Firestopping DIIM

Bill McHugh, FCIA Executive Director

INFO@FCIA.org

FCIA

Firestop Contractors International Association

FCIA – Firestop Contractors International Association

- **Fire Exits??**
- **Housekeeping….**
- **Thanks to FCIA Members**
  - Firestop Contractors
  - Manufacturers, Consultants
  - Firestop Distributors, Reps, Friends

Welcome, Thanks, From FCIA…..

FREE PDF MOP for Code Officials, Govermental ICC Members & Specifiers with Design Firms or Independent Practice

Info@FCIA.org

RESOURCES

www.FCIA.org

FCIA Actions – 2021 & 2022

Firestop Contractors International Association

- ***NEW Education for Careers in Firestopping!!***
- ***FCIA's Firestop Certificate of Achievement & Education Program***
- ***30 Hours Education & Exams***

FCIA – Firestop Contractors International Association

- **FREE Life Safety Digest**
- **UL/ULC, FM 4991 Contractor Programs**
- **IAS AC 291 Inspection Agency Accreditation Program**

- **Firestop Certificate &** Individual Knowledge
- **ASTM Inspection Standards**
- **Tools** @ **FCIA.org** for Specifiers, AHJ's, Building Owners, Firestop Contractors & Inspection Agencies
- **Watch FCIA.org for Webinar Announcements!**

FCIA Actions –2022

- Conferences - HYBRID
  - FCIA ECA @ Nashville, USA – May 18-20
  - FCIA ME @ Doha, Dubai – June 12-17
  - FCIA CAN @ Ontario – Sept. ‘22
  - FCIA FIC @ Amelia Island, FL – Nov. 2-4, ‘22
- Webinars & Symposiums
- Code Development & Standards Discussions
- Committee Action
- International Discussions
- ***NEW Education for Careers in Firestopping!!***
  - ***FCIA’s Firestop Certificate of Achievement & Education Program***

Firestopping & Compartmentation for Safety

- Total Fire Protection Stats…***North America***
- ***11,025 20 story + Tall Buildings, 70% in ….***
  NY, SF, LA, CHI, HI, Toronto…
- ***Compartmentation Primary…Many Buildings***
  - ***Older buildings***
  - ***Earthquakes***
  - ***Columns, Beams, Horizontal Assemblies***

- ***Source, Emporis.com***

Firestopping & Compartmentation for Safety

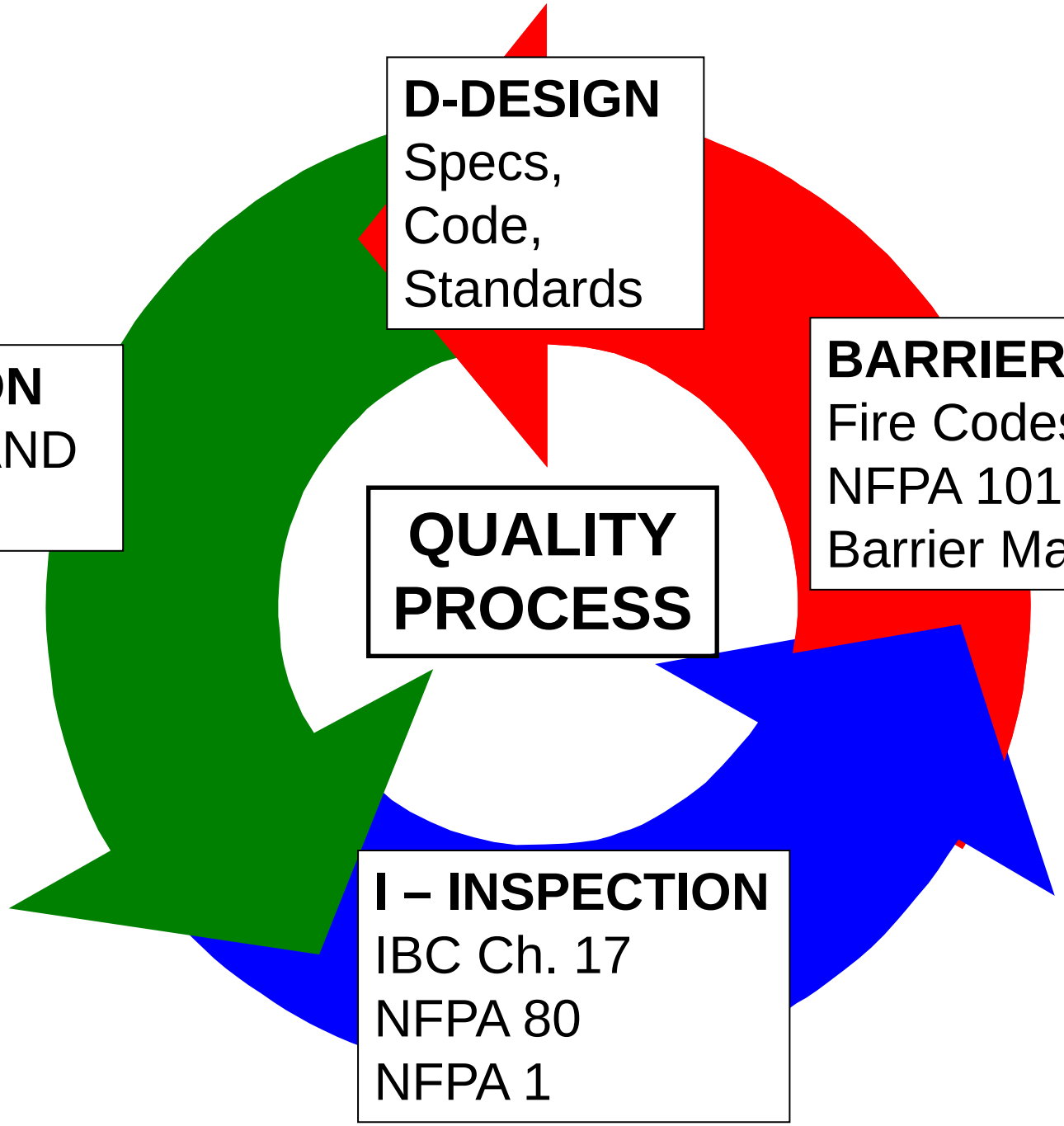
- **World Trade Center 7** - Recommendation C,
- (NIST NCSTAR 1A, report for towers I & II
- ***'the need for redundancy in fire protection systems that are critical to life structural integrity';***

  - Fireproofing, Compartmentation and Firestopping,
  - And the active sprinkler system each provide redundancy for maintaining structural integrity in a building fire, should one of the systems fail to perform it's intended function.

- ***"the ability of the structure and local floor systems to withstand a maximum credible fire scenario, without collapse, recognizing that sprinklers could be compromised, not operational, or non existent.".***

Outline

- FCIA – DIIM – Firestopping
  - Design – Specs, Codes, Testing, Products
  - Installation –
    - FM 4991, UL/ULC Qualified Firestop Contractor Programs
  - Inspection –
    - ASTM E2174 / E2393 Inspection Standards
    - IAS AC 291, Inspector Qualifications
  - Maintain Protection – Fire Codes; Barrier Management
  - Firestopping for Safety –
    - Repairs??


D-DESIGN
Specs,
Code,
Standards
BARRIER MANAGEMENT
Fire Codes
NFPA 101, 1, IFC
Barrier Management
I-INSTALLATION
MS Programs AND
Mfr. Education
QUALITY
PROCESS
I – INSPECTION
IBC Ch. 17
NFPA 80
NFPA 1

“DIIM” – Design, Install, Inspect, Maintain

- Fire Resistance & Smoke Resistant Firestopping
  - **Properly *Designed*** Building Codes
    - FCIA - 07-84-00 – Specification – ***CCS***
    - ***Tested and Listed Systems*** –
    - ASTM E814, UL 1479, ASTM E1966, UL 2079, E2307, E2837, E3037
    - **Movement, (M) Smoke (L), Water (W)**
  - Professional ***Installation*** –
    - FCIA Member, ULC Qualified Contractors, FM 4991 Approved
  - Properly ***Inspected*** –
    - ASTM E2174 / E2393, by IAS AC 291 Agencies, ULC, IFC, FM Exams
  - ***Protection Maintained*** – Annually – by FCIA Members

Barrier Continuity SYSTEMS

- **Products Become Systems – Test Standards**
  - **Fire & Smoke Barriers – Fire Separations**
    - ASTM E119, UL 263
  - **Firestopping –**
    - UL 1479, ASTM E814, UL 2079, E1966, E2307, E2837, E3037**…**test methods…”
  - **Swinging/Rolling Fire Doors** – UL 10B & UL 10C….NFPA 252
  - **Fire Rated Glazing –** UL 9, NFPA 257, UL 263, ASTM E119
  - **Fire/Smoke Dampers** – UL 555, UL 555S, UL 555C
- **SYSTEM Testing = Suitability Statement**

