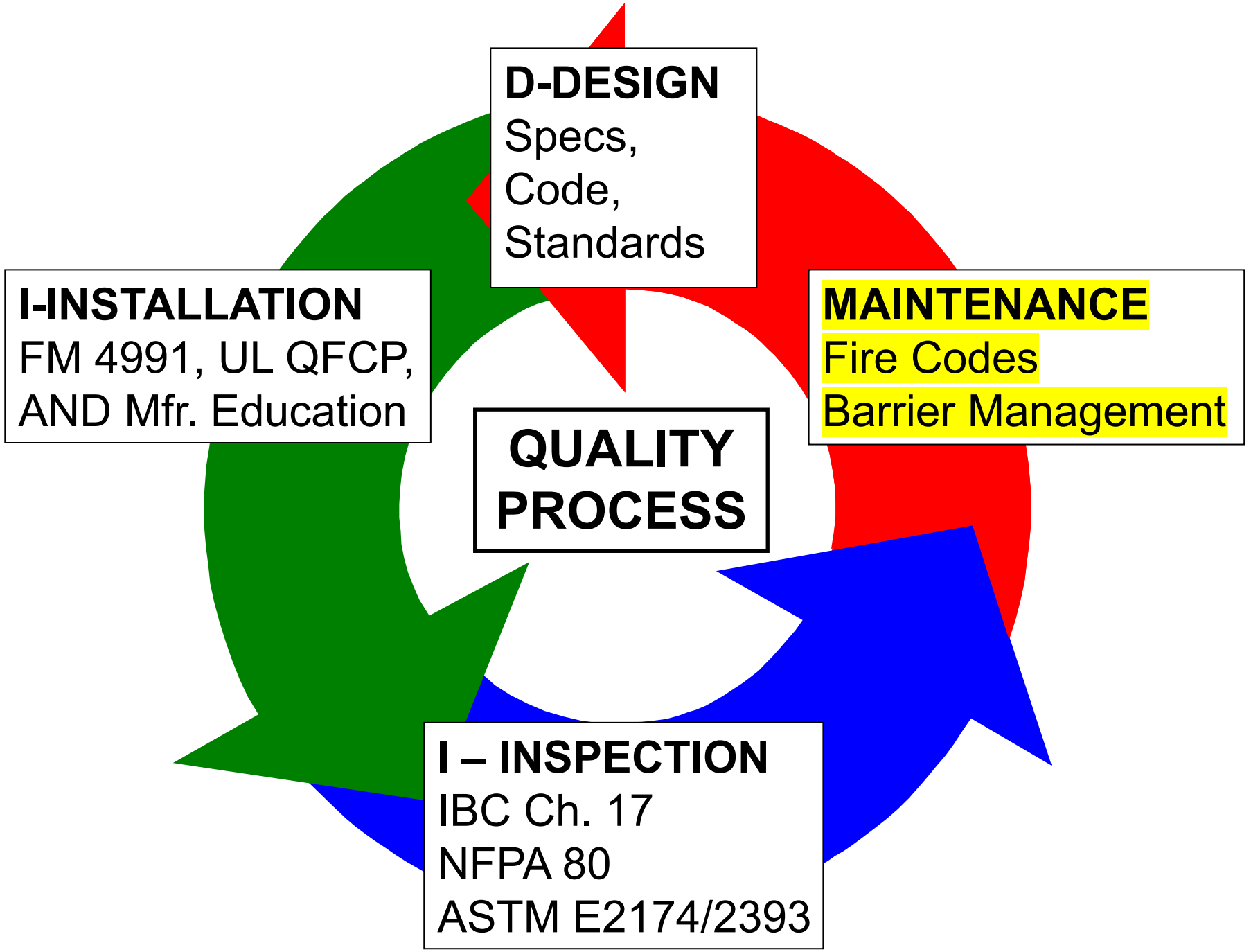
FCIA
FIRESTOP
DIIM

Design
Installation
Inspection

Maintenance & Management

Bill McHugh, FCIA
Rich Walke, CTI for FCIA

FCIA
Firestop Contractors International Association


D-DESIGN
Specs,
Code,
Standards
I-INSTALLATION
FM 4991, UL QFCP,
AND Mfr. Education
MAINTENANCE
Fire Codes
Barrier Management
QUALITY
PROCESS
I – INSPECTION
IBC Ch. 17
NFPA 80
ASTM E2174/2393

Firestopping for Safety “DIIM”

- Properly ***Designed*** and Specified Firestopping
  - FCIA – 07-84-00 - Specification
- ***Tested and Listed Systems*** – ASTM E814 / UL 1479, ASTM E1966 / UL 2079, FM 4990, ULC-S115, ASTM E2837, E2307, E3037, more
- Professional ***Installation*** – FCIA Member, FM 4991 Approved, UL/ULC Qualified Contractors
- Properly ***Inspected*** – ASTM E2174 / 2393 Processed by IAS AC 291 Accredited Inspection Agencies, Inspectors w/FM, UL, ULC,IFC Exam Success
- ***Maintained & Managed*** – Annually – FCIA Members – NFPA 1, 101, International Fire Code – UAE Fire and Life Safety Code of Practice

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 of Canada
- UAE Fire and Life Safety Code
- Many other Country Codes…

- ***Minimum Requirements*** – ***Construction*** & ***Maintenance***

Building & Fire Code Requirements

[BF] FIRE RESISTANCE. That property of materials or their assemblies that prevents or retards the passage of excessive heat, hot gases or flames under conditions of use. [IBC 2018 202]

[BF] FIRE-RESISTANCE RATING. The period of time a building element, component or assembly maintains the ability to confine a fire, continues to perform a given structural function, or both, as determined by the tests, or the methods based on tests, prescribed in Section 703. [IBC 2018, 202]

Fire Resistance

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

1. *Fire-resistance* designs documented in approved sources.
2. Prescriptive designs of fire-resistance-rated building elements, components or assemblies as prescribed in Section 721.
3. Calculations in accordance with Section 722.
4. Engineering analysis based on a comparison of building element, component or assemblies designs having *fire-resistance ratings* as determined by the test procedures set forth in ASTM E119 or UL 263.
5. Alternative protection methods as allowed by Section 104.11.
6. *Fire-resistance* designs certified by an approved agency.

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***

Existing Buildings

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

Smoke Barriers & Firestopping

- Smoke Barriers differ from Smoke Partitions?
  - **Smoke Barrier** –
    - **IBC** – Hourly Rated, Quantified Firestop "L" Rating
      - < 5cfm/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…'retard'
    - **NFPA** – Continuous membrane that is designed to form a barrier to ***limit the transfer of smoke***….

Fire Resistance SYSTEMS

- **Products Become Systems Through….**
- **Test Standard References**
  - **Structural Elements & Assemblies** – ASTM E119, UL 263
  - **Fire & Smoke Barriers** – ASTM E119, UL 263
  - **Firestopping** – ASTM E814 / UL 1479, ULC-S115, UL 2079, ASTM E1966, E2307, E2837, **…**test method…"
  - **Fire/Smoke Dampers** – UL 555, UL 555S
  - **Swinging/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**

Great Installation / Inspection starts @ SPEC…

New & Existing Buildings - Maintain Protection

- NEW Buildings – 07-84-00 Specs
  - www. FCIA .org & FCIA MOP
- Part I – Products…but
  - Systems
  - Product Properties
  - Manufacturers
- "Single Manufacturer to the greatest extent possible" – EJ/EFRRA's

Specs – Key Parts Relating to Installation

- 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

Specs – Key Parts Relating to Inspection

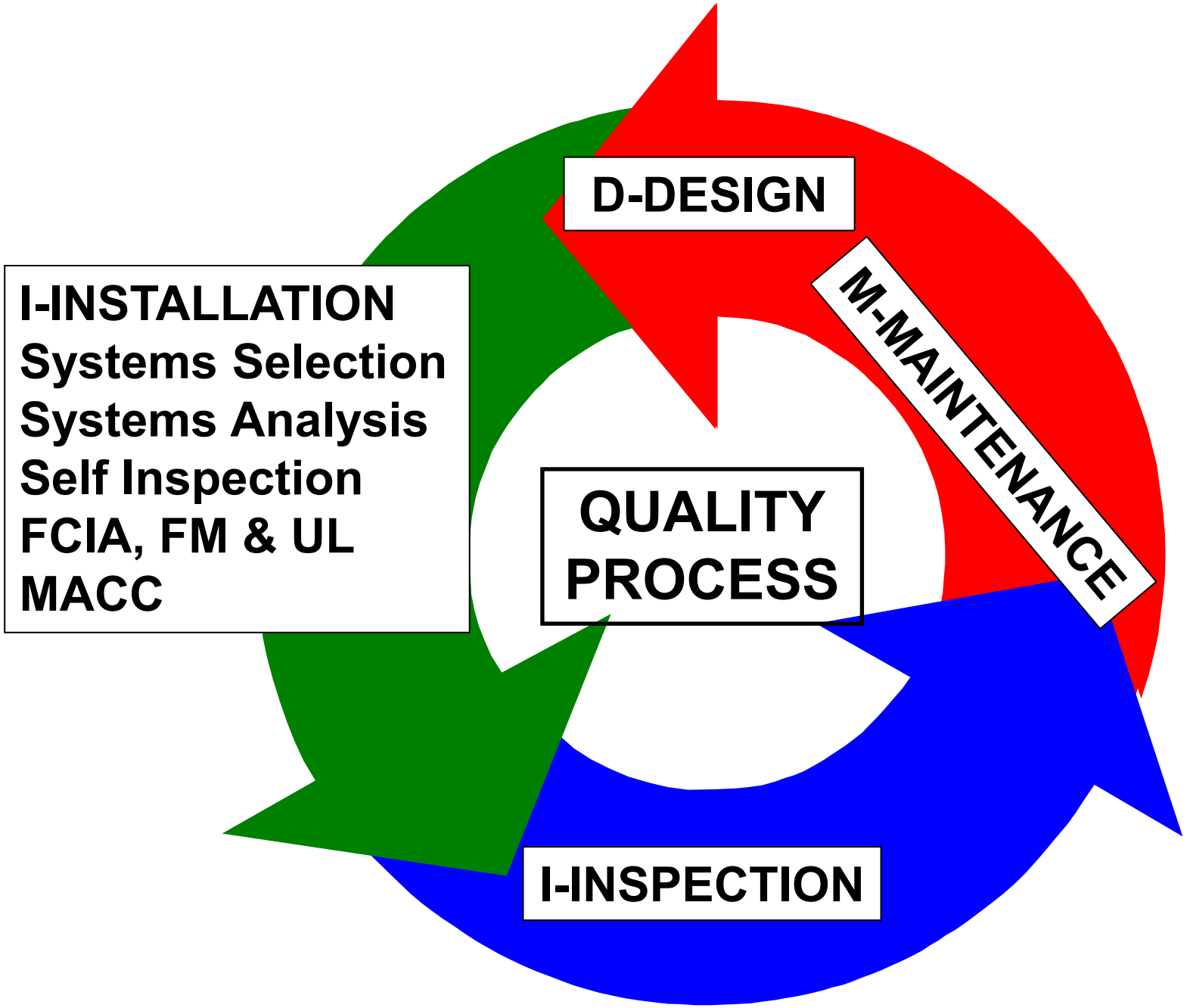
- NEW Buildings – 07-84-00 Specs - www. FCIA .org
- Part II – Qualifications – Special Inspection
  - Special Inspection Agency –
    - IAS AC 291 Accredited Special Inspection Agencies
  - Special Inspector Qualifications
    - FM Firestop Exam
    - UL Firestop Exam
      - AND
    - IFC Exam
    - ICC Certificate of Learning Achievement
    - FCIA Certificate of Achievement Education Program

