – UL 2079**
  - Min. Positive Pressure – .01 Water, 12” below assy.
  - Movement Cycling
    - Class I – min. 500 cycles, min. 1 cycle / minute
    - Class II- min. 500 cycles, min. 10 cycles / minute
    - Class III-min 100 cycles, min. 30 cycles / minute
  - Fire Tested at Maximum Joint Width
  - No Load Bearing Characteristics, unless noted
  - Assembly, L or W Ratings

HILTI Graphic



# Firestop Perimeter Fire Containment Systems

- Firestop Perimeter Systems

**Definition – ASTM E 2307**

- “A Perimeter Fire Containment System is a **specific field erected construction** consisting of a floor with a fire resistance rating, and an exterior curtainwall with no hourly resistance rating, and the fill material installed between the floor and the curtain wall to prevent the vertical spread of fire in a building.”



# *NFPA 285 & ASTM E 2307?*



**Intertek Image**



**Thomas Bell-Wright International Consultants**

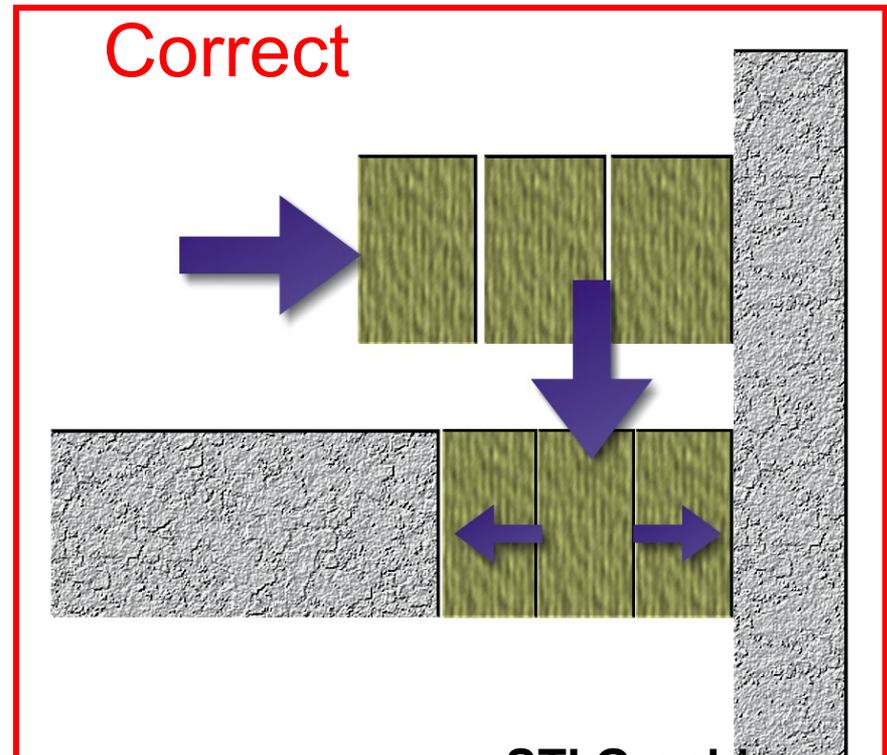
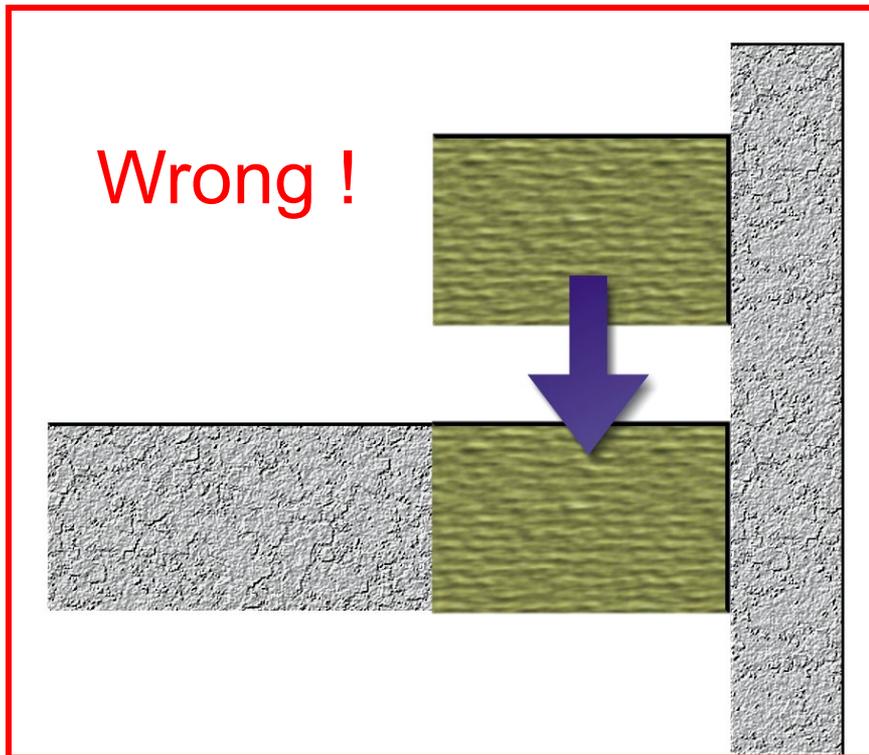
# Firestop Perimeter Fire Containment Systems



Graphic – Intertek

# Perimeter Fire Containment & Proper Installation of Mineral Wool

- Orientation of compressed mineral wool inserted perpendicular to the joint allows for movement.



# Installation – Who?

- Firestopping wrong, missing
- Systems Documentation?
- As Built Documentation??

*Conclusion –*

*Without Single Firestop Installation Contractor....*

*fire & life safety risks*



*Adler Photo*

# 3 Firestop Installation Methods

- **Each Trade**
  - “He/She who pokes hole, fills hole”
- **Multiple Contracts**
  - Firestop Contractors, Trades
- **Single Source Firestop Contractor**
  - *FCIA Member in Good Standing*
  - *FM 4991, UL, ULC Qualified*

# Firestop Contractor Qualifications

## 1. **Bought at Hardware Store, etc.**

- Contractor or Individual?

## 2. **Manufacturer Trained Individuals**

- 1 hour program
- ½ day program
- 2 day education

## 3. **UL/ULC Qualified, FM 4991 Approved Companies**

- 3<sup>rd</sup> Party Verified *Company* Management System
- *Individuals* Pass 3<sup>rd</sup> Party Exam
- *Individual* Knowledge – FCIA MOP
- All Manufacturers Products Covered
- *Company gets Approved or Qualified, not Individual*

# Why Contractor Qualifications?

- **Firestopping** Ratings - F, T, H, L W
- **Zero Tolerances?**
  - Annular Space Sizes, Gap Sizes
- **Product Properties**
  - Movement
  - Compatibility
  - Storage, Application, Curing Temps
- **SYSTEMS DOCUMENTATION**

# Firestop Contractor Qualifications

## FM & UL/ULC – 4 Components

1. Office Facility Quality Management System Audit
2. Field – Jobsite Audit
3. Employ a person
  - UL/FM Firestop Exam @ 80% or better
  - DRI if employed by Approved/Qualified Firm,
    - *Designated Responsible Individual (DRI)*
4. Annual Audit

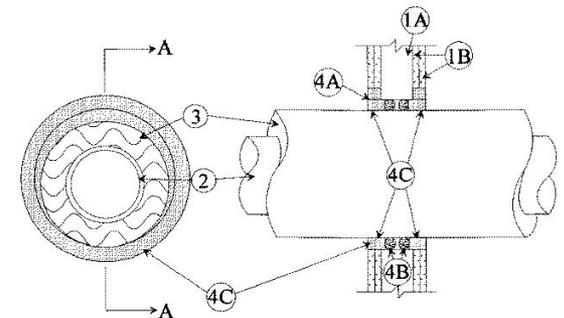


# **1. Office Audit of Company Management System Manual**

- Controlled Management Processes
- Project Successful Proven Contractor
- Education, Training, Accountability

# 1. FM, UL/ULC Company Audit of Management System (MS)

- Employee Training & Education
- Systems Selection
- Communicate systems to Field
- Material Controls
- Systems installation “protocol”
- Labeling
- Record keeping - Variance Procedures
- Non-Conformances
- Documentation
- Project closeout



## 2. *Company MS Jobsite Audit* by **UL/ULC, FM or**

- Verification of firestop systems Processes
- Verify Management System Works
- Verify Company “communication”
  - Office to field, field to office
- “Culture of Quality...”