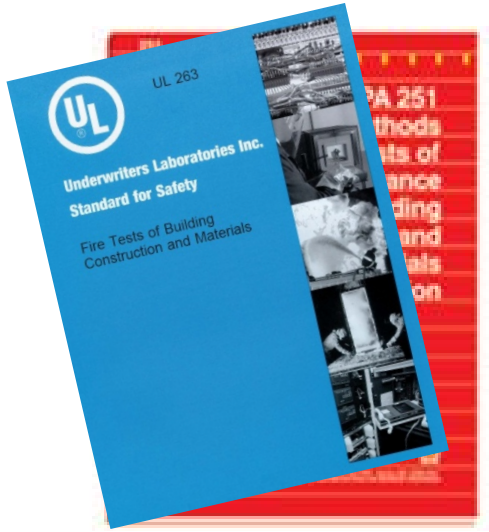
Fire-Resistance-Rated Construction

Establishing
Fire-Resistance Ratings

UL Image

Standards

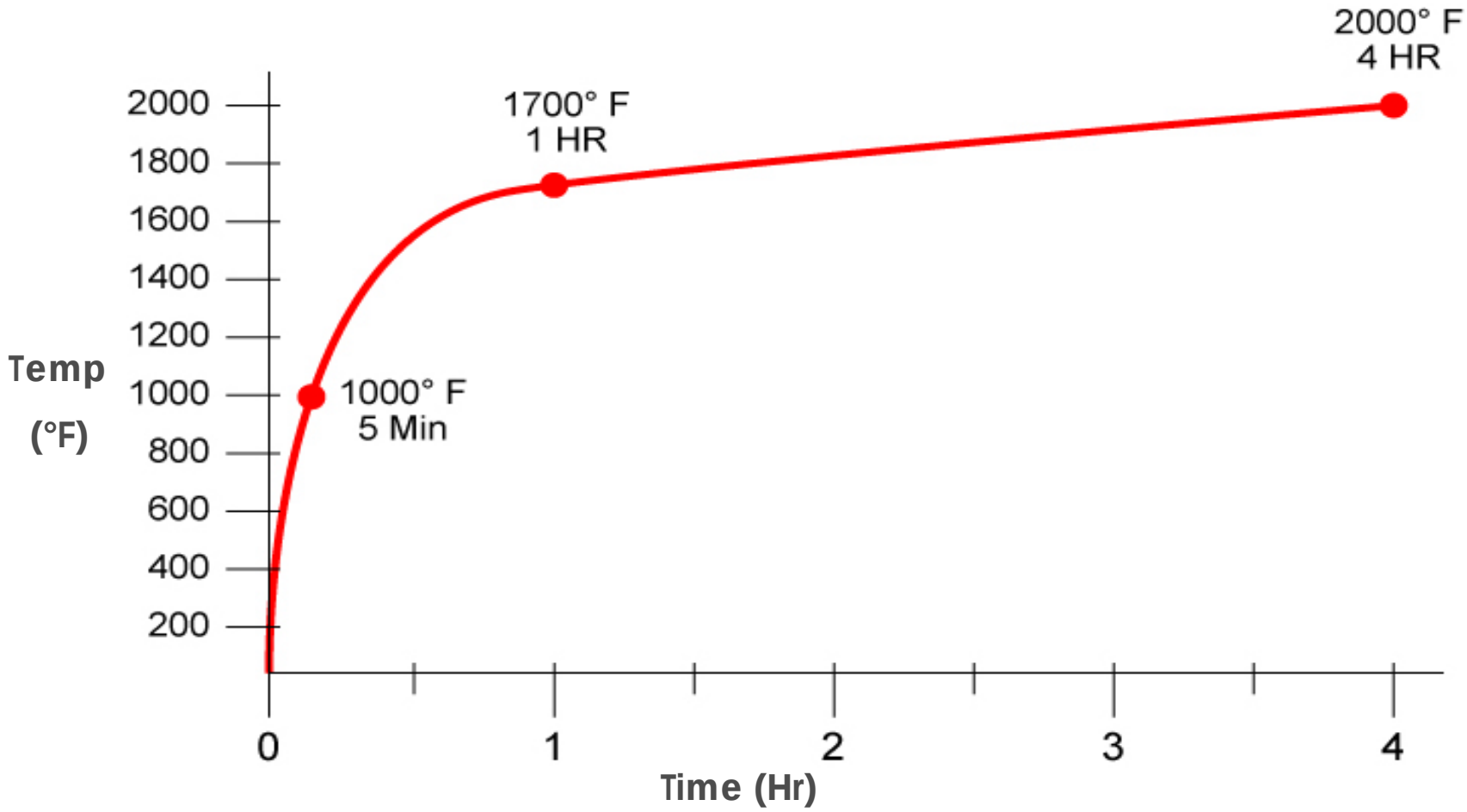
- US
  - ASTM E119
  - NFPA 251 (Withdrawn)
  - UL 263
- Canada
  - ULC-S101



Building Components

- Columns
- Beams
- Floor/Ceilings or Roof/Ceilings
- Walls

Time – Temperature Curve



Columns

- Sample size – Minimum 9 ft
- Tested unloaded

UL Image

Conditions of Acceptance – Columns

- 1000ºF / 1200ºF

OR

Tested load bearing

UL Image

Beams

- Sample size – Minimum 12 ft
- Load applied – Per design

UL Image

UL Image

UL Image

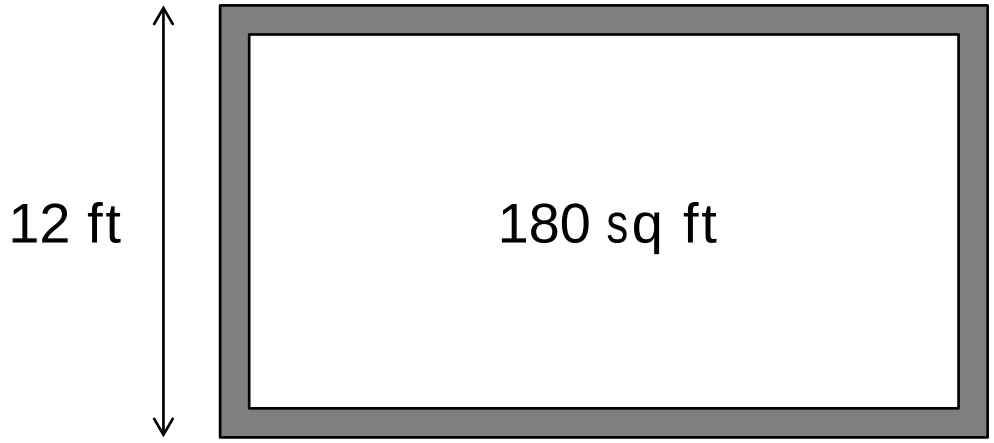
UL Image

Conditions of Acceptance – Beams

- Support load
- 1100ºF / 1300ºF

Floor/Ceiling or Roof/Ceilings

- Sample size – 180 sq ft / 12 ft
- Load applied – Per design



UL Image

Conditions of Acceptance
Floor/Ceilings or Roof/Ceilings

- Support load
- Flame passage
- 250ºF / 325ºF
- Support temperatures

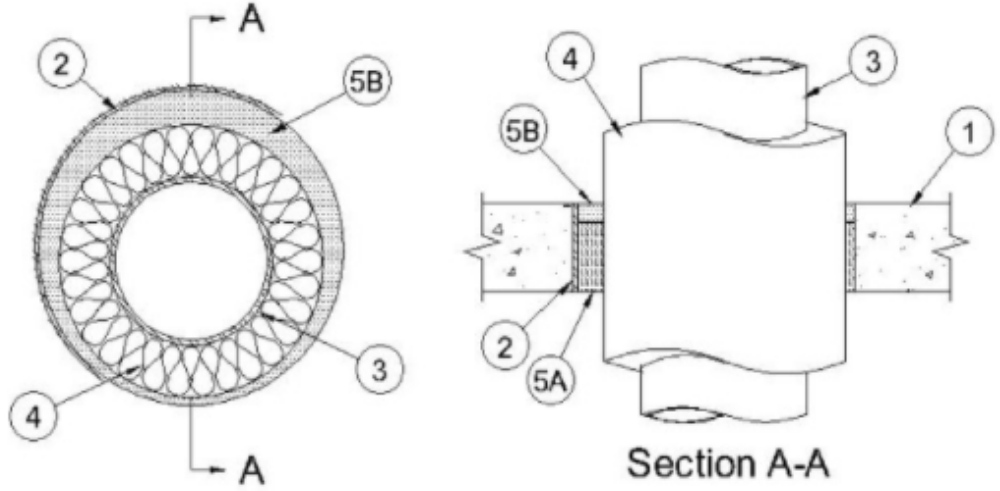
Systems & Materials …
Structural & Effective Compartmentation