Specs – Key Parts Relating to Execution

- NEW Buildings – 07-84-00 Specs
- Part III – Execution
  - Special Inspection
    - ASTM E2174 – Penetrations
    - ASTM E2393 – Joints

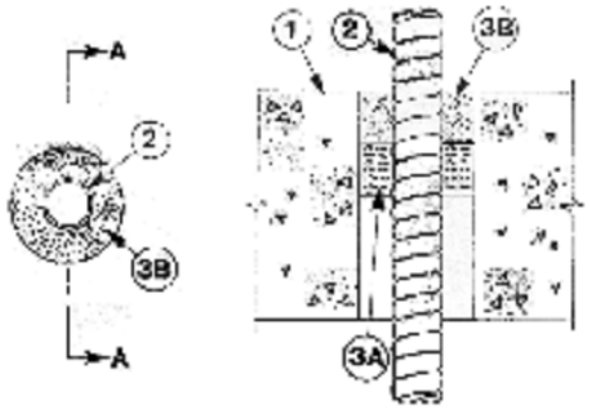
Specs – Don't Forget Division 1 Documentation for Building Life Cycle

- 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


D-DESIGN
M-MAINTENANCE
I-INSTALLATION
Systems Selection
Systems Analysis
Self Inspection
FCIA, FM & UL
MACC
QUALITY
PROCESS
I-INSPECTION

Firestopping for Continuity
I – Classified Systems

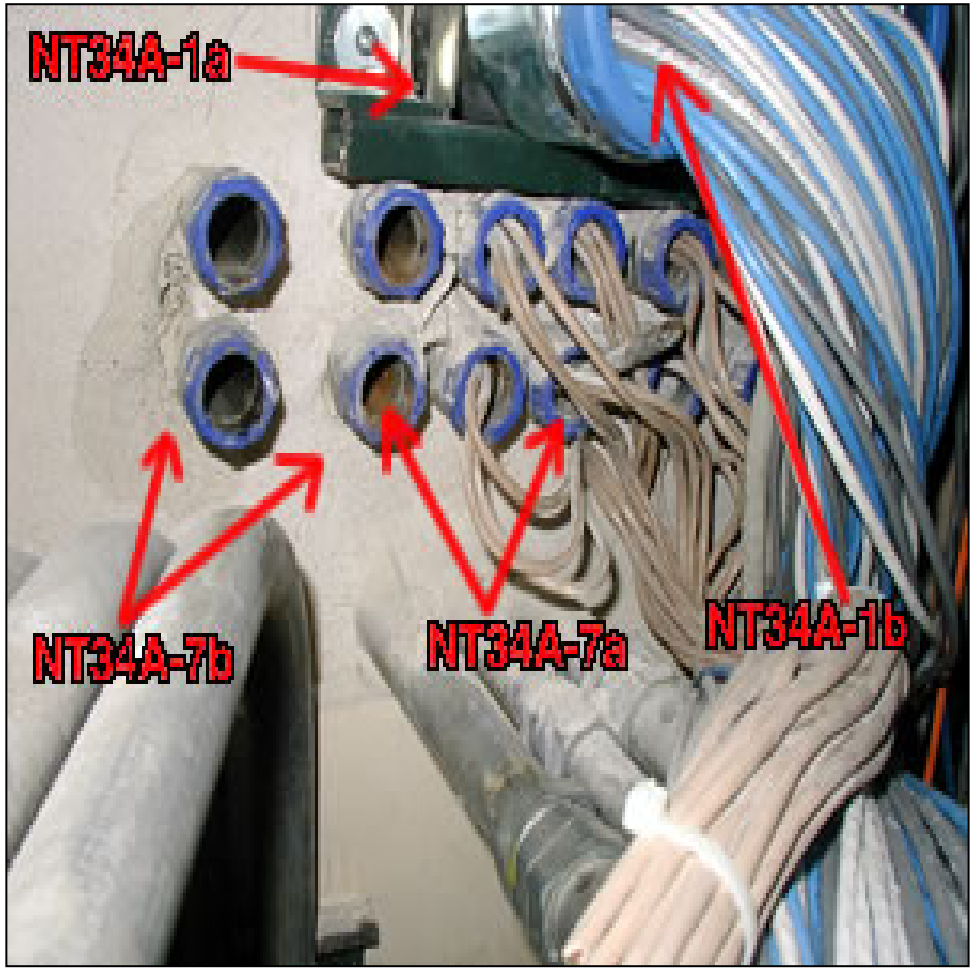
System No. C-AJ-1180
F Rating—2 Hr
T Rating—0 Hr



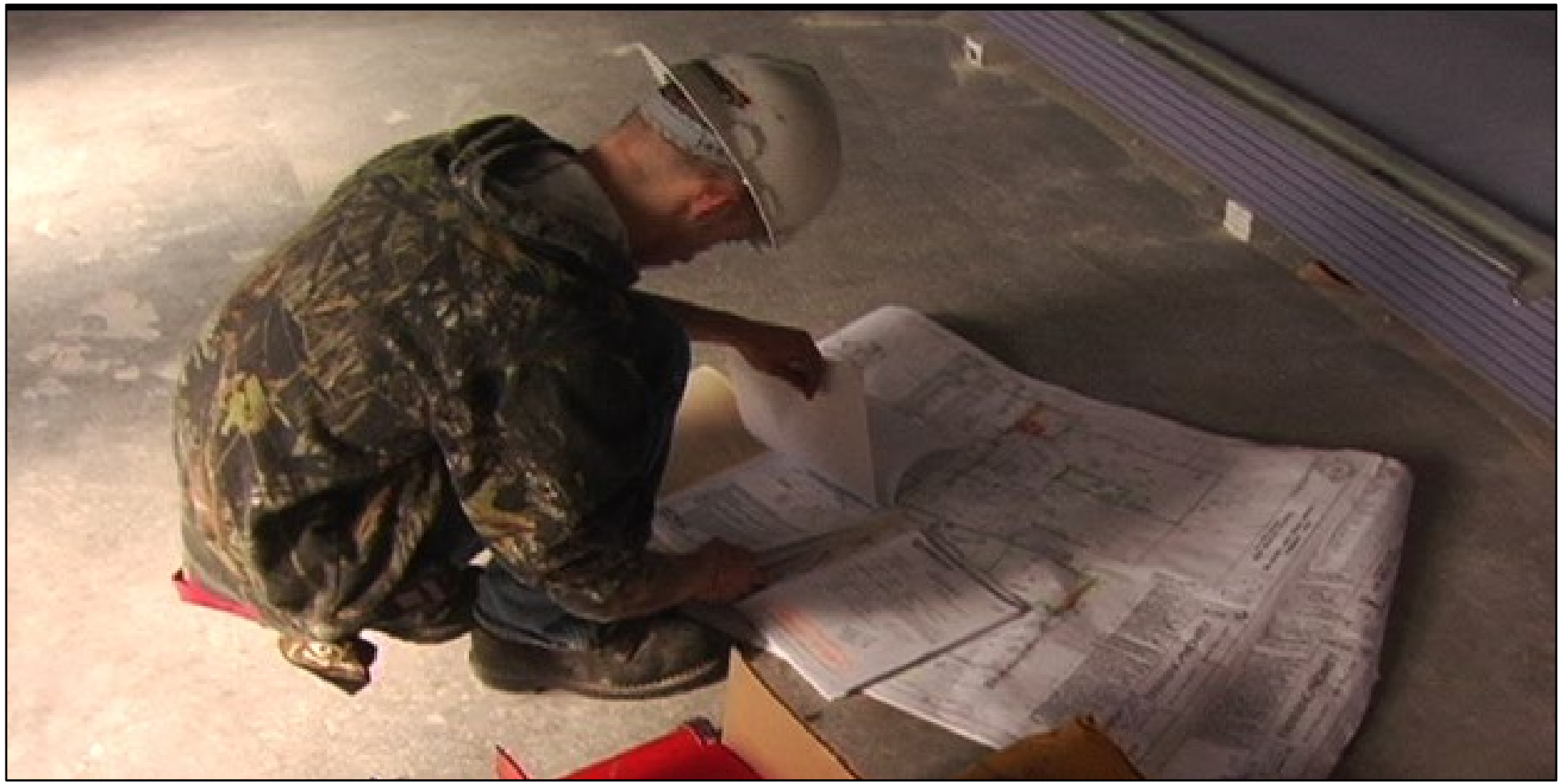
SECTION A-A

1. Floor or Wall Assembly—Min 4-1/2 in. thick lightweight or normal weight (100 to 150 pcf) concrete. Wall may also be constructed of any UL Classified Concrete Blocks*. Diam of circular through opening in floor or wall assembly to be 1/4 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 (CAZT) category in the Fire Resistance Directory for names of manufacturers.
2. Through Penetrating Product*—Max 4 in. diam (or smaller) steel, 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.
   Alliance Cable Corp.
3. Packing Material—Min 1 in. thickness of ceramic (alumina silica) fiber blanket or mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed min 1 in. from top surface of floor or from both surfaces of wall.
4. Fill, Void or Cavity Material*—Caulk—Applied to fill the annular space around the flexible metal conduit. In floors, a min 1 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.—[illegible]

*Bearing the UL Classification Marking
†Bearing the UL Listing Mark



Firestopping for Continuity
I – Listed Systems

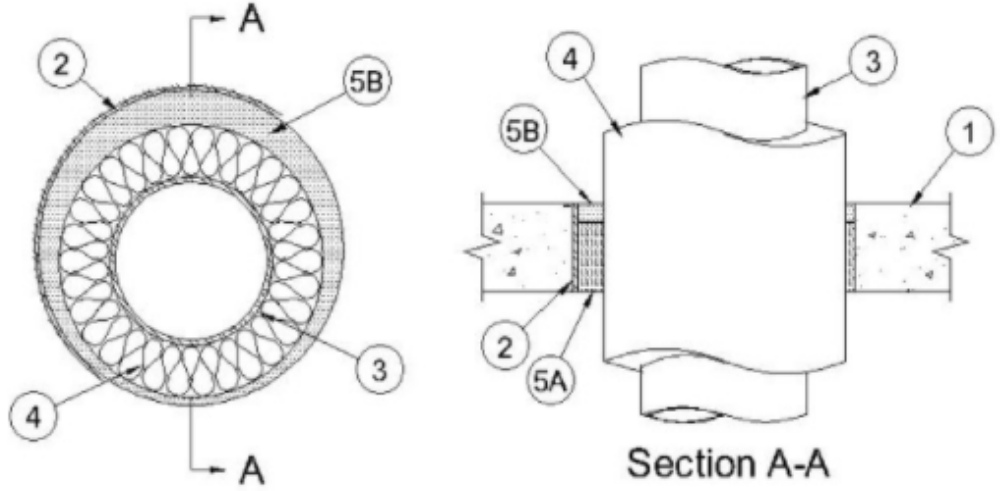


Systems & Materials….