»

Adler Photo



# 3. DRI – Company Appoints DRI if ....

- **Pass Rigorous Firestop Examination**
  - FCIA Firestop Manual of Practice
  - Firestop Systems Selection & Protocol
  - Management System Knowledge
- Keep CEU's
- Retested every 3 years if not enough CEU's
- One DRI per Approved Contractor Location



# 4. Annual Audit

## FM 4991 UL / ULC

### Contractor Company Personnel

- Continued satisfactory performance
  - Quality Manual Implementation
- Documented - Archived record keeping
- Employee Training Documentation
- Jobsite Visit
- DRI CEU Verification
- **Find @[www.fcia.org](http://www.fcia.org)**

# UL-ULC/FM 4991 Contractor Company Benefits

## **Quantified Differentiation ...**

- **Focus on the Company & Individual**
- Investment in Company Procedures
- Investment in People Education
- Investment in FCIA Manual of Practice
  - Project Successful Proven Contractor
  - Education, Training, Accountability
    - = Reduced Risk – Life, Property, Business

# Master Audit Certificate of Compliance Program

**A Jobsite Specific Management System Audit – Our audit provides verified processes were followed to properly installed firestop systems.**

**A Renewable Jobsite Specific Certificate – After completion of a successful audit, we issue a jobsite specific certificate that is renewable for the building owner.**

**Improved Firestop Systems Documentation – The MACC certificate in conjunction with the firestop systems documentation, builds the fire-resistance inventory required by the 2018 International Fire Code for fire and smoke protection features**



**Qualified Firestop Contractor Program**  
**Master Audit**  
**Certificate of Compliance**

Certificate Number: 1000-0001  
Audit Date: 08/03/2018  
Expiration Date: 12/31/2019

This certificate reports the findings of an audit by UL to the management system requirements of the Qualified Firestop Contractor Program. The audit was conducted to the requirements specified in the Qualified Firestop Contractor Program requirements. The UL qualified contractor was found to be in compliance with the requirements at the time of the site audit.

Structure Name: Underwriters Laboratories  
Job Number: 0001  
Address: 333 Pfingsten Rd.  
Northbrook, IL 60062

Qualified Contractor: FCTA  
Address: 4415 W. Harrison Street, Suite 540  
Hillside, IL 60162

Qualified Contractor Scope of Work:  
For Project # 0001 Firestopping Head and Bottom of Interior Fire Walls and all Trade Penetrations / Except Cable Tray

UL LLC makes no representations or warranties, expressed or implied, that the installed firestop system will prevent any loss or damage in the event of a fire or similar event, or that the system will in all cases provide the protection for which it is intended or intended. The certificate is evidence that the installing contractor's management system was in compliance with the applicable requirements of the Qualified Firestop Contractor Program.  
UL LLC is not an insurer and does not assume any obligation or undertake to discharge any liability of the Qualified Installing Contractor, or any other party for any loss, which may result in future, insurance settlements, loss, or otherwise in compliance with the requirements of the Qualified Firestop Contractor Program.  
Any modification to any firestop system of the structure will affect the complete firestop system and any smoke protection afforded by the system ineffective. Any changes will involve the certificate holder's responsibility for an annual visual inspection of the inventory of the structure and any under-resistor assemblies as required by the International Fire Code or other adopted codes. Please contact your local UL Qualified Firestop Contractor or visit [www.ul.com/firestopcontractor](http://www.ul.com/firestopcontractor) for a complete list of qualified contractors.

UL and the UL Logo are Trademarks of UL LLC © 2018  
Unauthorized reproduction or modification to this certificate constitutes fraud.  
This certificate is for reference use only.  
To verify Site Audit Certificate or Audit Requirements, Please refer to website:  
[www.ul.com/firestopcontractor](http://www.ul.com/firestopcontractor)



Certificate Number: 1000

**QUALIFIED FIRESTOP CONTRACTOR CERTIFICATE**

Company Name: Underwriters Laboratories Inc. File number: R12345 Issued: January 31, 2018  
Expires: December 31, 2019

Address: 333 Pfingsten Rd.  
Telephone: 480.296.6987 Email Address: [Raben.Sandvoaljr@UL.com](mailto:Raben.Sandvoaljr@UL.com)

This company has demonstrated that it complies with UL's Qualified Firestop Contractor Program Requirements. This certificate is not transferable and expires on December 31 of the following Year. This certificate may be displayed, copied and shared with others but must be used in its entirety.

Only those companies listed in UL's online Directory for the Qualified Firestop Contractor Program at [www.ul.com/contractor](http://www.ul.com/contractor) are considered eligible for that program and to use this Certificate and the UL Qualified Firestop Contractor Program Marking (shown here) in its advertising and promotional material in accordance with marking guidelines provided at [www.ul.com/contractor](http://www.ul.com/contractor).



Underwriters Laboratories  
Qualified Firestop Contractor Program

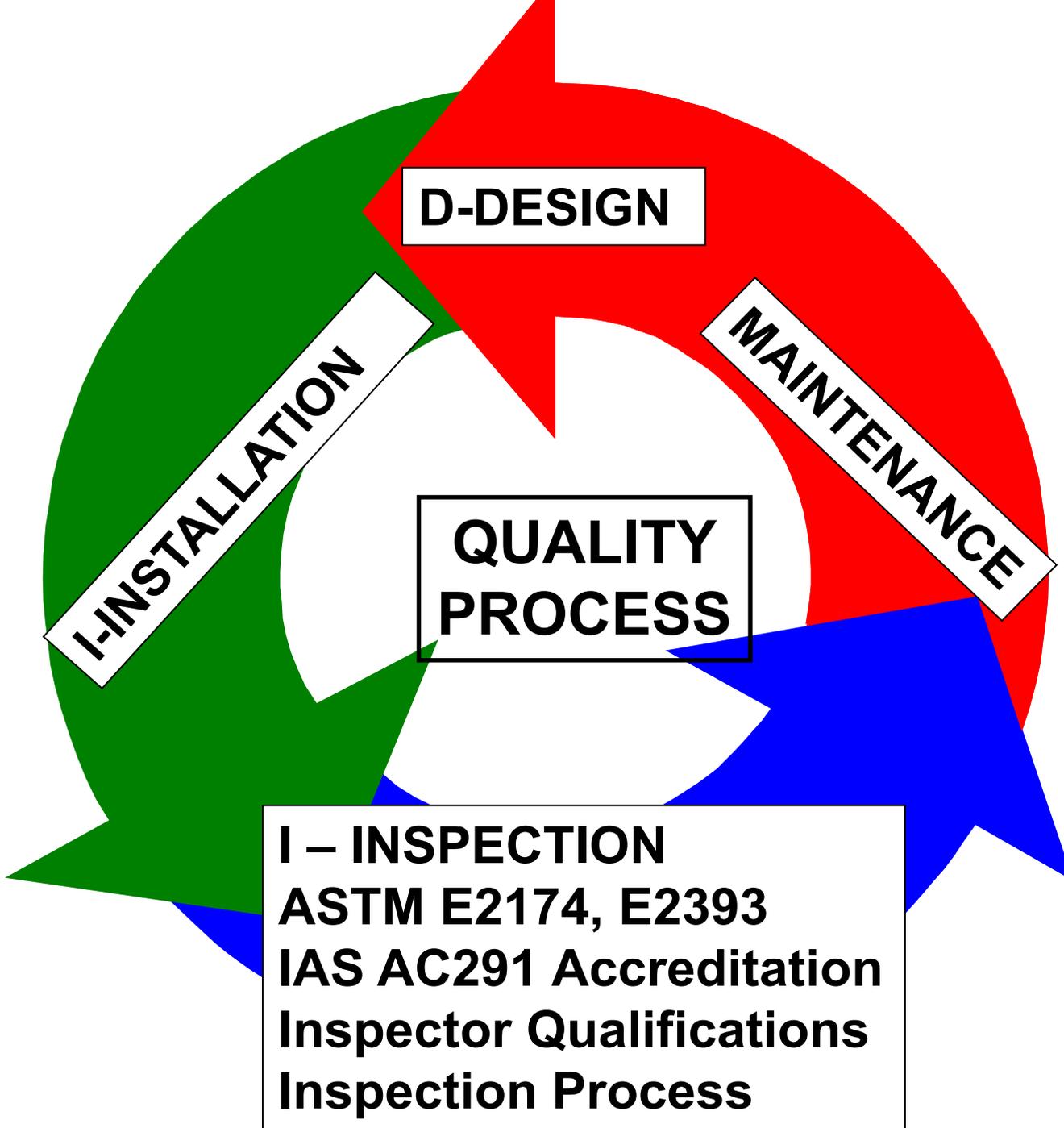
Underwriters Laboratories reserves the right to void this certificate at any point. This certificate does not indicate compliance with any UL product certification program.