Affinity Firestop Photo

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.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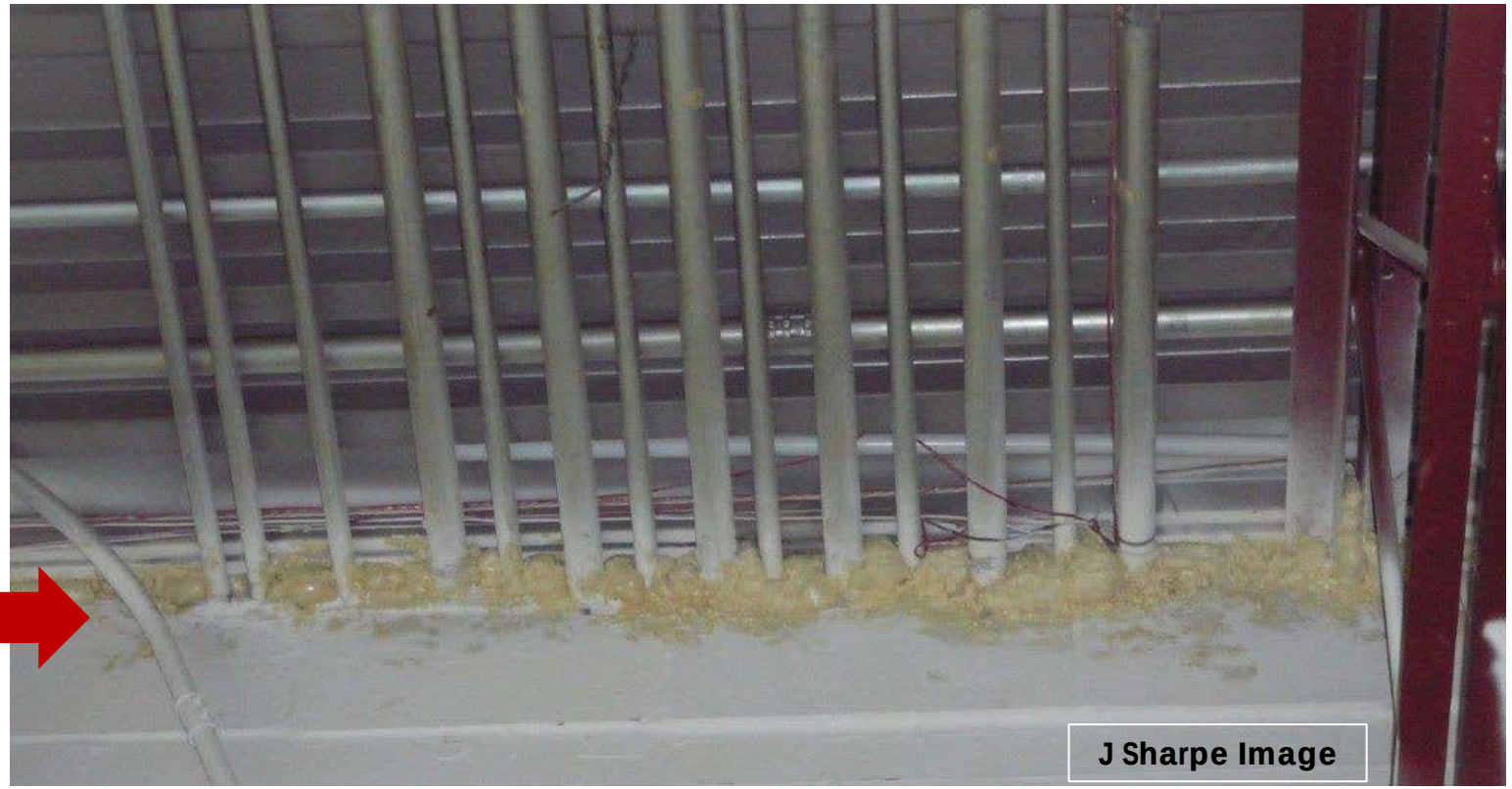
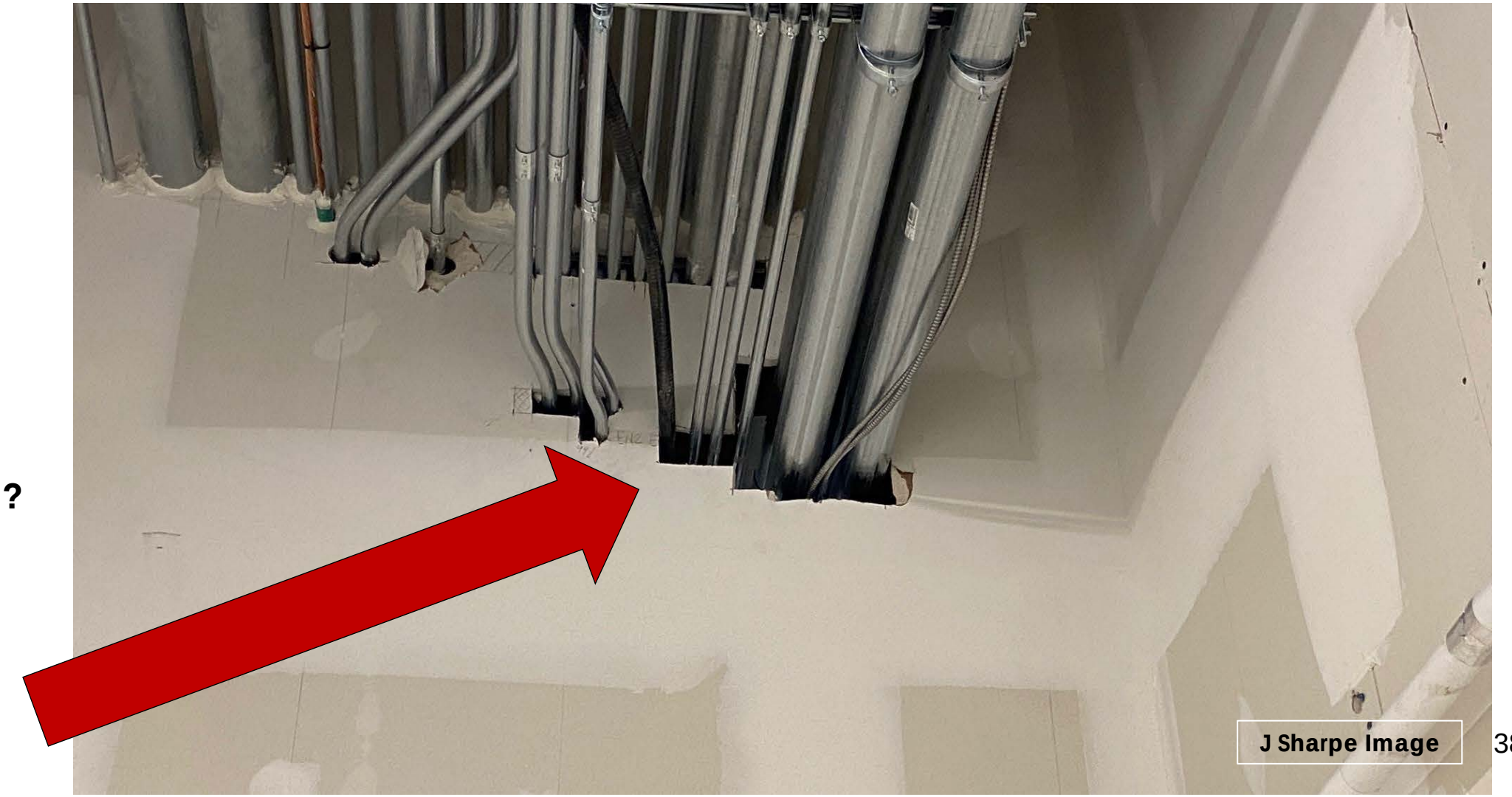
Firestopping & Compartmentation
Do we have a Problem, need Inspection??