Possible UL System Nos.: C-AJ-5138, C-AJ-5209, W-J-5091, Etc.

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^3) 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. to max 1 in. (13 mm to 25 mm).

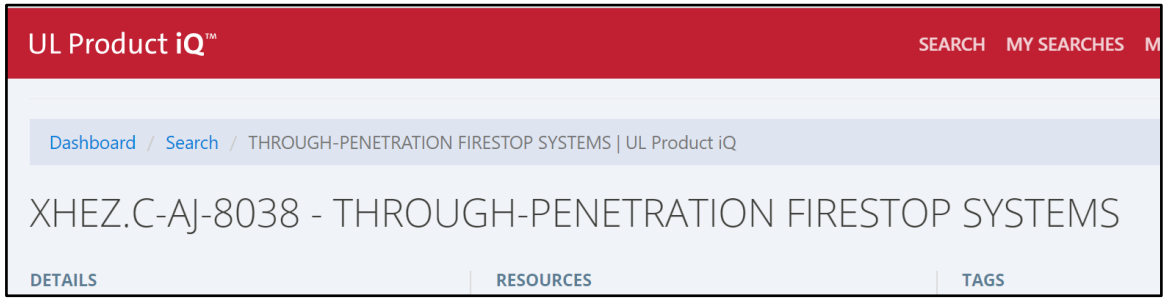
   See **Pipe and Equipment Covering - Materials** - (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a smoke Developed Index of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

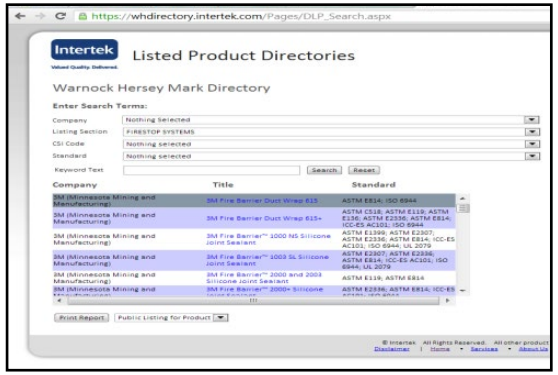
T Rating is 3/4 Hr for nom 1-1/2 in. (38 mm) thick pipe covering for penetrants A and B. T Rating is 1 Hr for nom 1-1/2 in. (38 mm) thick pipe covering for Penetrants C and D. T Rating is 0 Hr for all Penetrants when pipe coverings less than nom 1-1/2 in. (38 mm) thick.

Firestopping for Continuity Products Become Systems

- Firestop Systems Directories –
  - UL Product iQ
  - Intertek
  - FM Approvals
  - Others

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





How do Contractors Select/Analyze 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

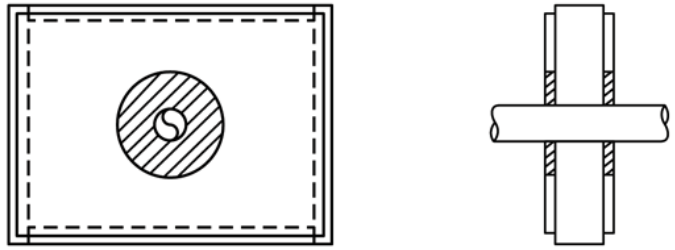
STI Graphic

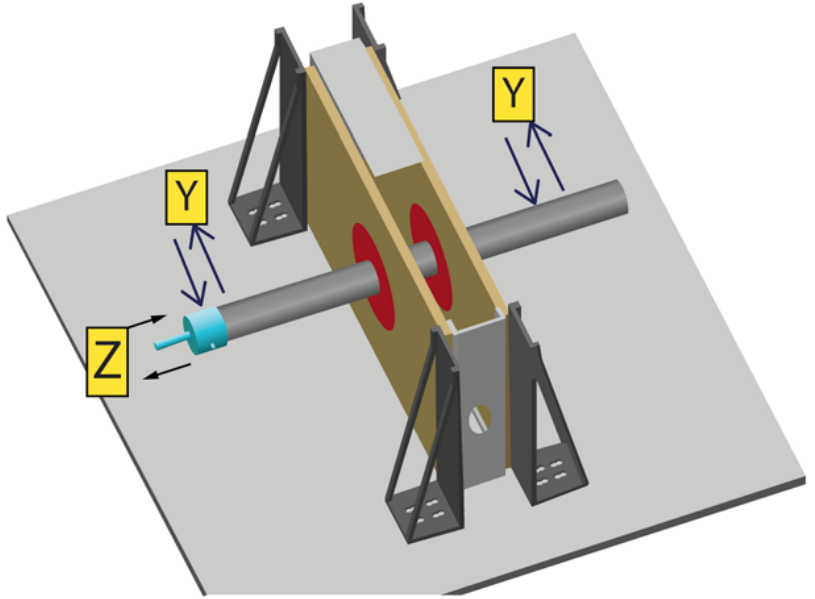
Firestopping for Continuity
Products become SYSTEMS Based on Testing

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

3M Photo

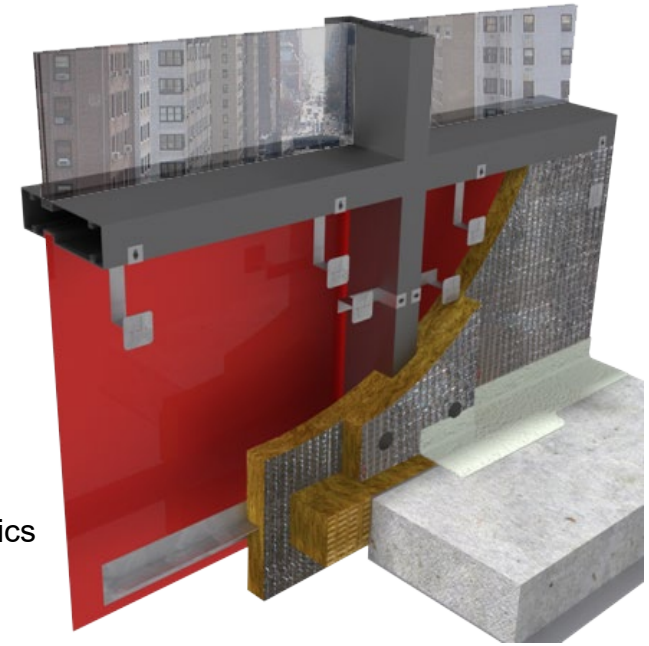
M Rating (Optional – ASTM Image)





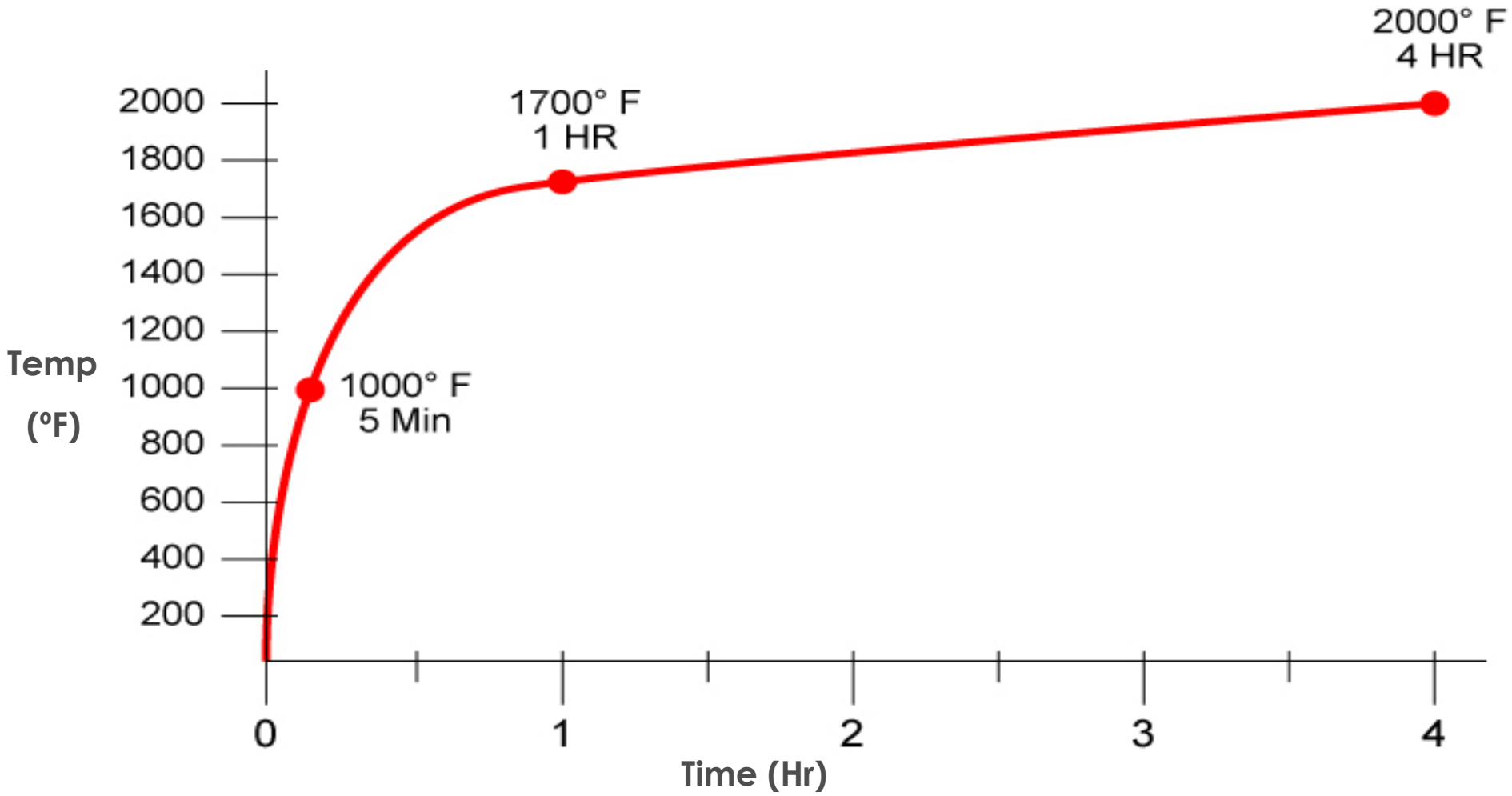
IBC & Curtain Walls

- **ASTM E2307**
- **Prevent Fire Spread – Interior Safing Slot**
  - **Interior Flame**
  - **Exterior Flame Plume from Window**
  - **Time & Temperature**
  - **Tested Systems….**
- **Leapfrog Testing - ASTM E2874**