For additional information regarding the Qualified Firestop Contractor Program, please visit [www.ul.com/contractor](http://www.ul.com/contractor)

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**UL Slide**



# Why Inspection?

## Firestop Installation Methods

- **Each Construction Discipline – MEP, etc.**
  - “He/She who pokes hole, fills hole”
- **Multiple Contracts**
  - Firestop Contractors, Trades
- **Single Source Firestop Contractor**
  - *FCIA Member in Good Standing*
  - *UL/ULC Qualified, or FM 4991*

# I – Inspection – Options

- **Contractor Self Inspection**
  - Verify Management System validity
  - Not 2%, 10%
  - Required for FM & UL, ULC Contractors
- **Manufacturer Inspection**
  - Does not exist ...
- **ASTM E 2174 & ASTM E 2393 –**
  - Independent 3<sup>rd</sup> Party
  - Destructive, Non Destructive
  - Specified Frequency



Affinity Firestop Photo

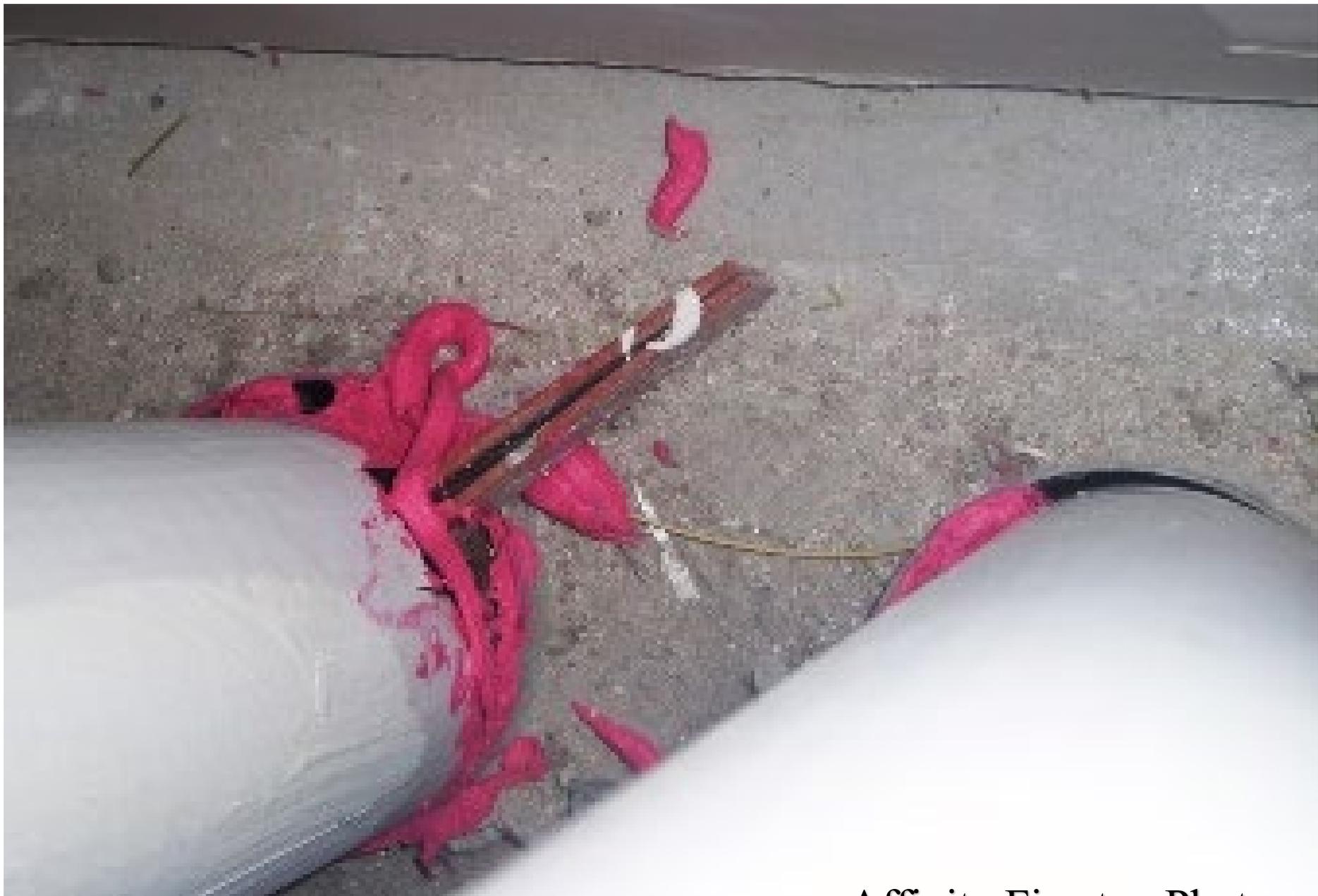


Affinity Firestop Photo



3" ProRoc TYPE X TE  
1222 C 15:34 MADE IN CANADA





Affinity Firestop Photo

- Now the good Firestop ....
- Using Systems.....

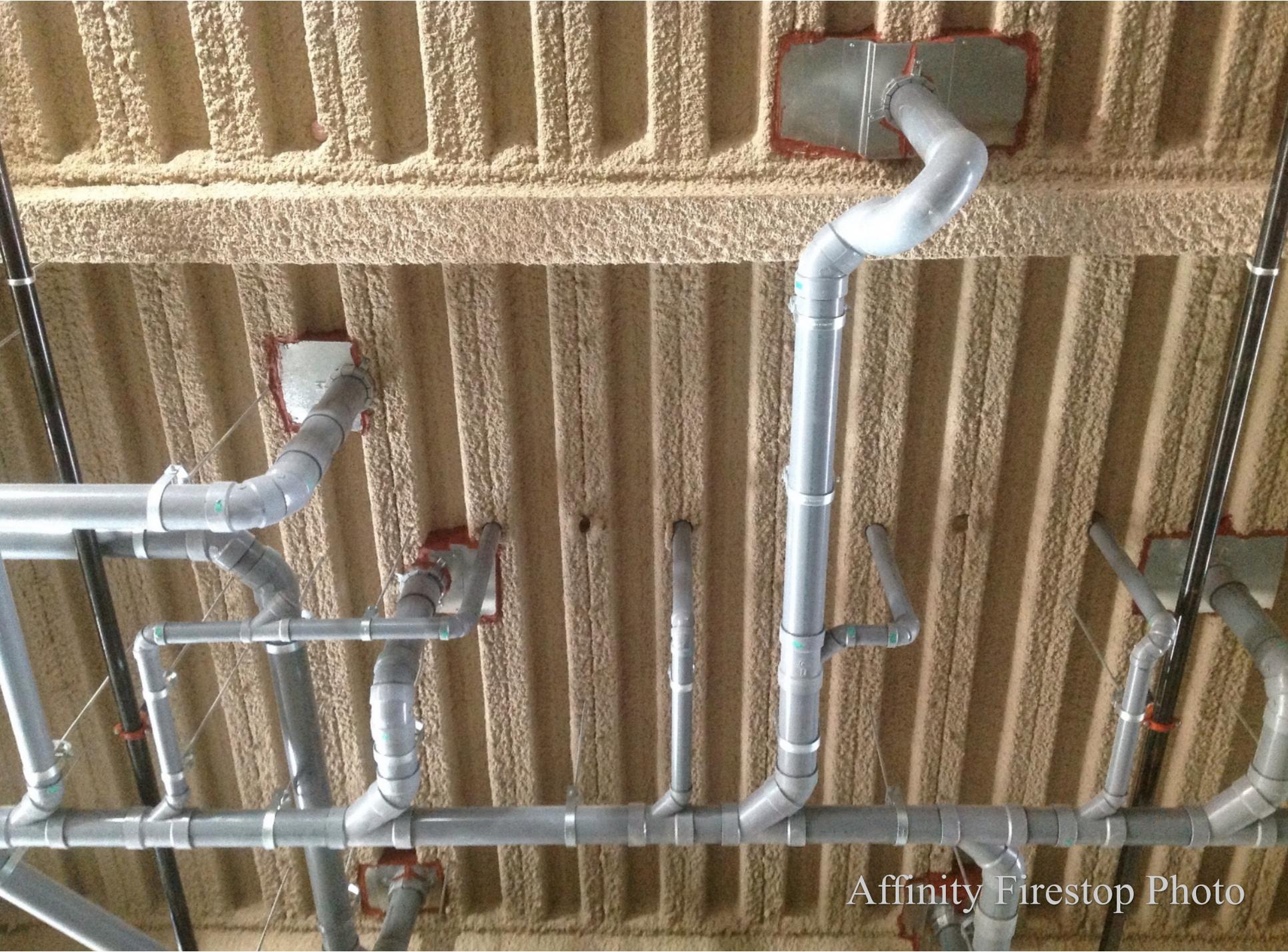


 **AFFINITY FIRESTOP SYSTEMS LTD**  
117 GERRARD ST. EAST, TORONTO, ONT. M5E 1B4  
TEL: 416-491-1111 WWW.AFFINITYFIRESTOP.COM

DATE:	BY:
PROJECT:	LOCATION:
AD:	DESCRIPTION:

**CAUTION! FIRESTOP SYSTEM**

Affinity Firestop Photo



Affinity Firestop Photo



Affinity Firestop Photo

# Firestop Inspection Standards & Professional Contractor = Success

- ASTM E 2174/ ASTM E 2393 Standard Practice



# I – Inspection – Code Requirements

**[A] 110.3 Required inspections.** The *building official*, upon notification, shall make the inspections set forth in Sections 110.3.1 through 110.3.10.