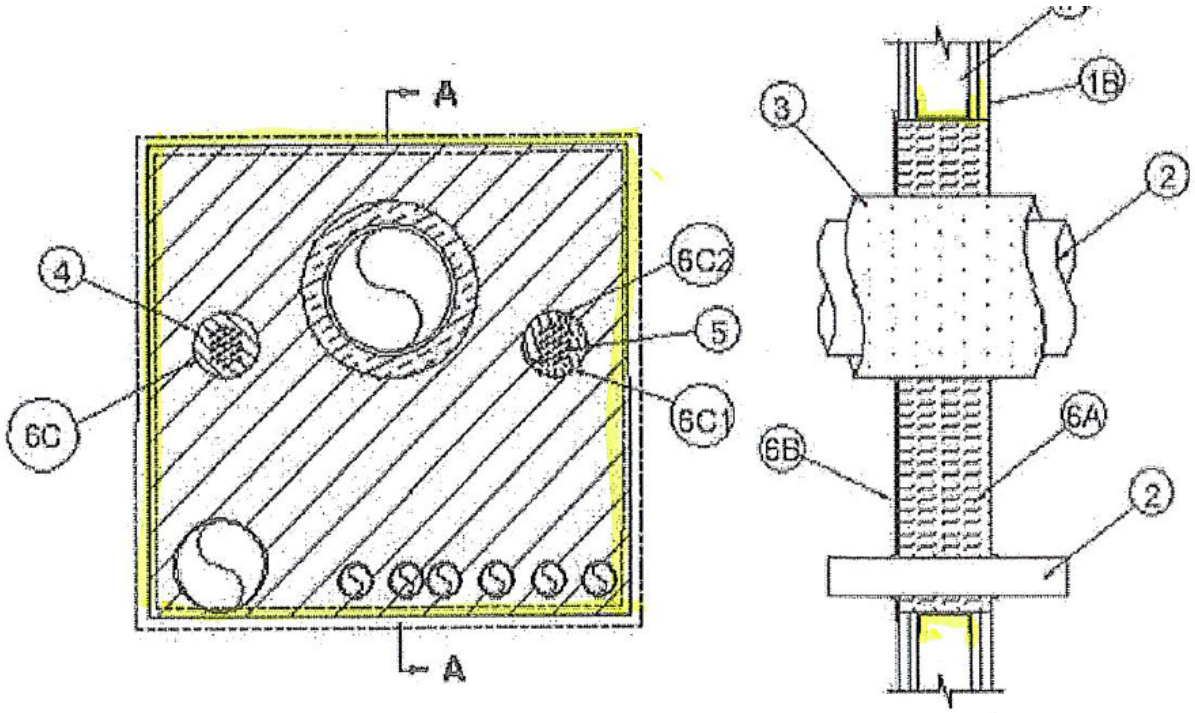
FOAM STILL???



Firestopping & Compartmentation
Do we have a Problem??



Firestopping & Compartmentation
Do we have a Problem??



Section A-A

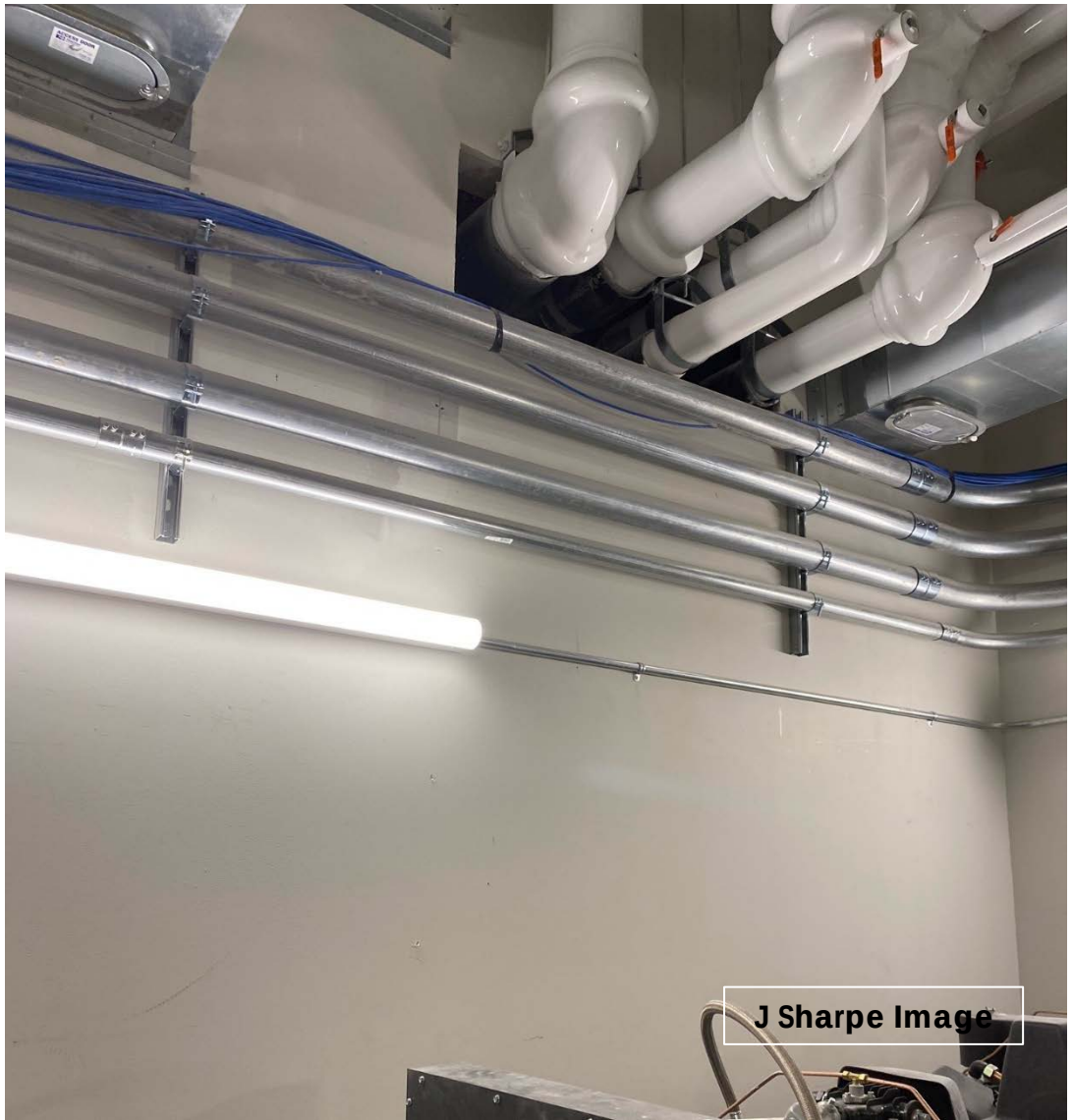
1. **Wall Assembly** — The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:

A. **Studs** — Wall framing may consist of either wood studs or channel shaped steel studs. Wood studs to consist of nom 51 by 102 mm (2 by 4 in.) lumber spaced max 406 mm (16 in.) OC. Steel studs to be min 89 mm (3-1/2 in.) wide and spaced max 610 mm (24 in.) OC. Additional framing members shall be located to completely frame the opening.

Firestopping & Compartmentation
Do we have a Problem??