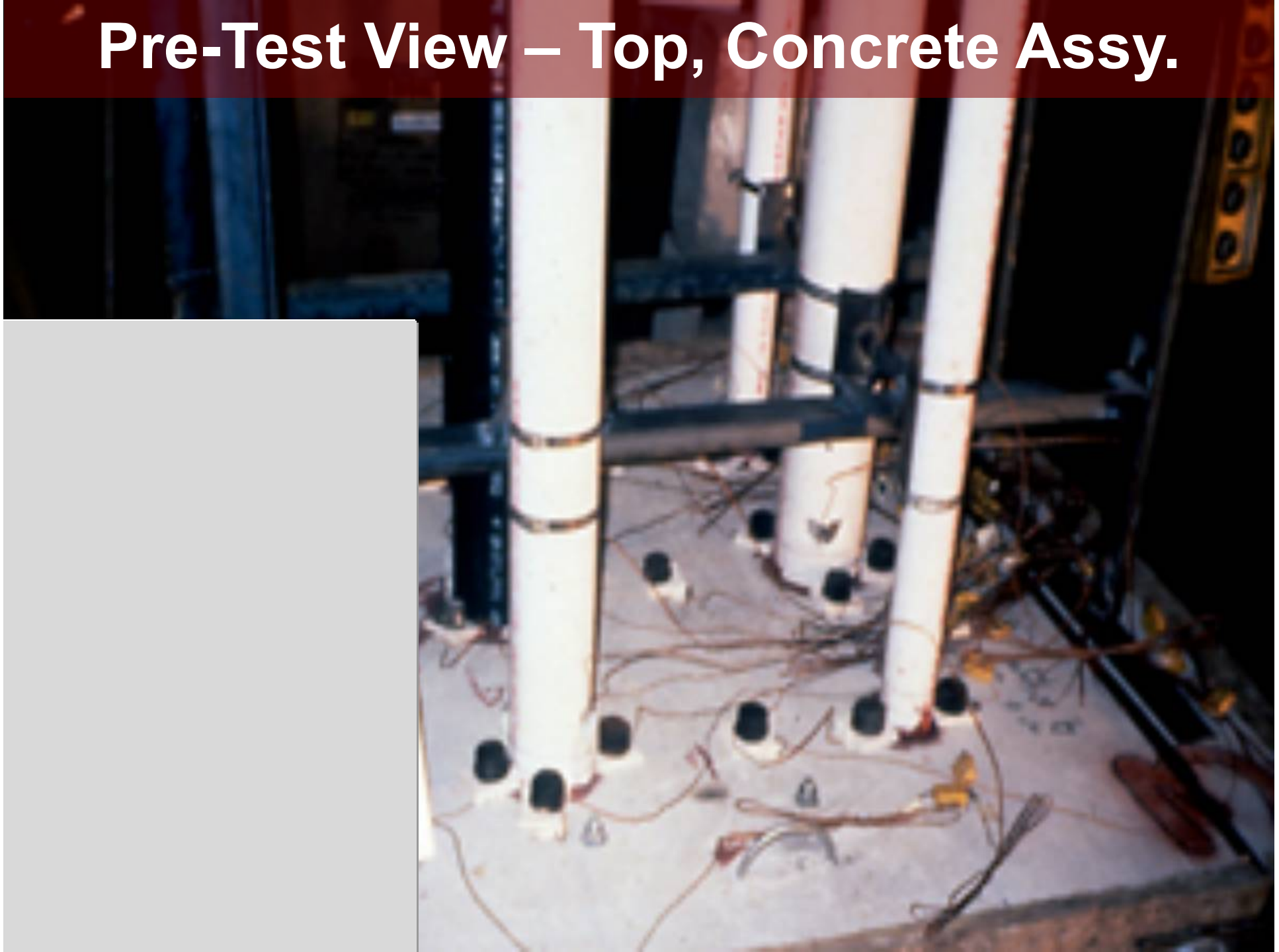


OCF/Thermafiber Graphics

Time-Temperature Curve



Pre-Test View – Top, Concrete Assy.



Hose Stream Test

UL Photo

Engineering Judgments/EFRRA

- Variances to Systems at Site?
  - **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***

J. Sharp – ProFirestop Photo

C. Zussman – Pepper Photo

Engineering Judgments/EFRRA

International Firestop Council – Manufacturers – www.firestop.org

IFC Recommended Guidelines for Evaluating Firestop Systems in Engineering Judgments.

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

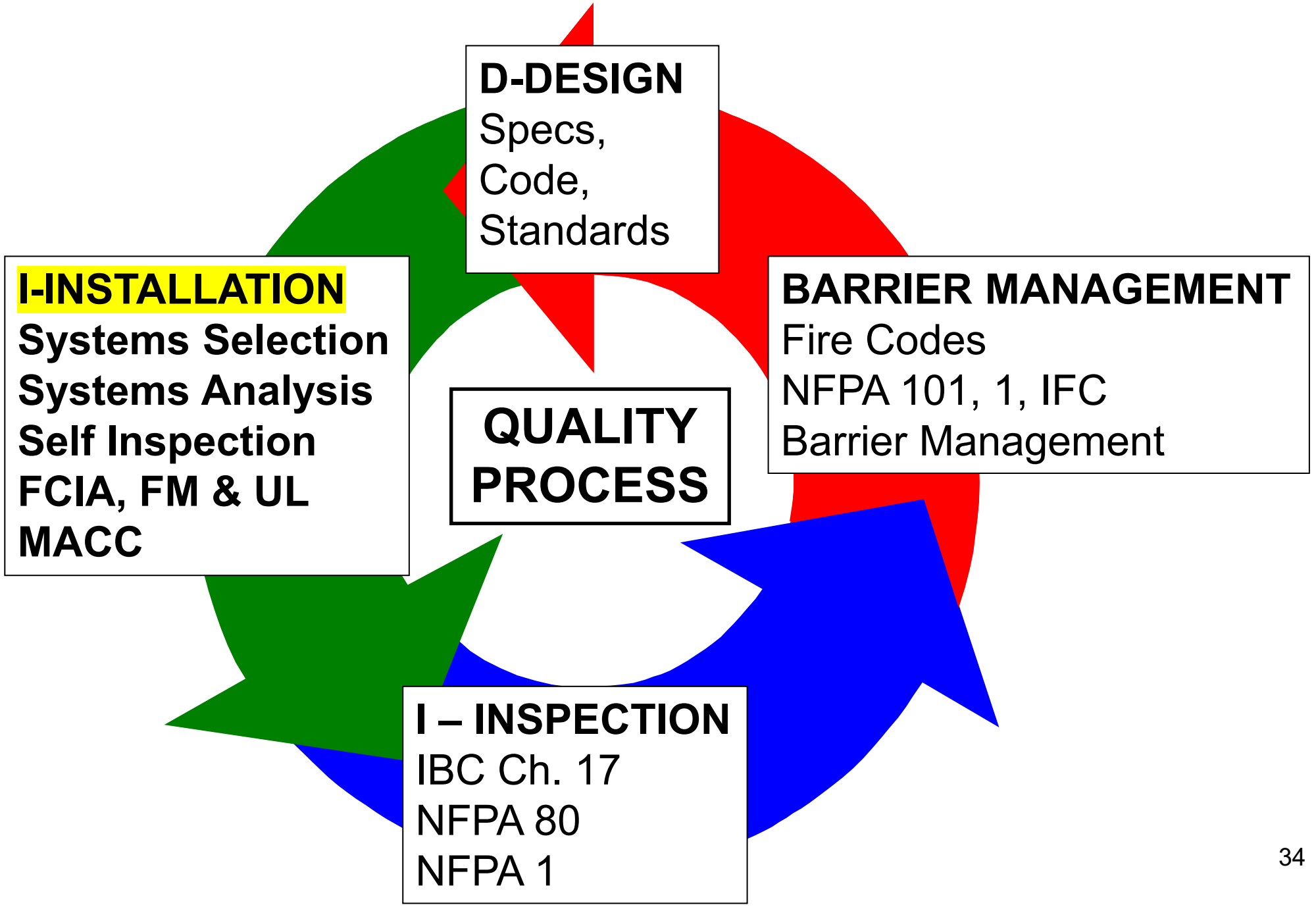
ADD THIS TO EJ”s….“Manufacturer attests this EJ will pass applicable firestop fire test with hose stream test if subjected…”

Engineering Judgments/EFRRA

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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- Size, Type, Thickness
- Annular Space, Joint, Breach Sizes
- Packing/Damming/Backing Materials
- Fill Material(s)

= Rated Firestop System

Manufacturers Instructions, Tested and Listed Designs

STI Graphic

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







STI, 3M, AD, HILTI, Nelson Photos

Review of UL Firestop and Joint Systems on UL Product iQ

- Review:
- U410
- C-AJ-1155
- C-Aj-3XXX
- C-AJ-4036
- C-AJ-8001
- W-L-1137
- W-L-2030
- W-L-2154
- W-L-5001
- BW-S-0002
- FF-D-1001
- HW-D-0221
- CW-D-1046

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
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