**[A] 110.3.6 Fire- and smoke-resistant penetrations.** Protection of joints and penetrations in fire-resistance rated assemblies, *smoke barriers* and smoke partitions shall not be concealed from view until inspected and *approved*.

# I – Inspection – Mandatory

**1705.16.1 Penetration firestops.** Inspections of penetration firestop systems that are tested and listed in accordance with Sections 714.3.1.2 and 714.4.1.2 shall be conducted by an approved inspection agency in accordance with **ASTM E 2174**.

**1705.16.2 Fire-resistant joint systems.** Inspection of fire resistant joint systems that are tested and listed in accordance with Sections 715.3 and 715.4 shall be conducted by an approved inspection agency in accordance with **ASTM E 2393**.

# Firestop Systems Inspection

## ASTM E 2174 - ASTM E 2393

- “Standard Practice for On-Site Inspection of Installed Fire Stops – Penetrations - Joints”
  - Standard Inspection Procedure
  - Special Inspection Agency Companies
  - Other Qualified Firms
  - Hired by & Report to Building Owner, Architect, Owners Rep, other than GC.
    - = Authorizing Authority

# Inspection in Codes

## ASTM E 2174 - ASTM E 2393

- NFPA 101 / 5000 - Chapter 8 - Annex
- 2012 International Building Code
  - CH 17 – Special Inspections
    - Buildings 75' & higher above Fire Department Access
    - Occupancy Type III, IV, Chapter 16 Table 1604.5
- Abu Dhabi International Building Code

# Agency & Individual Qualifications

## ASTM E 2174 - ASTM E 2393

- Inspector Firm & Inspectors
  - **‘Independent of, and Divested from ’**  
Installing firm, Distributor, Manufacturer,  
Competitor, Supplier...
  - **‘Not a Competitor** of the Installer, contractor,  
manufacturer, or supplier ....
  - **Other than the contractor...**
  - **Submit notarized statements of ...**

# Inspection Firm & Individual Qualifications

## ASTM E 2174 - ASTM E 2393

- Inspector Personnel meet at least one criteria.....
  - 2 years experience (Construction, Field), education, and credentials acceptable to AHJ
  - Accredited by AHJ
  - Meet ASTM E699

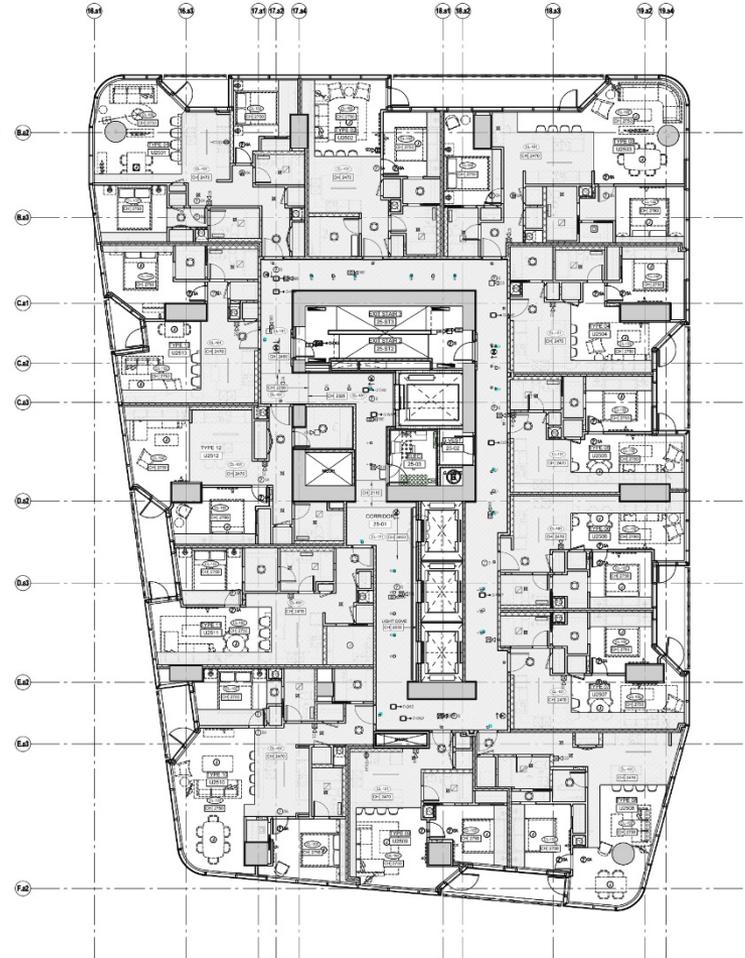
# IAS AC 291 Must be Specified

- **IAS AC 291 Quantified Qualifications**
  - Helps AHJ with “Approved Agency”
  - Not in ASTM Standards, Code
- **Individual Competencies - Exams**
  - FM Firestop Exam
  - **OR**
  - UL Firestop Exam
  - **AND**
  - IFC Exam

# Firestop Inspection Process

## ASTM E 2174 - ASTM E 2393

- Pre-Construction Meeting
  - Review Documents
  - Identify Conflicts
  - Review Materials Systems
- **ASTM E 814 or UL 1479, FM 4990, ASTM E 1966, UL 2079, ASTM E 2307 Systems, ULC S-115**



# Firestop Inspection Process

## ASTM E 2174 - ASTM E 2393

- Inspection Documents
  - Specifications and Drawings
  - Manufacturer Product Data Sheets and Installation Instructions
  - Listed Systems and EJ's/EFRRA's

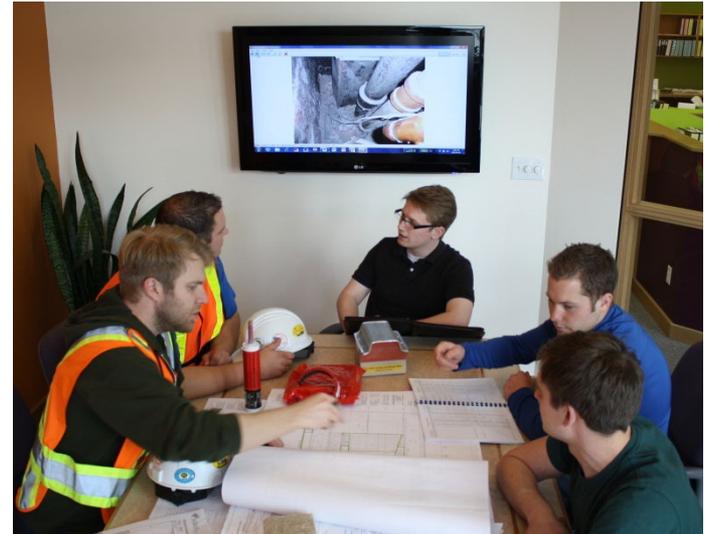
FIRESTOP CONTRACTOR (204) 555-0101		WARNING
This is an approved Firestop System and shall NOT be disturbed except by Authorized Personnel.		
Wall Penetration No.: <u>SE-2393-1</u>	Fire Rating Required: <u>1.5 F</u>	
Floor Level: <u>L1VL 200</u>	Room No.: <u>201</u>	
Installer's Name: <u>JJH/SHT</u>	Product: <u>FS-2H</u>	
Installation Date: <u>APRIL 1, 2013</u>	System Design No.: <u>C.A./322a</u>	
Re-authorized by:	Installer	Date
Company		



# Firestop Inspection Process

## ASTM E 2174 - ASTM E 2393

- Pre-Construction Meeting
  - Mock Up Review
  - Observation or Destructive Review (Testing)
  - Inspection Type Methodology
    - Frequency of reviews
    - Description of reviews
    - Specification and drawings
- Meeting(s) are required
  - During and Post Inspection



Affinity Firestop  
Photo

# Firestop Inspection Process

## ASTM E 2174 - ASTM E 2393

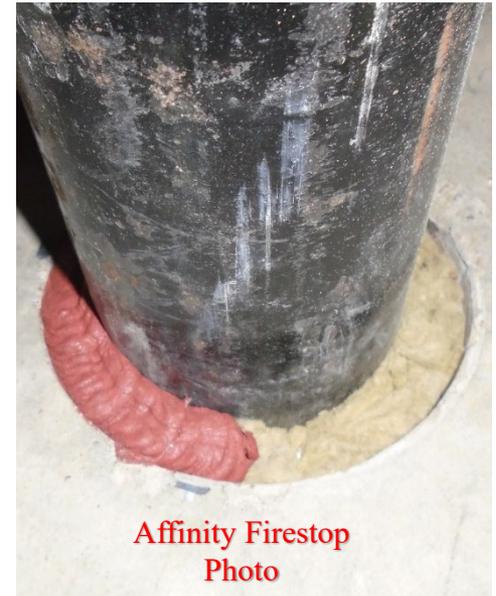
- Inspection Schedule
  - Notifies Inspector
  - Inspections within 2 days
  - Inspector verifies installation
    - Is in accordance with Documents
    - Meets Manufacturers Installation Instructions