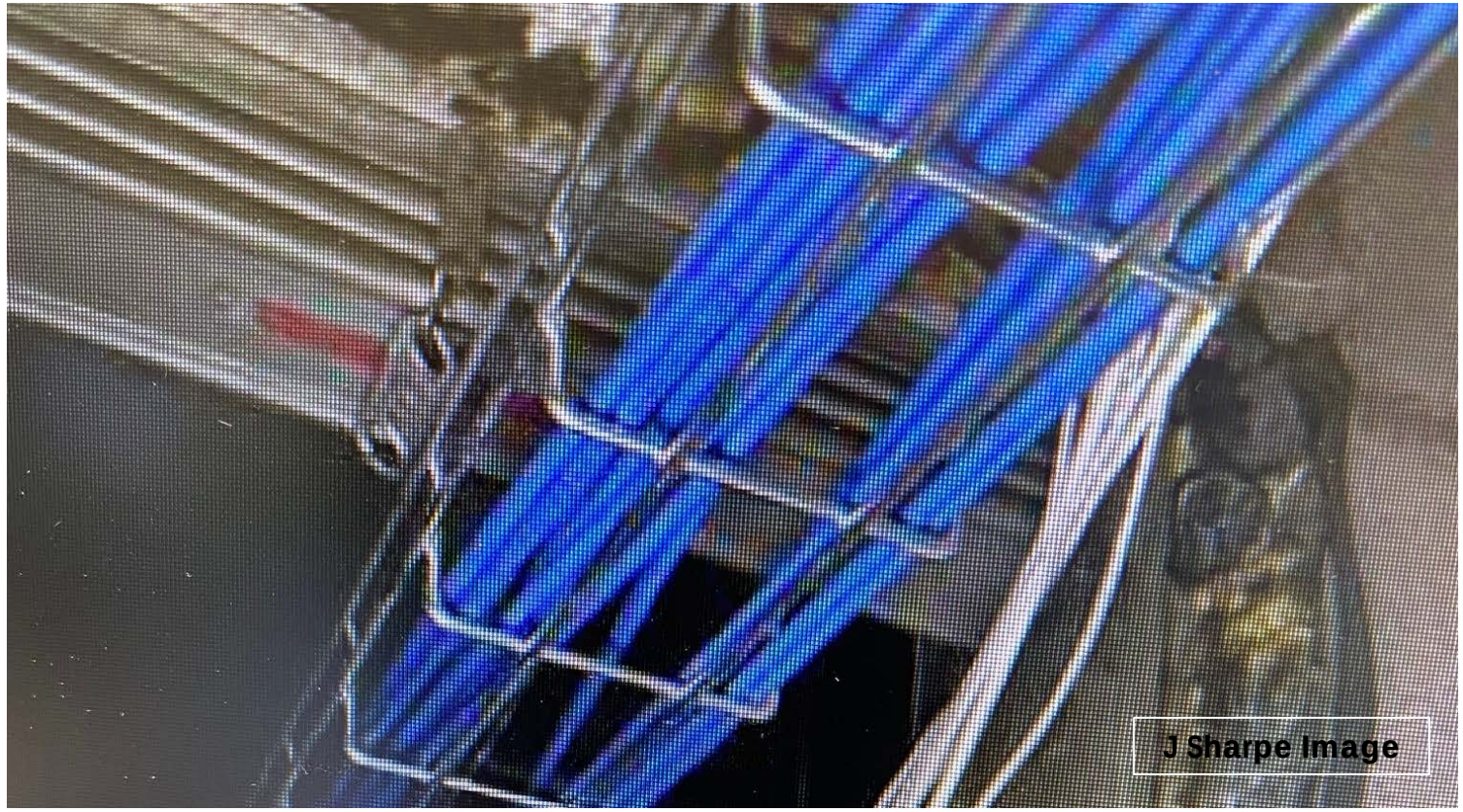
. Additional framing members shall be located to completely frame the opening.

Firestopping & Compartmentation
Do we have a Problem??

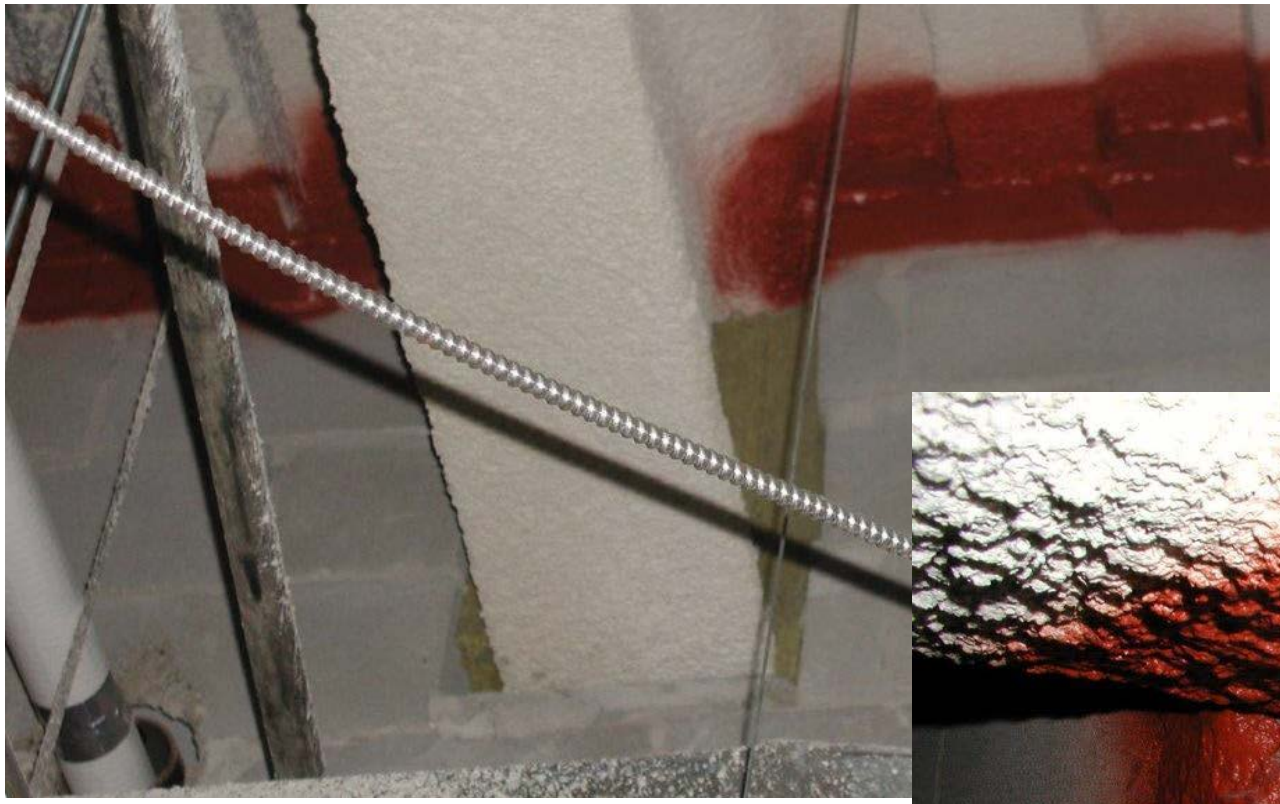


Firestopping & Compartmentation
Do we have a Problem??

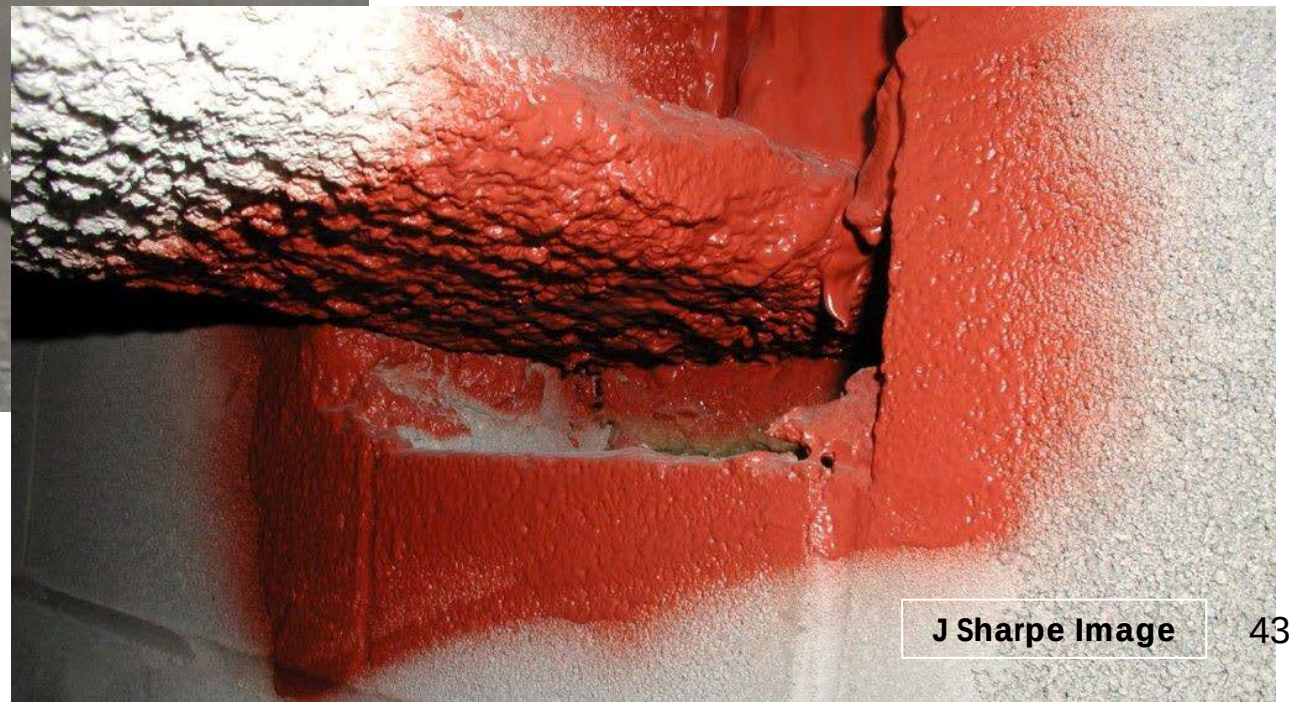
Cable Tray through a FIRE DAMPER?