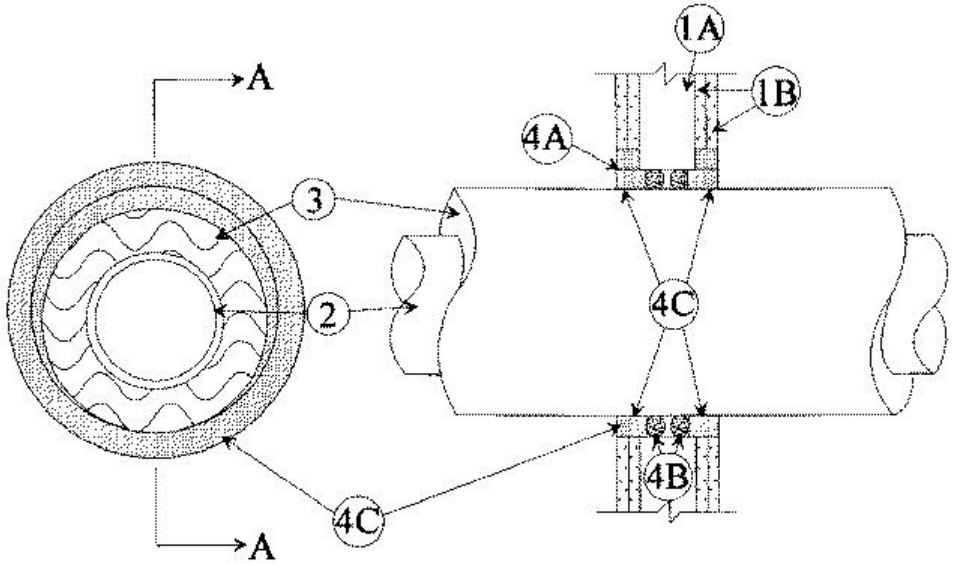
FM APPROVED 4991

Underwriters' Laboratories of Canada
Laboratoires des Assureurs du Canada
Qualified Firestop Contractor Program

Underwriters Laboratories Inc.
Qualified Firestop Contractor Program

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



CONFIGURATION A

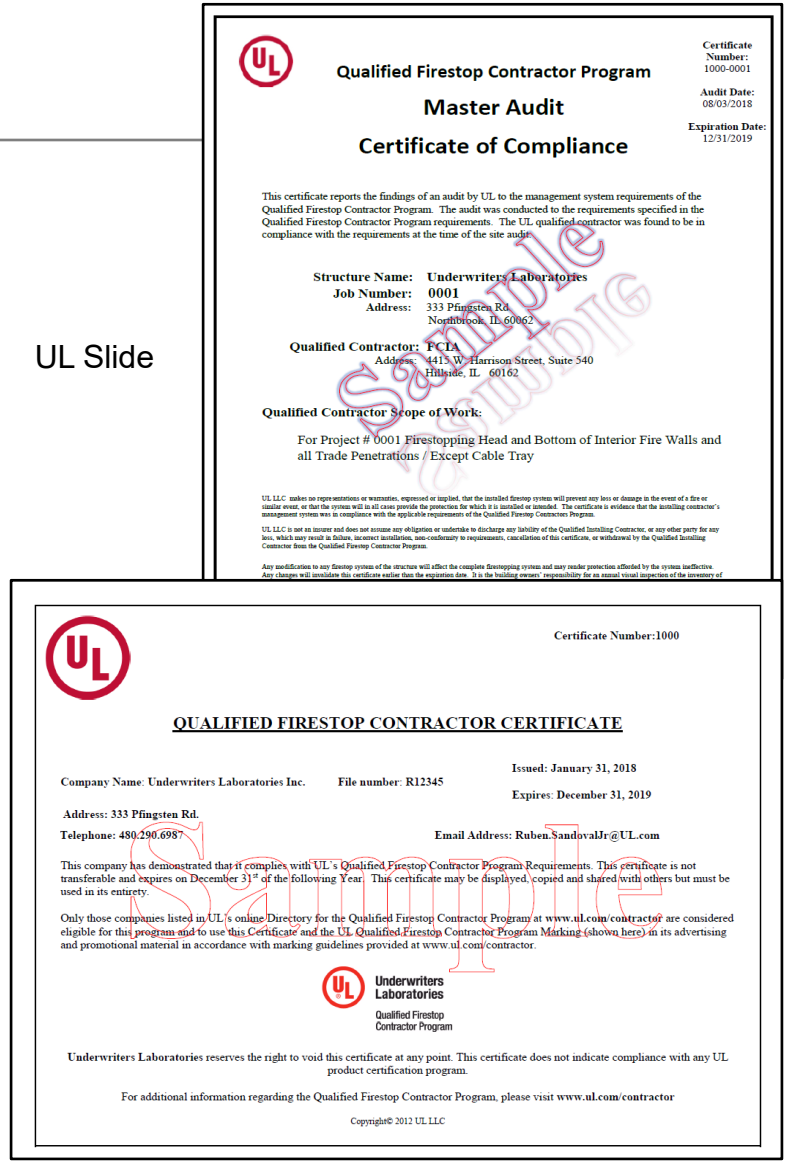
Master Audit Certificate of Compliance Program

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.

UL Slide



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: FCIA
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

Sample

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: 480.290.6987 Email Address: Ruben.SandovalJr@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 31st 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 are considered eligible for this 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.

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

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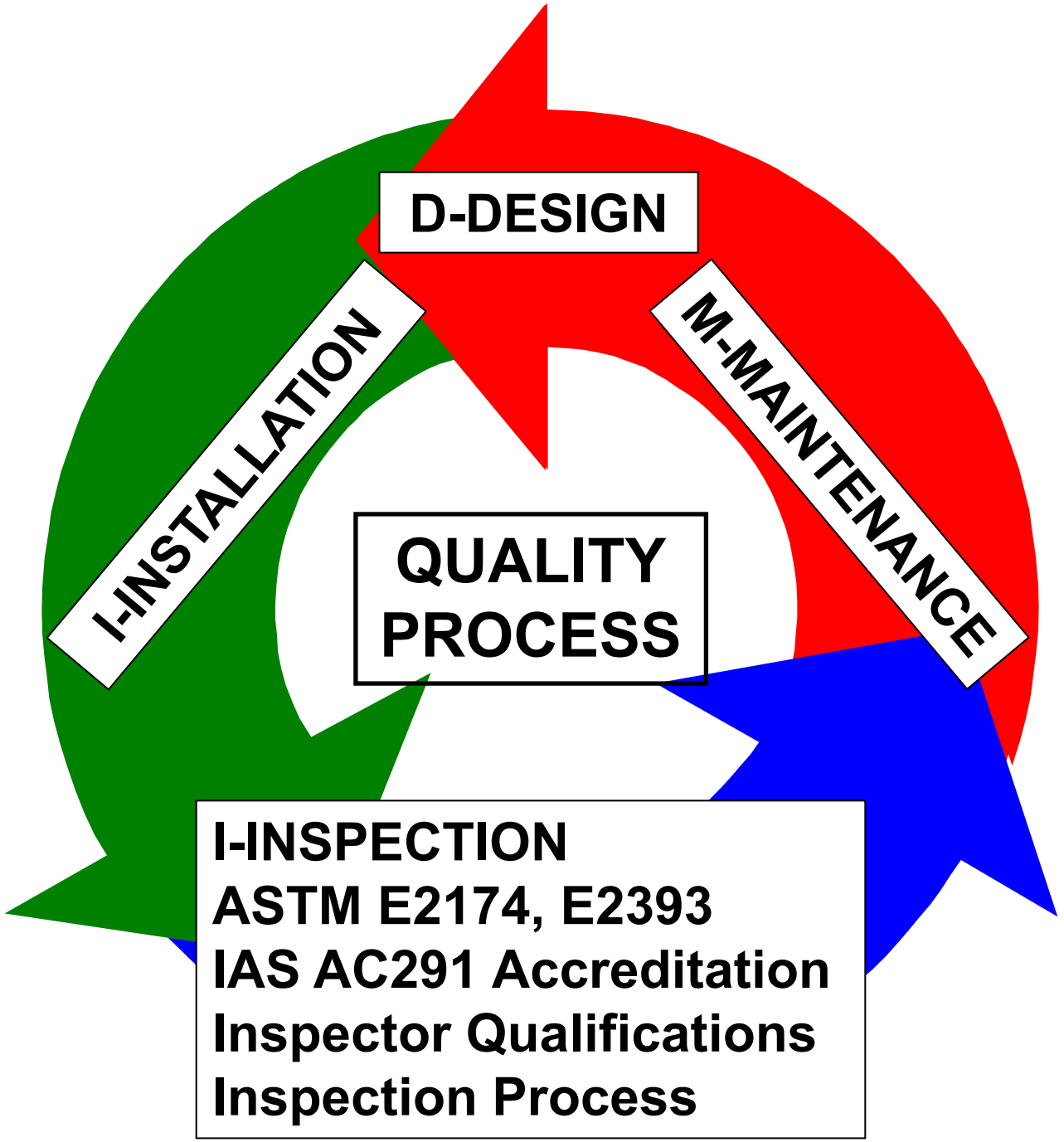
Sample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ASTM E2174, E2393
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Inspector Qualifications
Inspection Process