# Firestop Inspection Process

## ASTM E 2174 - ASTM E 2393

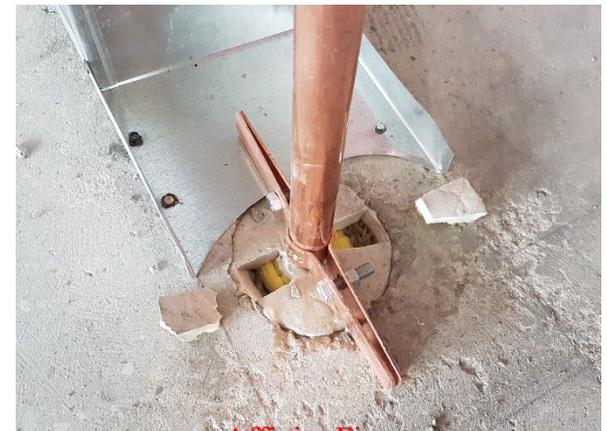
- Observation Reviews
  - Performed during construction
  - Witnessed randomly of the installed systems on each floor
  - 2174 - 10%, each **type** of Service Penetration Firestop System
    - Type = By System, By Scope of Work
  - 2393 - 5% of Total Lineal Feet for each type of Fire Resistance Rated Joint System
    - Type = By System, By Scope of Work



# Firestop Inspection Process

## ASTM E 2174 - ASTM E 2393

- Destructive Reviews (Testing)
  - Performed Post-Construction
  - **2174 - Minimum 2% , no less than 1**, each type per 930 m<sup>2</sup> (10,000 SF) of floor area
    - Type = By System, Scope of Work
  - **2393 - Minimum 1 / 152 LM (500 LF)** of Joint Area, by type, mandatory; Exception mechanical joints
    - Type = By System, Scope of Work



Affinity Firestop  
Photos

# Measure Sealant Thickness NOT MIDDLE Bond Lines – Pen./Assy.



# Firestop Inspection

## ASTM E 2174 - ASTM E 2393

- Equipment –
  - Tapes
  - Tablets w/Systems
  - Borescope to explore areas that are concealed or partially
  - NOT MICROMETERS



# Firestop Inspection Process

## ASTM E 2174 - ASTM E 2393

- Inspectors shall
  - Not supervise or direct FS Contractors
  - Commence reviews at the start of FS installation
  - Review installation based on manufacturers and system requirements
  - *Selecting Systems, Coaching is Supervising...*



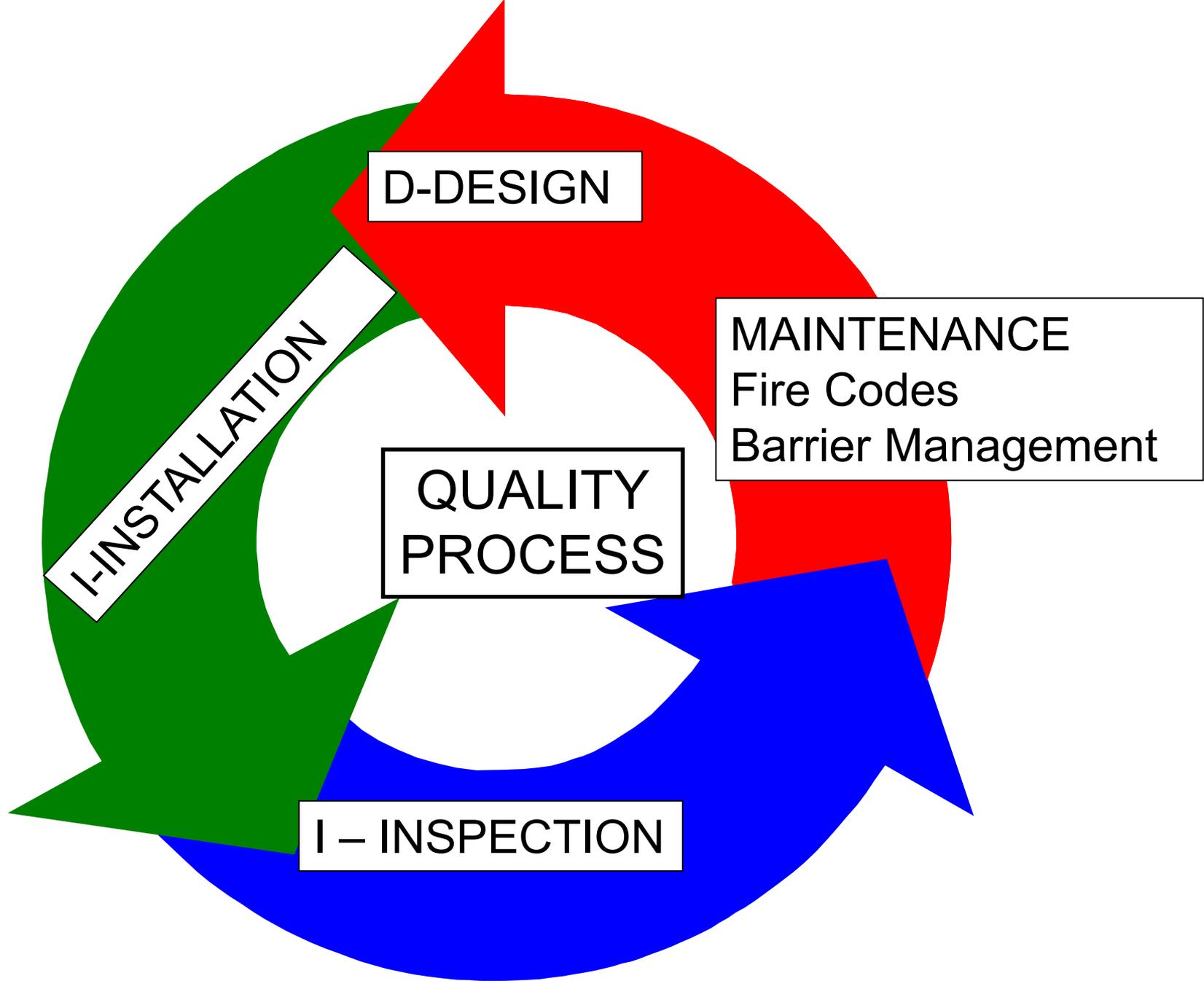
Affinity Firestop  
Photo

# Firestop Repairs

- Repairs
  - Instruction requirements by manufacturer
  - Listed systems
  - Patching
    - Systems....
    - Adhesion
    - Movement
    - T, L, W Ratings
    - *As recommended by MFR*

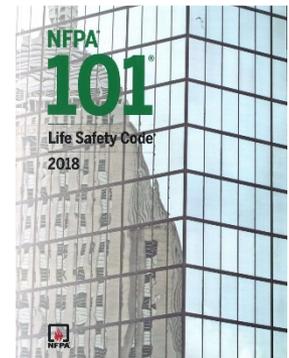
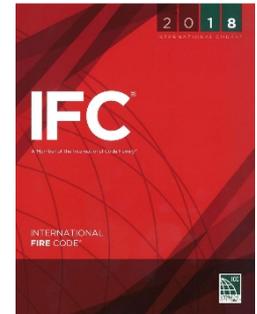


Affinity Firestop  
Photo



# Fire Codes Require Maintenance

- **NFPA 101**
- **NFPA 1**
- **International Fire Code**
- **Minimum Requirements Stated**
- **Frequency**



# National Fire Protection Association - NFPA 1-2018

- **12.2\* Construction.**
- 12.2.2 Fire safety construction features for new and existing occupancies shall comply with **this Code and the referenced edition of NFPA 101.**
- **12.3 Fire-Resistive Materials and Construction.**
- 12.3.1 The design and construction of fire walls and fire barrier walls that are required to separate buildings or subdivide a building to prevent the spread of fire shall comply with Section 12.3 and NFPA 221.

# National Fire Protection Association - NFPA 1-2018

- **12.3.2\* Quality Assurance for Penetrations and Joints.** In new buildings three stories or greater in height, a quality assurance program for the installation of devices and systems installed to protect penetration and joints shall be prepared and monitored by the RDP responsible for design. Inspections of firestop systems and fire-resistive joint systems shall be in accordance with 12.3.2.1 and 12.3.2.2.

# National Fire Protection Association - NFPA 1-2018

- 12.3.3\* Maintenance of Fire-Resistive Construction, Draft-Stop Partitions, and Roof Coverings.

**12.3.3.1 Required fire-resistive construction, including fire barriers, fire walls, exterior walls due to location on property, fire-resistive requirements based on type of construction, draftstop partitions, and roof coverings, shall be maintained and shall be properly repaired, restored, or replaced where damaged, altered, breached, penetrated, removed, or improperly installed.**

# National Fire Protection Association - NFPA 1-2018

- 12.3.3.2 Where required, **fire-rated gypsum wallboard** walls or ceilings that are damaged to the extent that through openings exist, the damaged gypsum wallboard shall be **replaced or returned to the required level of fire resistance using a listed repair system or using materials and methods equivalent to the original construction.**
- 12.3.3.3 Where readily accessible, required fire-resistance rated assemblies in high-rise buildings shall be visually inspected for integrity at least once every 3 years.