Firestopping & Compartmentation
Do we have a Problem??



Beam Pocket SYSTEMS? NOT HERE

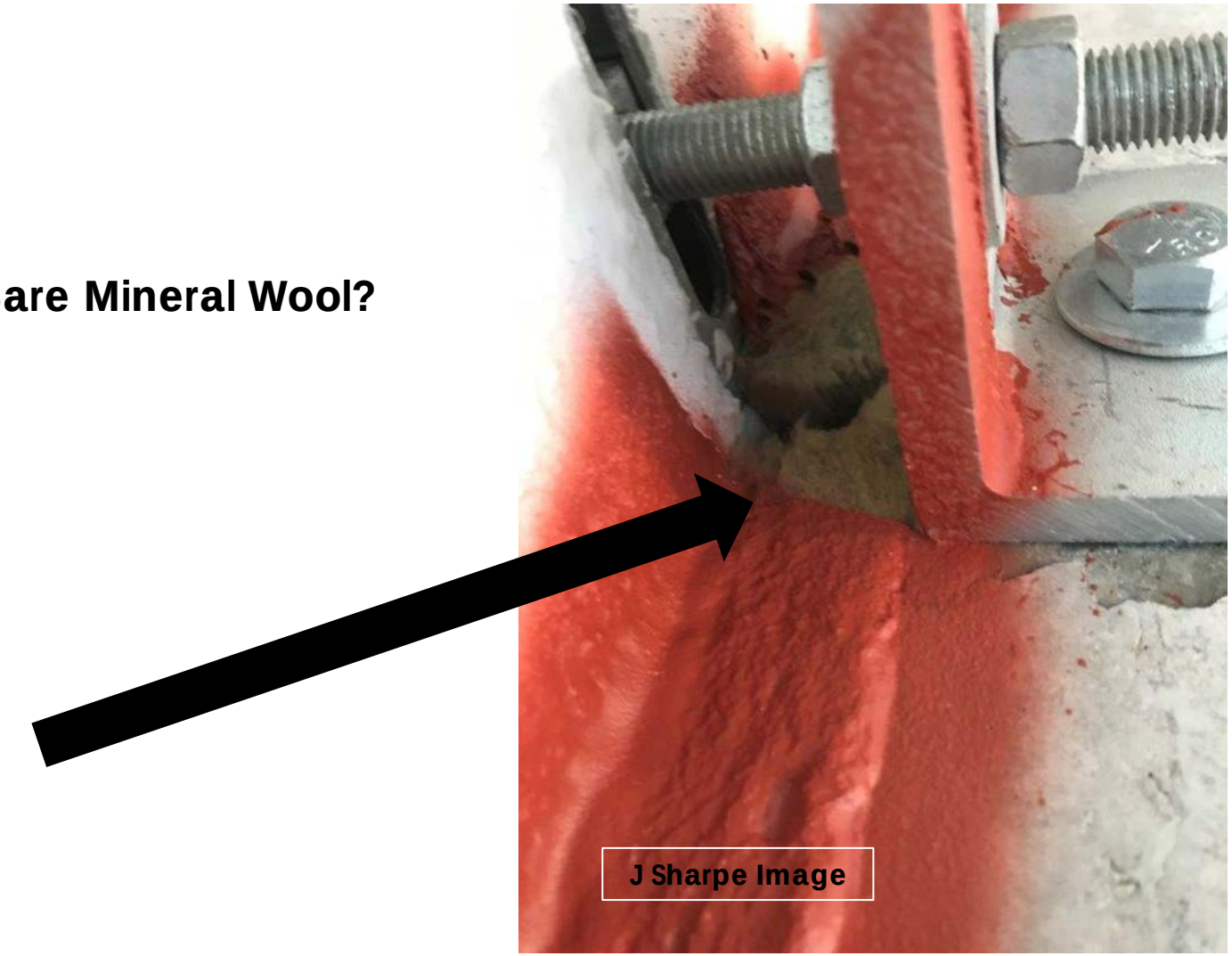


J Sharpe Image

Firestopping & Compartmentation
Do we have a Problem??

Firestopping & Compartmentation
Do we have a Problem??

Bare Mineral Wool?



Firestopping & Compartmentation
Do we have a Problem??

Where's the studs behind?

Sealant not TOOLED

Sealant under Anchors?

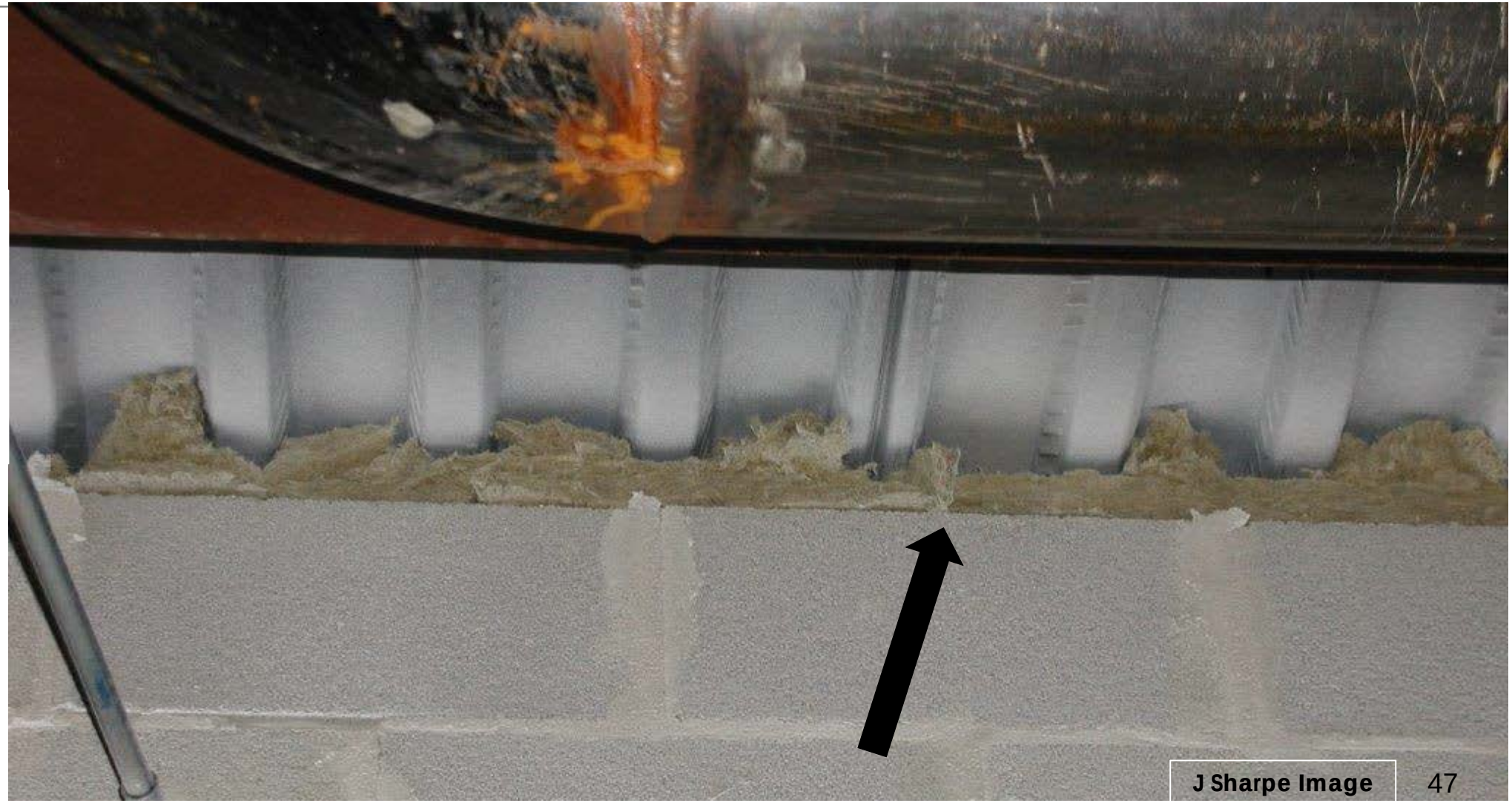
SYSTEM??

Firestopping & Compartmentation
Do we have a Problem??

Mineral Wool with NOTHING?

Continuity?

SYSTEM?