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*

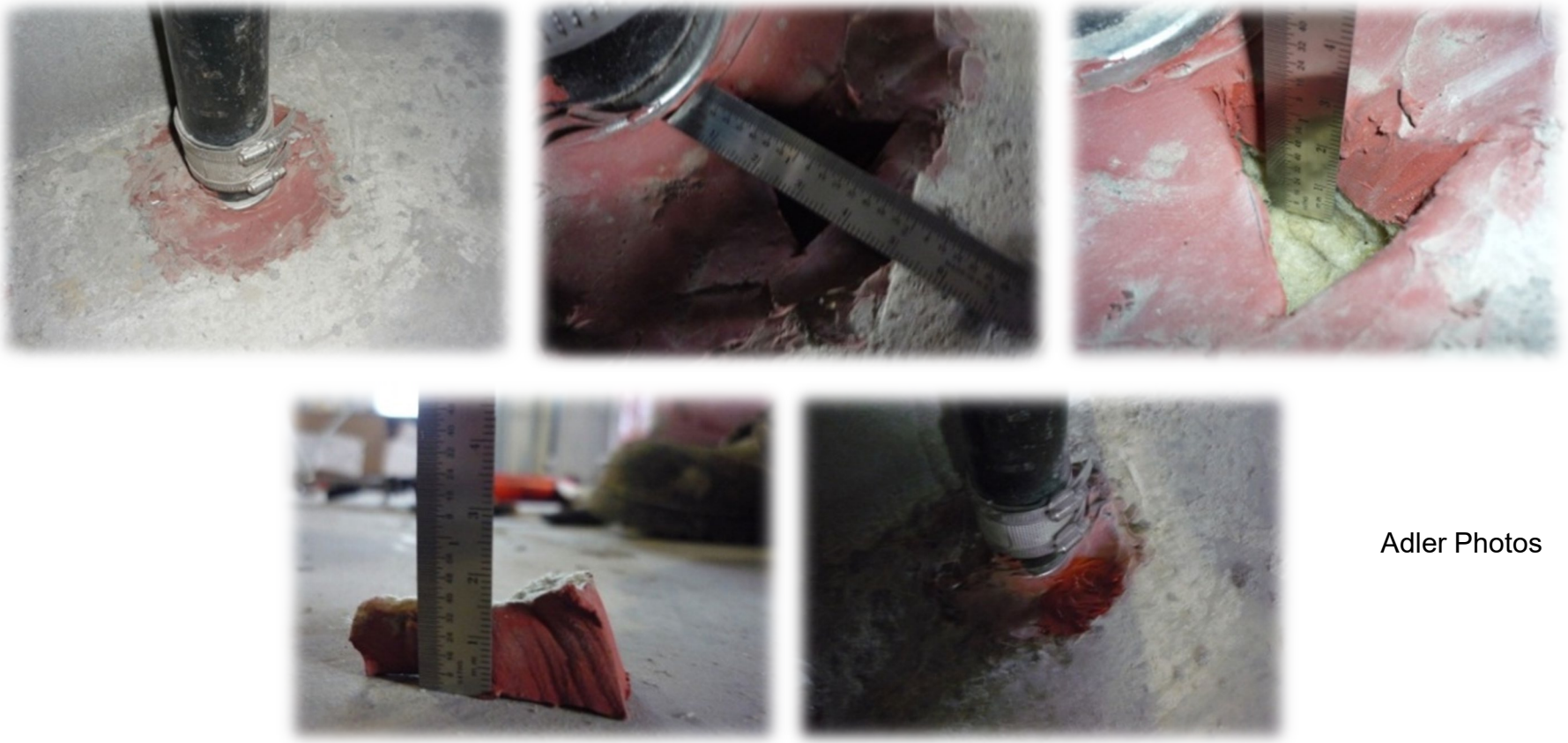
Inspection in Codes
ASTM E2174 – ASTM E2393

- NFPA 101 / 5000 – Chapter 8 – Annex
- 2012 International Building Code
  - CH 17 – Special Inspections (FCIA Proposals)
    - Buildings 75’ & higher above Fire Department Access
    - Occupancy Type III, IV, Chapter 16 Table 1604.5
    - Residential > 250 Occupants – 2021 (FCIA Proposal)
- Abu Dhabi International Building Code

Firestop Systems Inspection
ASTM E2174 – ASTM E2393

- "Standard Practice for On-Site Inspection of Installed Fire Stops – Penetrations - Joints"
  - Standard Inspection Procedure
  - Special Inspection Agency Companies
  - Independent
  - Hired by & Reports to..
    - Building Owner, Architect, Owners Rep, other than GC
      = Authorizing Authority

Measure Sealant Thickness at Bond Lines to Pen./Assy. – Not Middle of Annular Space

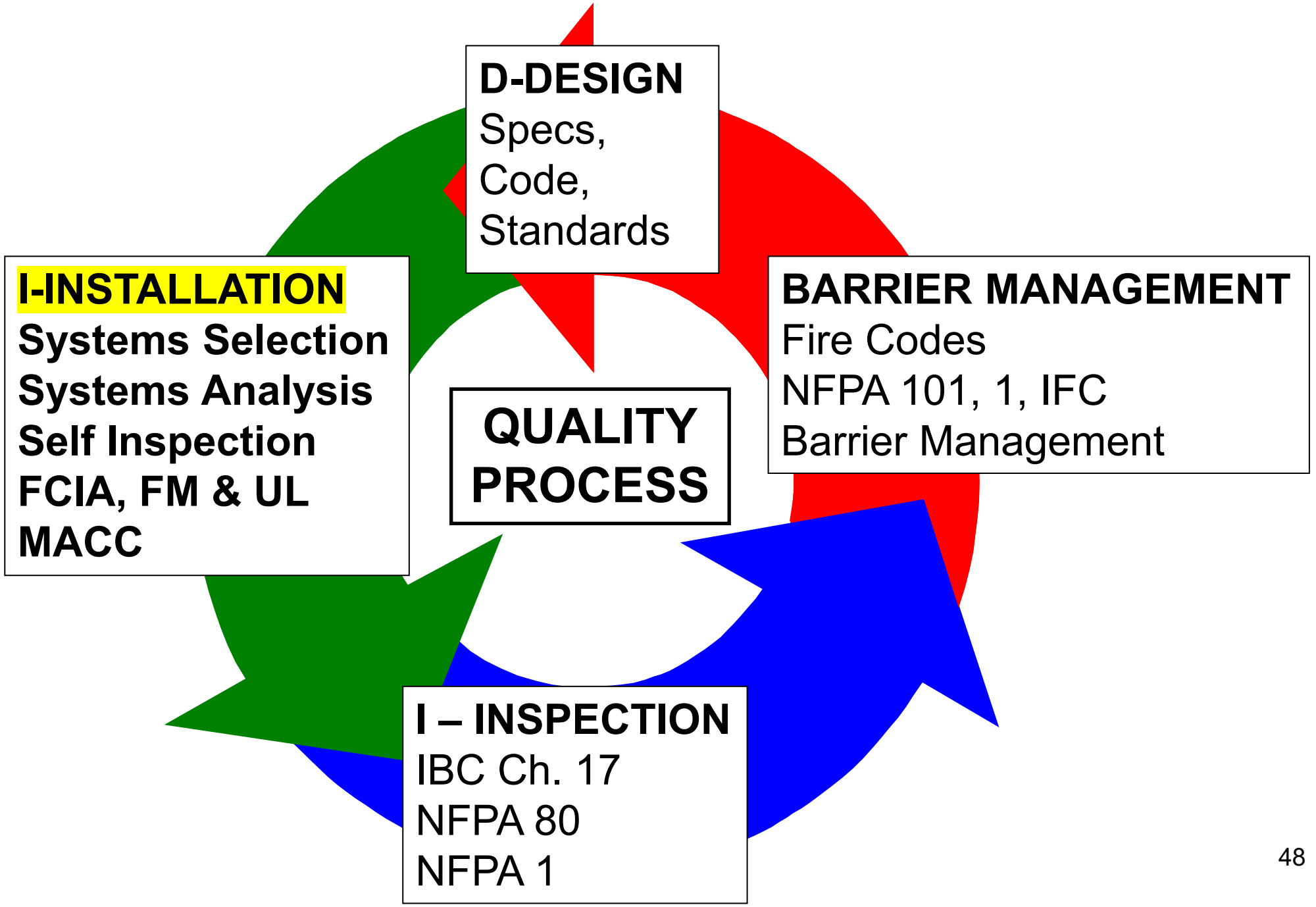


Adler Photos

Firestop Inspection
ASTM E2174 – ASTM E2393

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

Firestop Southwest, Affinity Firestop Photos


D-DESIGN
Specs,
Code,
Standards
I-INSTALLATION
Systems Selection
Systems Analysis
Self Inspection
FCIA, FM & UL
MACC
BARRIER MANAGEMENT
Fire Codes
NFPA 101, 1, IFC
Barrier Management
QUALITY
PROCESS
I – INSPECTION
IBC Ch. 17
NFPA 80
NFPA 1

How do Contractors Select/Analyze Systems & Inspection Agencies Analyze?

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

STI Graphic

= Rated Firestop System

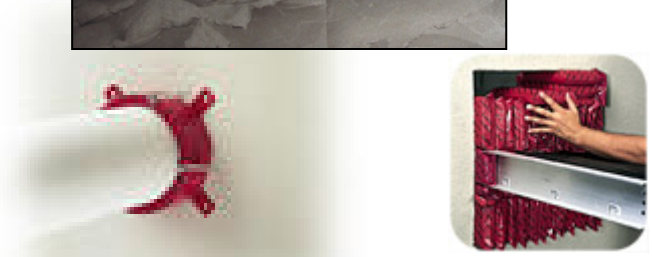
Manufacturers Instructions, Tested and Listed Designs

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





STI, 3M, AD, HILTI, Nelson Photos

Review of UL Firestop and Joint Systems on UL Product iQ

- Review:
- U410
- C-AJ-1155
- C-Aj-3XXX
- C-AJ-4036
- C-AJ-8001
- W-L-1137
- W-L-2030
- W-L-2154
- W-L-5001
- BW-S-0002
- FF-D-1001
- HW-D-0221
- CW-D-1046