# National Fire Protection Association - NFPA 1-2018

- 12.3.3.3.1 The person responsible for conducting the visual inspection shall demonstrate appropriate **technical knowledge and experience in fire-resistance-rated design and construction** acceptable to the AHJ.
- 12.3.3.3.2 **A written report prepared by the person responsible for conducting the visual inspection shall be submitted to the AHJ documenting the results of the visual inspection.**

# National Fire Protection Association - NFPA 101-2012

- **SECTION 4.5.8 Maintenance, Inspection, and Testing.**
- **4.5.8.1** **Whenever or wherever any device**, equipment, system, condition, arrangement, level of protection, fire-resistive construction, or any other feature **is required for compliance** with the provisions of this Code, **such device**, equipment, system, condition, arrangement, level of protection, fire-resistive construction, or other feature **shall thereafter be continuously maintained** in accordance with applicable NFPA requirements or requirements developed as part of a performance-based design, or as directed by the AHJ. [101:4.6.12.1]

# National Fire Protection Association - NFPA 101-2012

- **4.5.8.2 No existing life safety feature shall be removed or reduced** where such feature is a requirement for new construction. [101:4.6.12.2]
- **4.5.8.3\* Existing life safety features **obvious to the public**, if not required by the Code, shall be either maintained or removed.** [101:4.6.12.3]
- **4.5.8.4 Any device**, equipment, system, condition, arrangement, level of protection, fire-resistive construction, or any other feature **requiring periodic testing, inspection, or operation** to ensure its maintenance **shall be tested, inspected, or operated** as specified elsewhere in this Code or as directed by the AHJ. [101:4.6.12.4]
- **4.5.8.5 Maintenance, inspection, and testing shall be performed under the supervision of a responsible person who shall ensure** that testing, inspection, and maintenance **are made at specified intervals** in accordance with applicable NFPA standards or as directed by the AHJ. [101:4.6.12.5]

# International Fire Code Maintenance



## SECTION 703 FIRE-RESISTANCE-RATED CONSTRUCTION

**703.1 Maintenance.** The required fire resistance rating of fire-resistance rated construction (including walls, fire stops, shaft enclosures, partitions, smoke barriers, floors, fire resistive coatings and sprayed fire resistant materials applied to structural members and fire resistive joint systems) shall be maintained. Such elements shall be visually inspected by the owner annually and properly repaired, restored or replaced when damaged, altered, breached or penetrated.

**Openings** made therein for the passage of pipes, electrical conduit, wires, ducts, air transfer openings, **and holes** made for any reason shall be protected with approved methods capable of resisting the passage of smoke and fire.

# 2015 International Fire Code Maintenance

## SECTION 703

### FIRE-RESISTANCE-RATED CONSTRUCTION

**703.1 Maintenance.** The required *fire-resistance rating* of fire-resistance-rated construction, including, but not limited to, walls, firestops, shaft enclosures, partitions, *smoke barriers*, floors, fire-resistive coatings and sprayed fire-resistant materials applied to structural members and fire-resistant joint systems, shall be maintained. Such elements **shall be visually inspected by the *owner* annually and properly repaired, restored or replaced where damaged, altered, breached or penetrated. Records of inspections and repairs shall be maintained..**



# 2015 International Fire Code Maintenance

## SECTION 703

### FIRE-RESISTANCE-RATED CONSTRUCTION

**703.1 Maintenance. (continued)** Where concealed, such elements shall not be required to be visually inspected by the *owner* unless the concealed space is accessible by the removal or movement of a panel, access door, ceiling tile or similar movable entry to the space. Openings made therein for the passage of pipes, electrical conduit, wires, ducts, air transfer openings and holes made for any reason **shall be protected with *approved* methods** capable of resisting the passage of smoke and fire. Openings through fire-resistance-rated assemblies shall be protected by self- or automatic-closing doors of *approved* construction meeting the fire protection requirements for the assembly.



# 2015 International Fire Code Maintenance

## **SECTION 703**

### **FIRE-RESISTANCE-RATED CONSTRUCTION**

#### **703.1 Maintenance. (continued) 703.1.1 Fireblocking and draftstopping.**

Required *Fireblocking* and draftstopping in combustible concealed spaces shall be maintained to provide continuity and integrity of the construction.

**703.1.2 Smoke barriers and smoke partitions.** Required *smoke barriers* and smoke partitions shall be maintained to prevent the passage of smoke.

Openings protected with *approved* smoke barrier doors or smoke dampers shall be maintained in accordance with NFPA 105.

#### **703.1.3 Fire walls, fire barriers and fire partitions.**

Required *fire walls, fire barriers* and *fire partitions* shall be maintained to prevent the passage of fire. Openings protected with *approved* doors or fire dampers shall be maintained in accordance with NFPA 80.



# 2018 International Fire Code

- **701.6 Owner's responsibility.** The **owner** **shall maintain an inventory of all** **required** *fire-resistance-rated and smoke resistant* construction, and the construction included in Sections 703 through 707 and such construction shall be visually inspected by the *owner annually and properly repaired, restored or replaced where damaged, altered, breached or penetrated.*

# 2018 International Fire Code

- **701.6, Continued...PC2**
- **Records of inspections and repairs** shall be maintained. Where concealed, such elements shall not be required to be visually inspected by the *owner unless the concealed space is accessible by the removal or movement of a panel, access door, ceiling tile or similar movable entry to the space.*

# 2018 International Fire Code

- **703.1 Maintaining protection. Materials and firestop systems used to protect membrane- and through-penetrations in fireresistance- rated construction and construction installed to resist the passage of smoke shall be maintained.**

# 2018 International Fire Code Documentation Required

- **703.1 ... Continued.**

The materials and firestop systems shall be securely attached to or bonded to the construction being penetrated with no openings visible through or into the cavity of the construction. Where the system design number is known, the system shall be inspected to the listing criteria and manufacturer's installation instruction.

# International Property Maintenance Code

## **IPMC SECTION 703**

**[F] 703.1 Fire-resistance-rated assemblies.** The required fire-resistance rating of fire-resistance-rated walls, fire stops, shaft enclosures, partitions and floors shall be maintained.

**[F] 703.2 Opening protectives.** Required opening protectives shall be maintained in an operative condition. Fire and smokestop doors shall be maintained in operable condition. Fire doors and smoke barrier doors shall not be blocked or obstructed or otherwise made inoperable.

**International Existing Building Code**

# UAE Fire and Life Safety Code of Practice

## Maintenance & Management

### Chapter 1, SECTION 21 Firestopping

**21.15.2** The required fire resistance rating of installed firestop systems shall be ***visually inspected by the owner or owner's inspection agency annually.*** Damaged, altered or breached firestop systems shall be properly repaired, restored or replaced to comply with applicable codes as per the guidelines of Civil defense.

**21.15.3** Any new **Openings** made therein for the passage of through penetrants, **shall be protected with approved firestop system** to comply with applicable codes as per the guidelines of Civil defense.

# National Fire Code of Canada

## National Fire Code of Canada

- ***Division B – Part 2, Building and Occupant Fire Safety***
  - ***2.2.1.2 – Damage to Fire Separations*** – where *fire separations* are damaged so as to affect their integrity, they shall be repaired so that the integrity of the *fire separation* is maintained...
- **FCIA Manual of Practice – Appendix, Maintenance**

FCIA recommends Barrier Management for Effective Compartmentation and Structural Protection

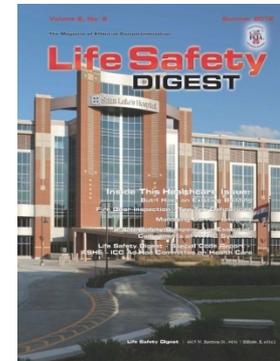


# M–Barrier Management Systems

- **Barrier Management Starts at New Construction Specification.....**

# M–Barrier Management Systems Starts @ NEW CONSTRUCTION

- **NEW Buildings – 07-84-00 Specs**
  - **www.FCIA.org**
- **Part I – Focus on**
  - **Systems**
  - **Not Products**
  - **Manufacturers**
- **“Single Manufacturer to the greatest extent possible” – EJ’s**



# M–Barrier Management Systems Starts with CONSTRUCTION

- **NEW Buildings – 07-84-00 Specs**
  - **www.FCIA.org**
- **Part II– Contractor/Installer Qualifications**
  - **FCIA Member in Good Standing, AND**
  - **FM 4991, Standard for the Approval of Firestop Contractors, OR**
  - **UL Qualified Firestop Contractor Program**
  - **AND**
  - **Manufacturer Accredited, Approved, Trained**