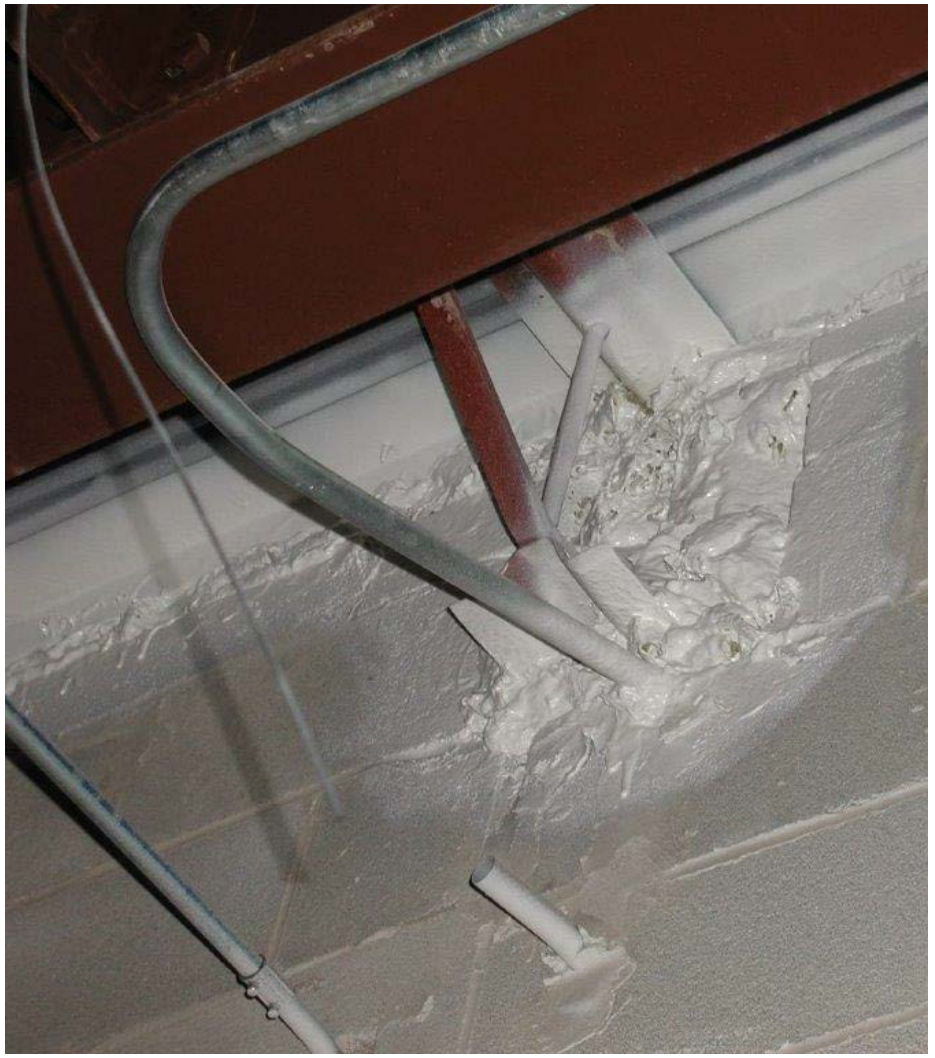


J Sharpe Image

Firestopping & Compartmentation
Do we have a Problem??

Mineral Wool
- **Flat**
- **Compressed**
- **Spray Even**

SYSTEM STATES
COMPRESSION



I-Beam to Fluted Deck OVER WALL
Beam is a WALL TOO!

Firestop Solutions Photo

Firestopping & Compartmentation
Do we have a Problem??

Firestop Spray?

Show Me the SYSTEM!
Show me the LISTING!

Firestopping & Compartmentation
Do we have a Problem??

Studs to support??

Firestopping & Compartmentation
Do we have a Problem??

Fiberglas Insulation HIDING Penetration

Plastic Pipes = COLLARS

Insulated Metal

SEALANT ONLY MOST CASES

Firestopping & Compartmentation
Do we have a Problem??

Transitions

Metal Pipe
Plastic Pipe

UNSAFE

Firestopping & Compartmentation
Do we have a Problem??

Firestopping & Compartmentation
Do we have a Problem??

Transitions

Metal Pipe
Plastic Pipe

UNSAFE

Firestopping & Compartmentation
Do we have a Problem??

Sheet Metal? Composite Sheet?

Firestopping & Compartmentation
Do we have a Problem??

Nothing…

Firestopping & Compartmentation
Do we have a Problem??

Fire Damper Annular Space?

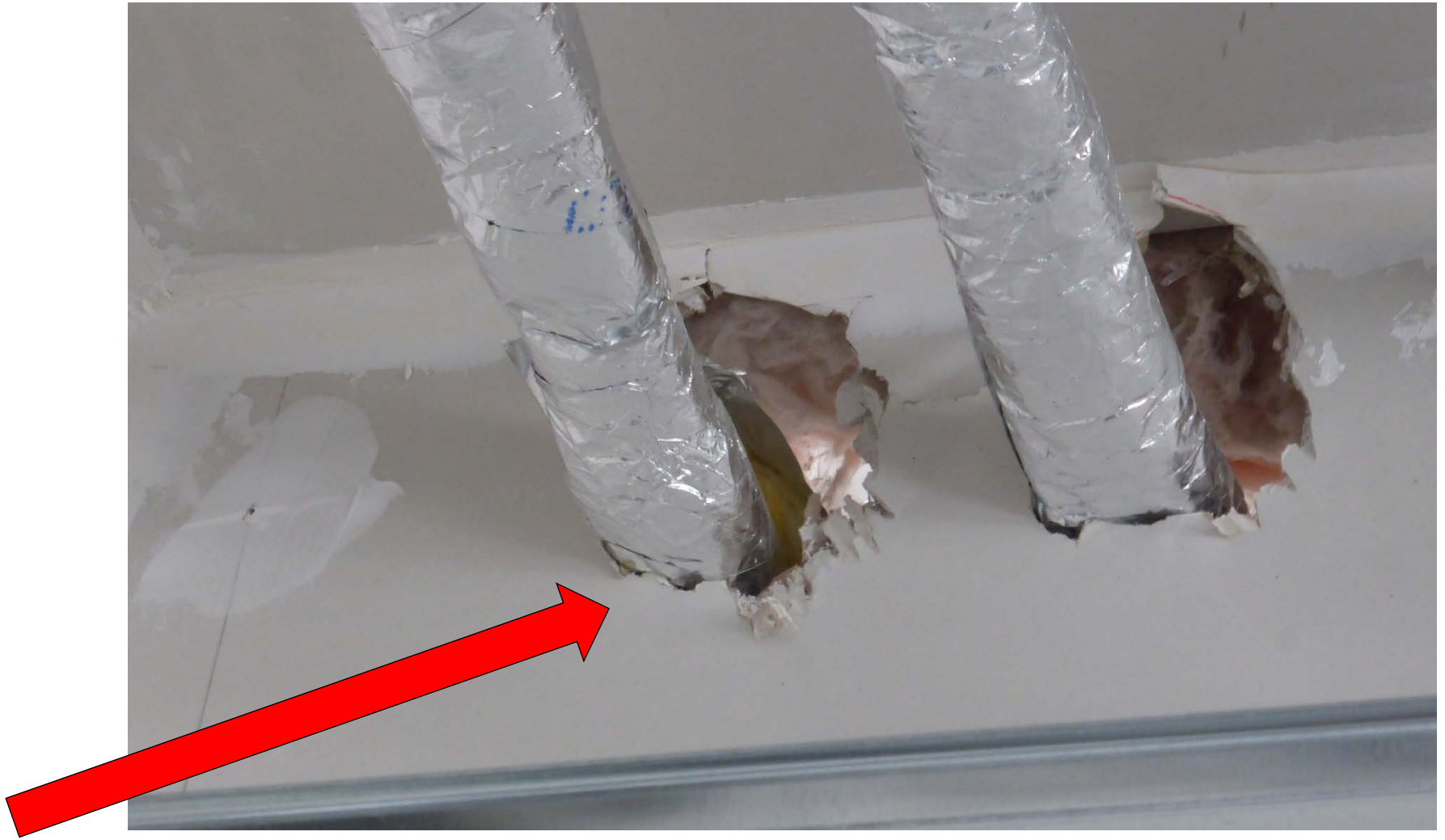
Firestopping & Compartmentation
Do we have a Problem??

Annular Space Control

System LIMITS ANNULAR SPACE

Firestopping & Compartmentation
Do we have a Problem??

Annular Space Control?



Firestopping & Compartmentation
Do we have a Problem??

What's this?

Firestopping & Compartmentation
Do we have a Problem??

What SYSTEM is THIS?

Firestopping & Compartmentation
Do we have a Problem??