Firestop & Inspection

Firestop & Inspection

Firestop & Inspection

Firestop & Inspection

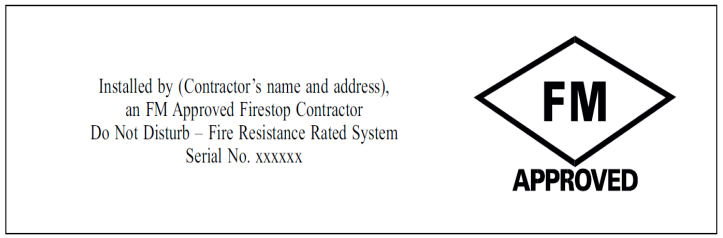
Firestop Repairs

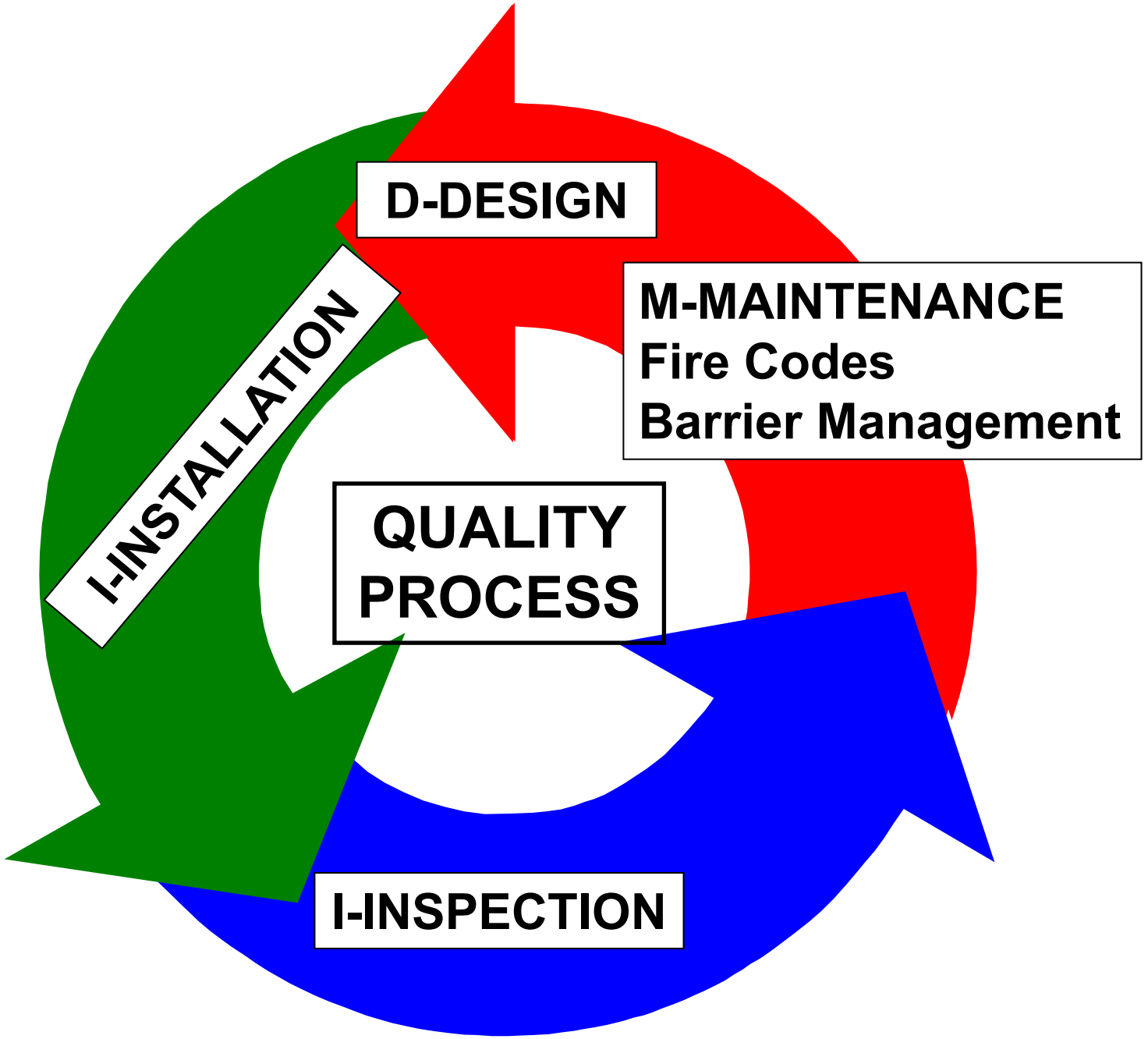
- Repairs
  - Instruction requirements by manufacturer
  - Listed systems
  - Patching
    - Systems….
    - Adhesion
    - Movement
    - T, L, W Ratings
    - ***As recommended by MFR***

Affinity Firestop Photo

Repairs Simplified with Labels…

- Inspection Documents
  - Identify System, Materials
- Identification Systems (Labels)
  - Firestop Contractor Installed
  - Speeds System Evaluation

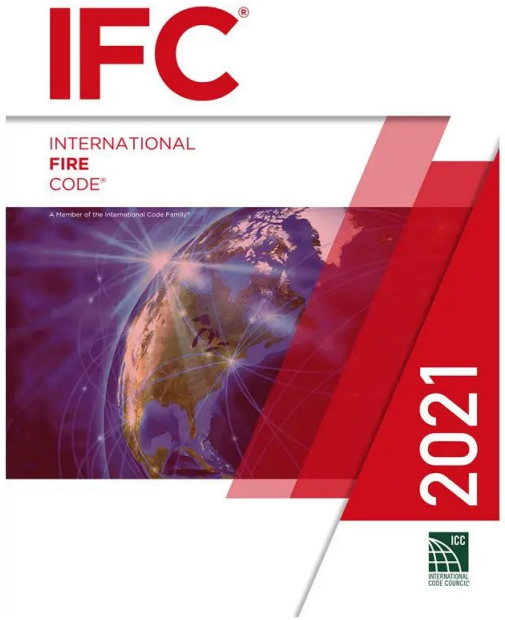


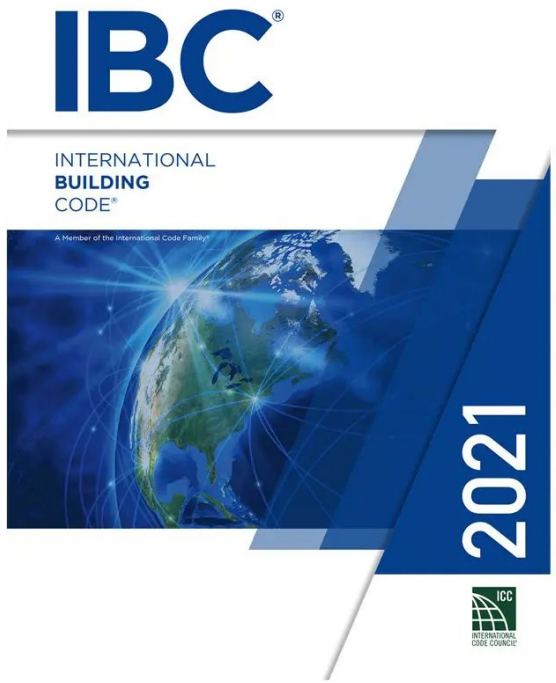

D-DESIGN
M-MAINTENANCE
Fire Codes
Barrier Management
I-INSTALLATION
QUALITY
PROCESS
I-INSPECTION

Existing Buildings? Did you know…

- **Fire, existing building codes have existed for decades**

- Fire Codes dictate maintaining protection of structural fire-protection and fire-resistance-rated compartmentation

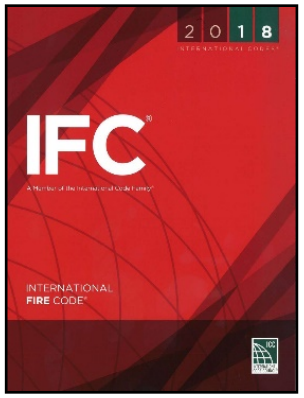


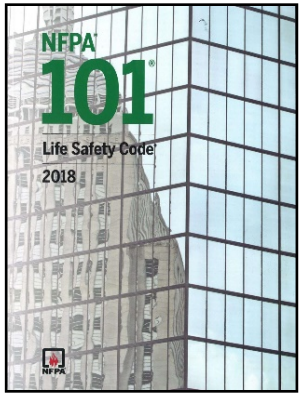


Fire Codes Require Maintenance

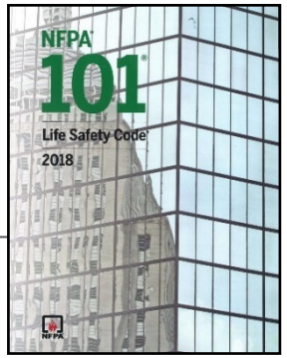
- NFPA 101
- NFPA 1
- International Fire Code
- UAE Fire & Life Safety Code

  - Minimum Requirements Stated
  - Frequency
  - **What really happens?**



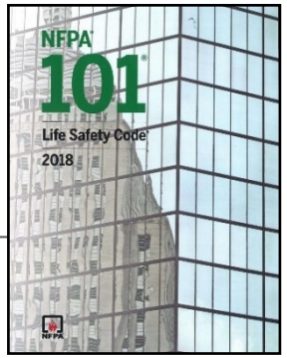


National Fire Protection Association NFPA 101 – 2018



- **SECTION 4.6.12 Maintenance, Inspection, and Testing.**
  - **4.6.12.1** **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.

National Fire Protection Association
NFPA 101 – 2018



- **4.6.12.2** **No existing life safety feature *shall be removed or reduced*** where such feature is a requirement for new construction.
- **4.6.12.3*** **Existing life safety features obvious to the public, if not required by the Code, *shall be either maintained or removed*.**
- **4.6.12.4** **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.
- **4.6.12.5** **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.

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.

FCIA Added Emphasis

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.

FCIA Added Emphasis

National Fire Protection Association
NFPA 1 – 2018 – Has Inspection Too…

- **12.3.2.1** … Penetrations … shall be inspected in accordance with **ASTM E2174 …**
- **12.3.2.2** … Joint systems … shall be inspected in accordance with **ASTM E2393 …**

- **FCIA INTIATIVE WITH KOFFEL ASSOC.…**

FCIA Added Emphasis

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.*

FCIA Added Emphasis

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.

FCIA Added Emphasis

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.

FCIA Added Emphasis

2009 International Fire Code Maintenance

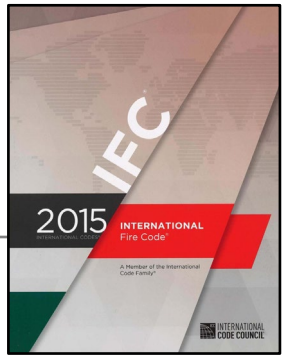
SECTION 703
FIRE-RESISTANCE-RATED CONSTRUCTION

- **703.1 Maintenance.** The required fire-resistance rating of fire-resistance-rated construction (including walls, 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 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. …

FCIA Added Emphasis

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 when damaged, altered, breached or penetrated. Records of inspections and repairs shall be maintained. …

FCIA Added Emphasis

2018 International Fire Code Maintenance

SECTION 701
GENERAL

- **701.1 Scope.** The provisions of this chapter shall govern the inspection and maintenance of the materials, systems and assemblies used for **structural *fire-resistance***, *fire-resistance-rated* construction separation of adjacent spaces and construction installed to resist the passage of smoke to safeguard against the spread of fire and smoke within a building and the spread of fire to or from buildings. New buildings shall comply with the *IBC*.

FCIA Added Emphasis

2018 International Fire Code Maintenance

SECTION 701
GENERAL

- **701.2 Fire-resistance-rated construction.** The *fire-resistance rating* of the following *fire-resistance-rated* construction shall be maintained:
  1. Structural members
  2. *Exterior walls*
  3. *Fire walls, fire barriers, fire partitions*
  4. *Horizontal assemblies*
  5. Shaft enclosures

2018 International Fire Code Maintenance

SECTION 701
GENERAL

- **701.3 Smoke barriers.** The *fire-resistance rating* and smoke-resistant characteristics of smoke barriers shall be maintained.
- **701.4 Smoke partitions.** The smoke-resistant characteristics of smoke partitions shall be maintained.