# M–Barrier Management Systems Starts with CONSTRUCTION

- **NEW Buildings – 07-84-00 Specs**
  - **www.FCIA.org**
- **Part II – Qualifications – Special Inspection**
  - **Special Inspection Agency –**
    - **IAS AC 291 Accredited Special Inspection Agencies**
  - **Special Inspector Qualifications**
    - **FM Firestop Exam**
    - **UL Firestop Exam**
    - **AND**
    - **IFC Exam**

# M–Barrier Management Systems Starts with CONSTRUCTION

- **NEW Buildings – 07-84-00 Specs**
- **Part III – Execution**
  - **Special Inspection**
    - **ASTM E 2174 - Penetrations**
    - **ASTM E 2393 - Joints**

# Built Right = Maintain Right WHEN SPECIFIED

- **Reference 01-78-00 Closeout Submittals**
  - **01 78 29 Final Site Survey**
  - **01 78 33 Bonds**
  - **01 78 36 Warranties**
  - **01 78 39 Project Record Documents**
  - **01 78 43 Spare Parts**
  - **01 78 46 Extra Stock Materials**
  - **01 78 53 Sustainable Design Closeout Documentation**

# M–Barrier Management Systems

## Policy Topics

- **Advise Clients – Create a Budget to Meet Code Requirements**
- **Inventory – What Info?**
- **Implement Fire Resistance Management**
  - **In House (Rules)**
  - **Outside Contractor (Rules)**
- **Monitor Process**

# M–Barrier Management Systems

## Policy Topics

- **Advise Clients – Create a Budget to Meet Code Requirements**
- **Inventory – What Info?**
- **Implement Fire Resistance Management**
  - **In House (Rules)**
  - **Outside Contractor (Rules)**
- **Monitor Process**

# Barrier Management Policy Contents

- *Annual Line Item Budget*
- **Rules of Engagement in Contracts**
  - Internal Contracts
  - External Contracts
- **Pre Construction Meetings**
- **Barrier Warnings - Markings**
- **Violation Consequences**
- **Ongoing Management**
- **Staff - Occupant Education**



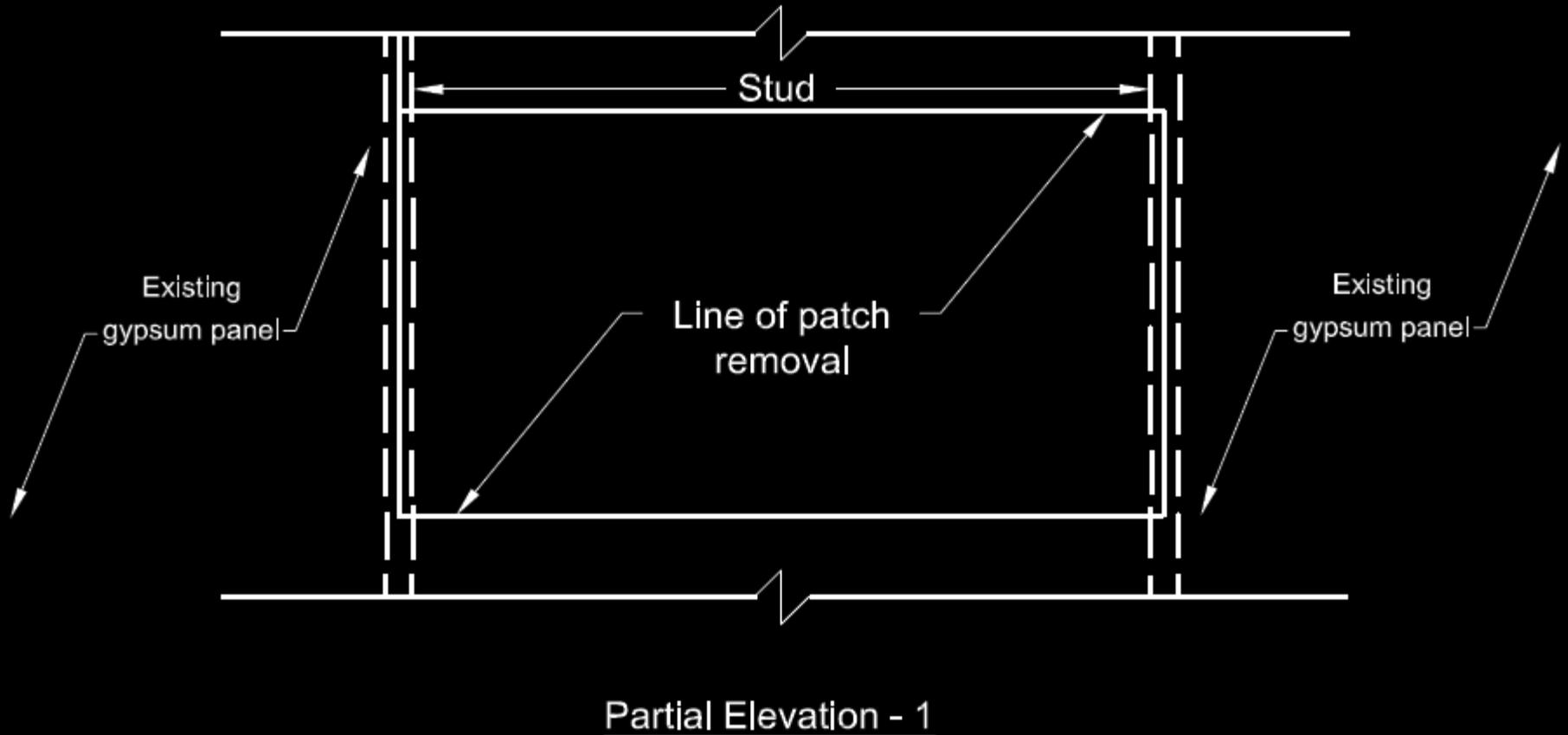
# M–Barrier Management Systems

- **Barrier Inventory Elements & Policy...**
  - **Life Safety Drawings**
  - **Existing Conditions Documented**
  - **Ongoing Survey Records**
  - **Deficiency Reports**
  - **Systems Documentation Control, Retrieval**
- **ALL FIRE PROTECTION FEATURES**