2018 International Fire Code Maintenance

SECTION 701
GENERAL

- **701.5 Maintaining protection.** Materials, systems and devices used to repair or protect breaches and openings in fire-resistance-rated construction and construction installed to resist the passage of smoke shall be maintained in accordance with Sections 703 through 707.

FCIA Added Emphasis

2018 International Fire Code Maintenance

SECTION 701
GENERAL

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

- **FCIA Initiative with Koffel Assoc. – 'Inventory'…**

FCIA Added Emphasis

2018 International Fire Code Maintenance

SECTION 701
GENERAL

- **701.6 Owner's responsibility Cont. 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.

FCIA Added Emphasis

2018 International Fire Code Maintenance

SECTION 701
GENERAL

- **701.7 Unsafe Conditions.** Where any components in this chapter are not maintained and do not function as intended or do not have the *fire-resistance* or the resistance to the passage of smoke required by the code under which building was constructed, remodeled or altered, such component(s) or portions thereof shall be deemed an unsafe condition in accordance with Section 111.1.1.

FCIA Added Emphasis

2018 International Fire Code Maintenance

SECTION 701
GENERAL

- **701.7 Unsafe Conditions Cont.** Components or portions thereof determined to be unsafe shall be repaired or replaced to conform to the code under which building was constructed, remodeled or altered, as deemed appropriate by the *fire code official*. Where the condition of components is such that any building, structure or portion thereof presents an imminent danger to the occupants of the building, structure or portion thereof, the *fire code official* shall act in accordance with Section 111.2.

FCIA Added Emphasis

2018 International Fire Code Maintenance

SECTION 703
PENETRATIONS

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

FCIA Added Emphasis

2018 International Fire Code Maintenance

SECTION 703
PENETRATIONS

- **703.1 Maintaining protection cont.** 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 instructions.

- **FCIA Initiative…"Where the system design number is known"…**

FCIA Added Emphasis

2018 International Fire Code Maintenance

SECTION 704
JOINTS AND VOIDS

- **704.1 Maintaining protection.** Where required when the building was originally constructed, materials and systems used to protect joints and voids in the following locations shall be maintained. The materials and systems shall be securely attached to or bonded to the adjacent construction, without openings visible through the construction.

FCIA Added Emphasis

2018 International Fire Code Maintenance

SECTION 704
JOINTS AND VOIDS

- **704.1 Maintaining protection cont.**
  - Subparagraphs 1 through 7 detail the types of joints and voids required to be maintained. This list corresponds to joints and voids which are required to be protected by the 2018 IBC.
- Unprotected joints and voids do not need to be protected where such joints and voids were not required to be protected when the building was originally constructed.

FCIA Added Emphasis

2018 International Fire Code Maintenance

SECTION 705
DOOR AND WINDOW OPENINGS

- **705.1 Maintaining protection.** Where required when the building was originally constructed, opening protectives installed in *fire-resistance-rated* assemblies, *smoke barriers* and *smoke partitions* shall be inspected and maintained in accordance with this section.

FCIA Added Emphasis

2018 International Fire Code Maintenance

SECTION 705
DOOR AND WINDOW OPENINGS

- **705.2 Inspection and maintenance.** *Opening protectives* in *fire-resistance-rated* assemblies shall be inspected and maintained in accordance with NFPA 80. *Opening protectives* in *smoke barriers* shall be inspected and maintained in accordance with NFPA 80 and NFPA 105. Openings in smoke partitions shall be inspected and maintained in accordance with NFPA 105.

FCIA Added Emphasis

2018 International Fire Code Maintenance

SECTION 705
DOOR AND WINDOW OPENINGS

- **705.2 Inspection and maintenance cont.** Fire doors and smoke and draft control doors shall not be blocked, obstructed, or otherwise made inoperable. Fusible links shall be replaced promptly whenever fused or damaged. *Opening protectives* and smoke and draft control doors shall not be modified.

FCIA Added Emphasis

2018 International Fire Code Maintenance

SECTION 705
DOOR AND WINDOW OPENINGS

- **705.2.1 Labeling requirements.** Where approved by the *fire code official*, the application of field-applied labels associated with the maintenance of *opening protectives* shall follow the requirements of the *approved* third-party certification organization accredited for *listing* the opening protective.

2018 International Fire Code Maintenance

SECTION 705
DOOR AND WINDOW OPENINGS

- **705.2.2 Signs.** Where required by the *fire code official*, a sign shall be permanently displayed on or near each *fire door* in letters not less than 1 inch (25 mm) high to read as follows:
    1. For doors designed to be kept normally open: FIRE DOOR—DO NOT BLOCK.
    2. For doors designed to be kept normally closed: FIRE DOOR—KEEP CLOSED.

2018 International Fire Code Maintenance

SECTION 705
DOOR AND WINDOW OPENINGS

- **705.2.3 Hold-open devices and closers.** Hold-open devices and automatic door closers, where provided, shall be maintained. During the period that such device is out of service for repairs, the door it operates shall remain in the closed position.

FCIA Added Emphasis

2018 International Fire Code Maintenance

SECTION 705
DOOR AND WINDOW OPENINGS

- **705.2.4 Door operation.** Swinging *fire doors* shall close from the full-open position and latch automatically.
- **705.2.5 Smoke- and heat-activated doors.** Smoke-activated doors shall be maintained to self-close or automatically close upon detection of smoke. Existing fusible-link type automatic door-closing devices are permitted if the fusible link rating does not exceed 135˚F (57˚C).

FCIA Added Emphasis

2018 International Fire Code Maintenance

SECTION 705
DOOR AND WINDOW OPENINGS

- **705.2.6 Testing.** Horizontal and vertical sliding and rolling *fire doors* shall be inspected and tested annually to confirm proper operation and full closure. Records of inspections and testing shall be maintained.

FCIA Added Emphasis

2018 International Fire Code Maintenance

SECTION 706
DUCT AND AIR TRANSFER OPENINGS

- **706.1 Maintaining protection.** Dampers protecting ducts and air transfer openings shall be inspected and maintained in accordance with NFPA 80 and NFPA 105. Other products or materials used to protect the openings for ducts and air transfer openings shall be securely attached to or bonded to the construction containing the duct or air transfer opening, without visible openings through or into the cavity of the construction. Any damaged products or materials protecting duct and air transfer openings shall be repaired, restored or replaced.

FCIA Added Emphasis

2018 International Fire Code Maintenance

SECTION 706
DUCT AND AIR TRANSFER OPENINGS

- **706.2 Unprotected openings.** Unprotected duct and air transfer openings in *fire-resistance-rated* construction and construction installed to resist the passage of smoke shall be protected so as to comply with requirements that were in effect when the building was constructed.

FCIA Added Emphasis

2018 International Fire Code Maintenance

SECTION 707
CONCEALED SPACES

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

FCIA Added Emphasis

2018 International Fire Code Owner's Responsibility

- **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.*
- **FCIA Initiative with Koffel Associates**

FCIA Added Emphasis

2018 International Fire Code
Fire-Resistance Inventory Explained

- **Life Safety Drawings**
- Designs, Systems and Assemblies – **Listings**
- **Manufacturers Installation and Maintenance Instructions**
- How?
  - Paper & Files
  - Spreadsheets
  - Software

International Property Maintenance Code

2018 IPMC SECTION 703

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

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 – *W*here *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

UAE Fire & Life Safety Code of Practice

3.7. Maintenance & Management

3.7.1. Provide protection and maintain conditions during & after installation that ensure installed firestop systems are without damage or deterioration at the time of Substantial Completion. If, despite such protection, damage or deterioration occurs, damaged/deteriorated systems shall be removed and replaced with new ones.

UAE Fire & Life Safety Code of Practice

3.7. Maintenance & Management

3.7.2. The condition of installed firestop systems shall be visually inspected by the owner or owner's representative 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.

UAE Fire & Life Safety Code of Practice

3.7. Maintenance & Management

3.7.3. Any new openings made therein for passage of through penetrants shall be protected with approved firestop system to comply with applicable codes as per the guidelines of Civil Defense.

Saudi Arabia Fire Code

SECTION 107 MAINTENANCE

107.1 Maintenance of safeguards. Where any device, equipment, system, condition, arrangement, level of protection, or any other feature is required for compliance with the provisions of this code, or otherwise installed, such device, equipment, system, condition, arrangement, level of protection, or other feature shall thereafter be continuously maintained in accordance with this code and applicable referenced standards.

M–Barrier Management Systems

- **Visual Building Survey/Inspection….**
  - **Does it look like the assembly?**
    - Annular Space
    - Visible Breaches, unless listing allows
    - Joint Width
    - Penetrating Item Types, Coverings
    - # Penetrating Items, Types
    - Penetrations in Joints & Not in System/Listing…
    - Much more…
  - **Competent Personnel**

How do Contractors Select/Analyze 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

STI Graphic

M–Barrier Management System for Building Owners

- Life Safety Drawings
- Tested and Listed Systems (Listings), if not incorporated in the ….
- Manufacturers Installation, Maintenance and Repair Instructions
- Manufacturers Product Data Sheets
- Safety Data Sheets, where applicable.

M–Barrier Management System for Building Owners

- Build an Action oriented ‘visual inspection’, survey schedule.
- Assign someone – a fire-resistance/smoke resistant champion - to manage, and be responsible that inspections, repairs and recordkeeping take place on a timely basis.
- Train the inspection and repair staff.
- FREE Barrier Management Symposium online is a start. Check it out at www.FCIA.org

M–Barrier Management System for Building Owners

- Keep easily retrievable records of ‘inventory’, inspections and repairs for AHJ’s
  - Paper
  - Electronic
- Repeat the process, for the life of the building.

M–Barrier Management Systems

- **Visual Building Survey/Inspection….**
  - Tested and Listed Systems (Listings)
  - Manufacturers installation instructions

C-AJ-8XXXX???
See Tag/Label Identification System

Affinity Firestop Photo

C-AJ-???

Affinity Firestop Photo

C-AJ-5209?

C-AJ-8XXX??

W-L-2XXX???
NOPE!!

W-L-2XXX Wallboard Patch??

NO!!

Affinity Firestop Photo

Good Luck!

Affinity Firestop Photo

M–Barrier Management Systems
Building Owner's Policy Topics

- **Create a Budget to Meet Code Requirements**
- **Inventory – What Info?**
  - Life Safety Drawings
  - Manufacturers Instructions
  - Tested and Listed Systems (Listings)
- **Implement Fire Resistance Management**
  - In House Policy
  - Outside Contractor Policy
- **Monitor Process**
- **Annual Visual Inspection & Keep Records**
- **Show Fire Marshal….Insurance Company**

Questions??

Thanks for Attending!!!

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Firestop Contractors International Association

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FCIA
Firestop Contractors International Association