# M–Barrier Management Systems

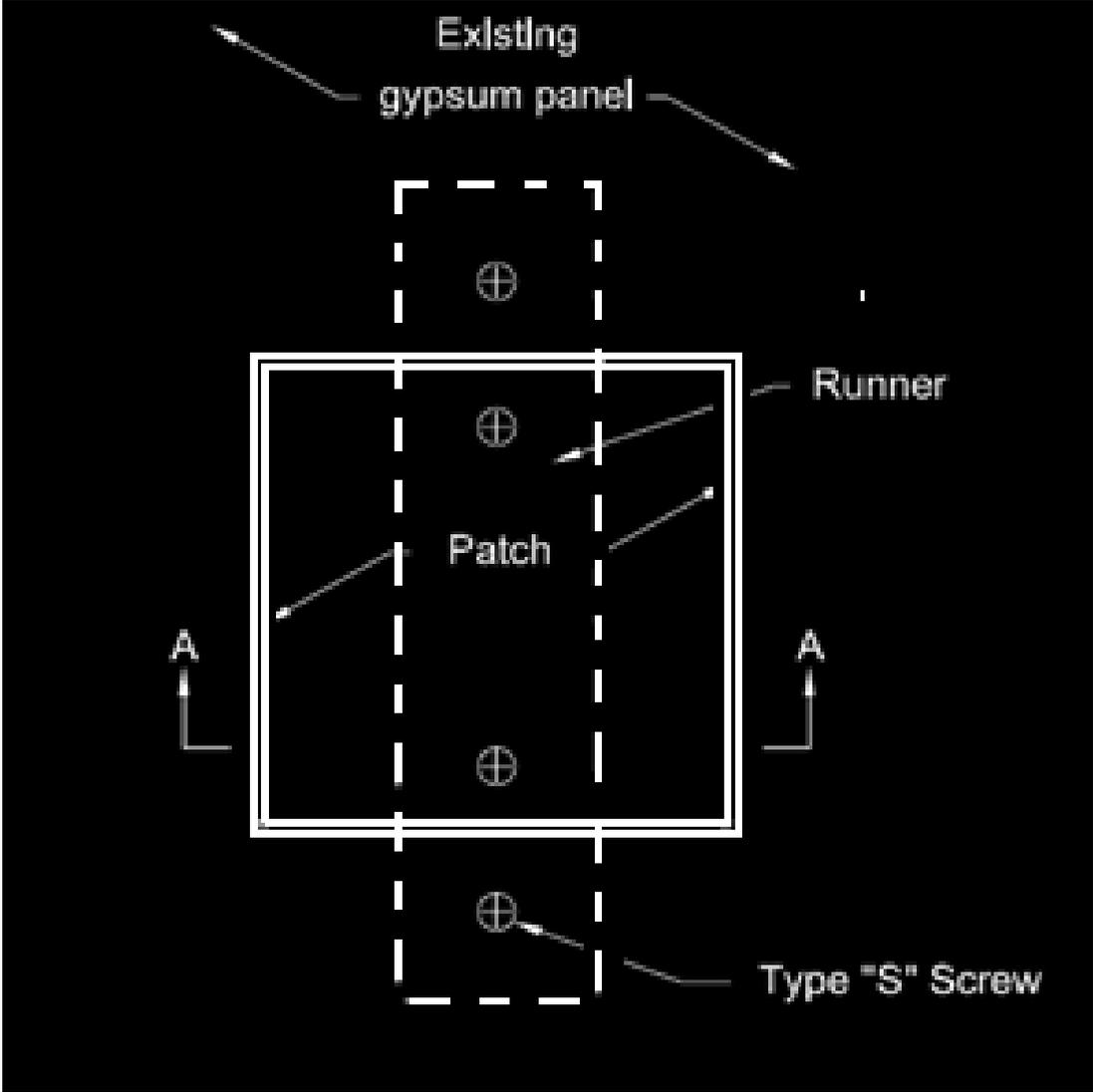
- **Barrier Repair Examples**

# Gypsum Wallboard Repair Large Holes

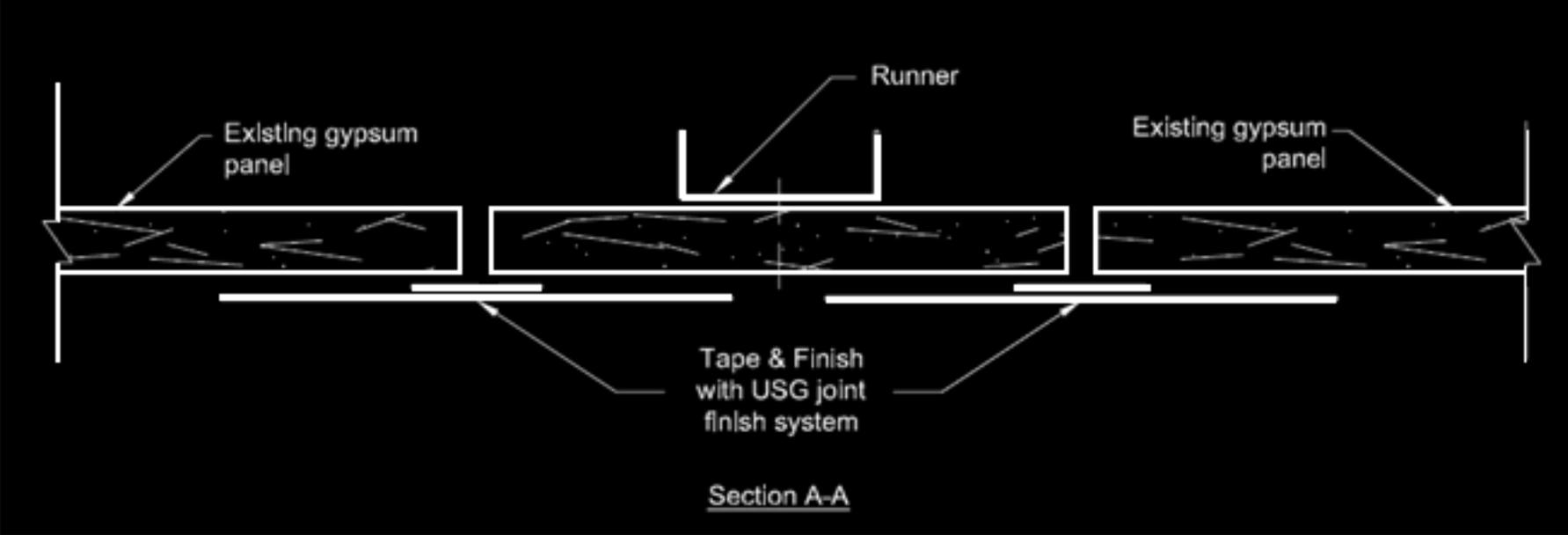


- USG Photo

# Gypsum Board Repairs - Small

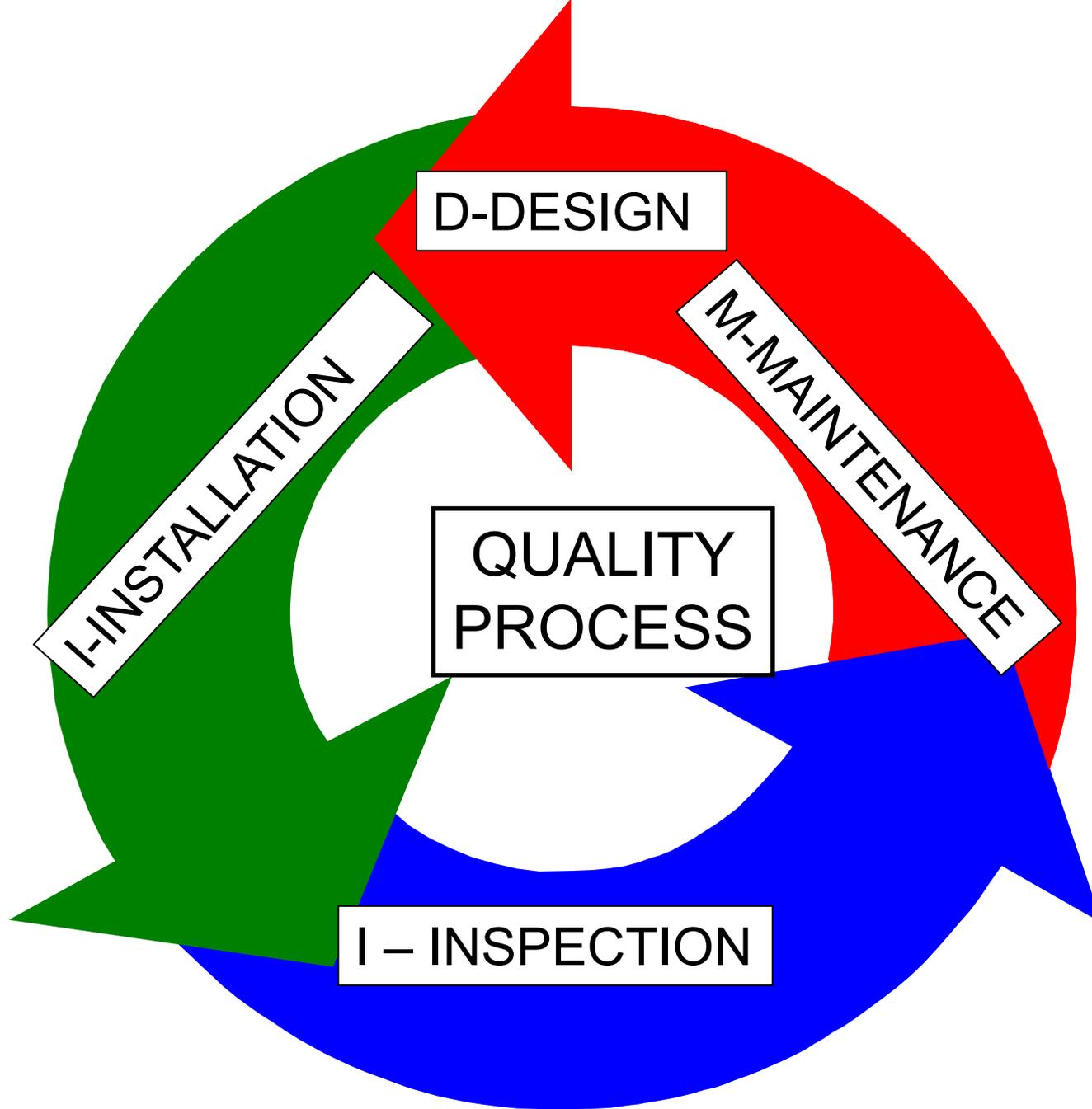


# Gypsum Board Repairs - Small



# M–Barrier Management Systems

- **Electronic Best Practice Elements**
  - **Action Oriented**
    - **Projects - Specifications**
    - **Ongoing Surveys – FCIA RPPS 2010-1**
  - **Action Reminders**
  - **In Process Status**
  - **Record Retrieval**



# FCIA DIIM & Firestopping

Proper ***DIIM*** Means Reliable Systems...

- Properly ***Designed*** - A/E - Consultant
  - Tested and Listed Systems, FCIA Member Mfr's., Compartments per IBC, NFPA Codes, SUBMITTALS....***Specified (CCS, CDT, RSW)***
- Properly ***Installed***
  - FCIA Member, FM 4991, or UL ***Qualified Contractors***
- Properly ***Inspected***
  - ASTM E 2174 & ASTM E 2393, by IAS ***Qualified Inspectors at IAS AC 291 Accredited Inspection Firms***
- Properly ***Maintained & Managed*** –
  - FCIA Member, FM 4991, or UL Qualified Contractors.

# Effective Compartmentation is a SYSTEM





# Contacts

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# FCIA Webinar

## Fire-Resistance Maintenance

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