Firestopping & Compartmentation
Do we have a Problem??

Lots of Gypsum Wallboard Compound & NO FIRESTOP SYSTEM

Firestopping & Compartmentation
Do we have a Problem??

Surface Patches?

Red STUFF?

New Developments….

CROSS LAMINATED TIMBER (CLT)

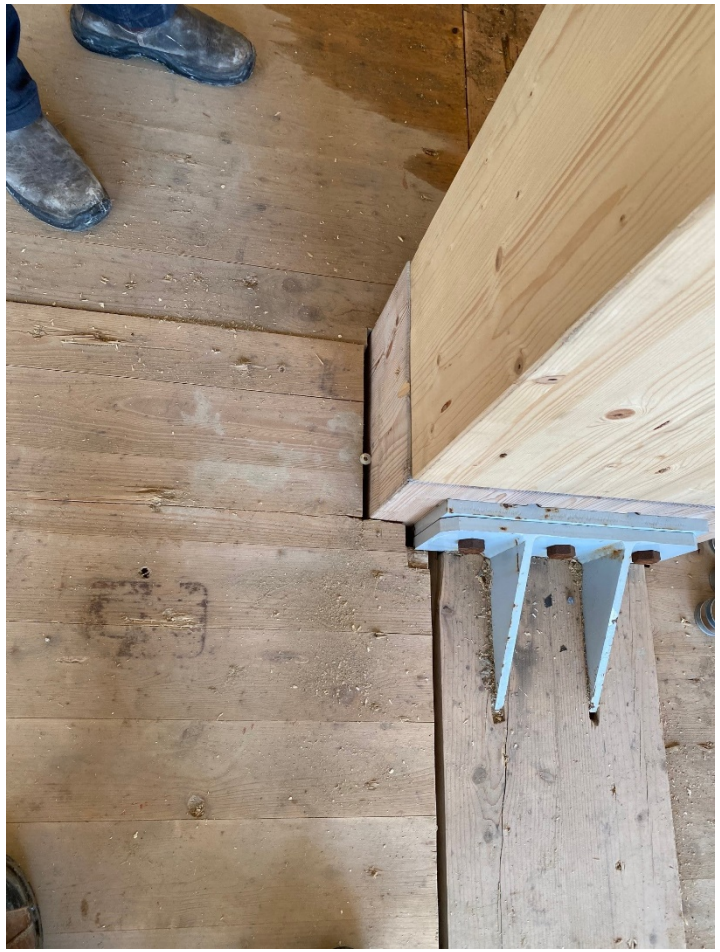
&

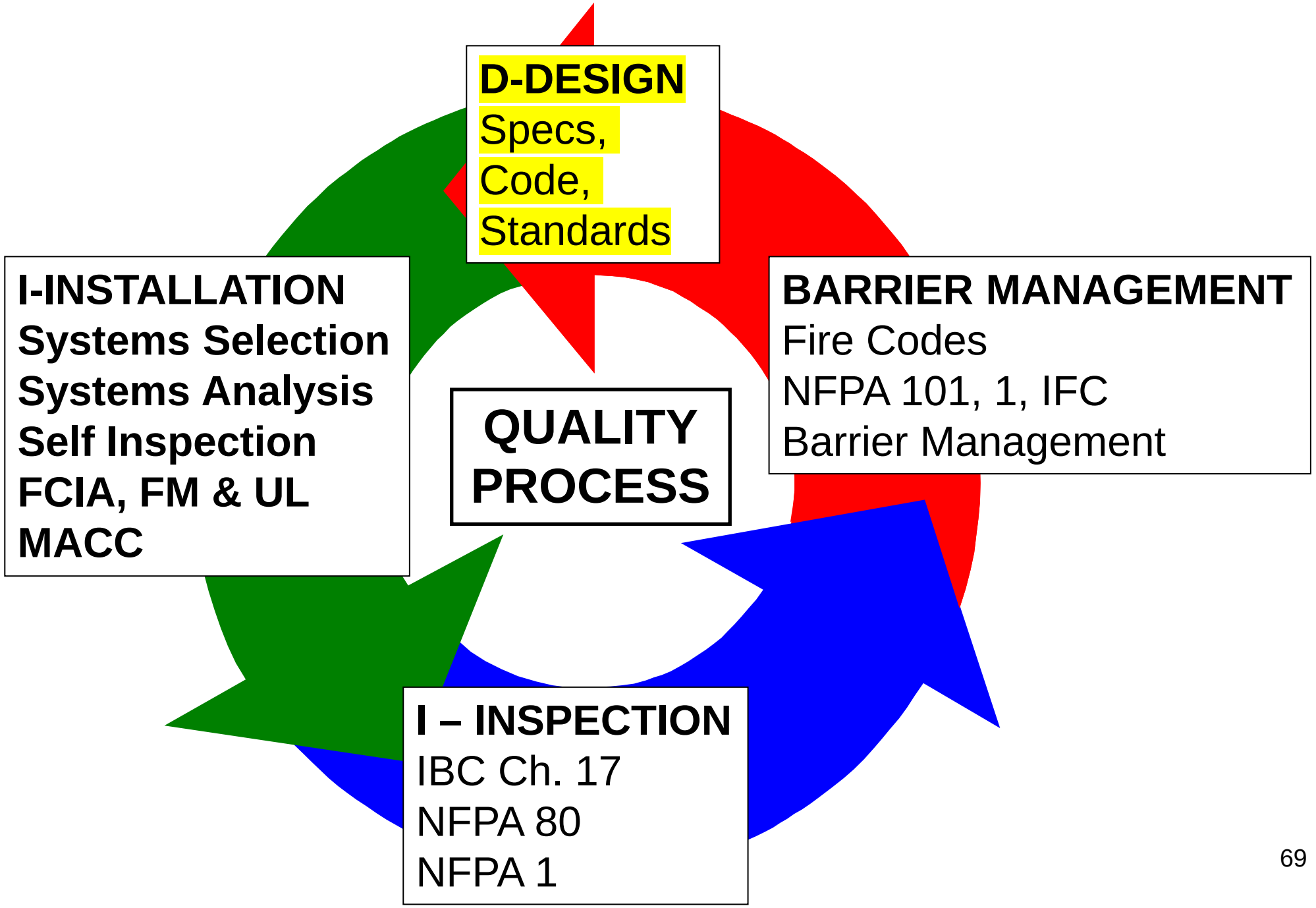
Firestopping

New Developments….

Any Tested and Listed Systems For CLT Structural or Penetrations/Joints?

New Developments….




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

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
- National Building Code of India
- Other Worldwide Codes….

- ***Minimum requirements*** - ***Construction*** & ***Maintaining Protection***

Building & Fire Code Requirements

- Fire Smoke Compartments -
  - ***Exterior Walls***
  - ***Fire Walls (IN-Fire Wall or Fire Separating Wall)***
  - ***Fire Compartment***
  - ***Fire Barrier (IN-Fire Resisting Barrier)***
  - ***Fire Partitions (Not in NFPA)***
  - ***Fire Separations (CAN)***
  - ***Smoke Barriers***
  - ***Smoke Partitions***
  - ***Archaic Assemblies***

Existing Buildings

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

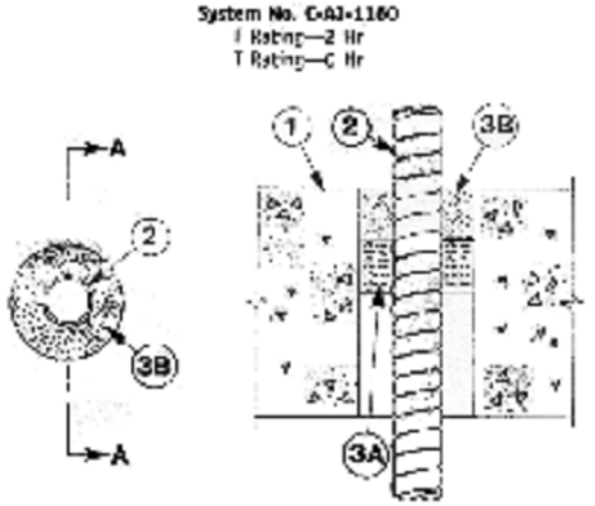
Smoke Barriers & Firestopping

- Smoke Barriers differ from Smoke Partitions?
  - **Smoke Barrier** –
    - **IBC** – Hourly Rated, Quantified Firestop “L” Rating
      - < 5 cfm/sf (IBC 2006)
      - < 50 cfm, 100 sf of Wall Area (IBC 2009)
    - **NFPA** – … ‘restricting the passage of smoke’…
      - Hourly Rated, Quantified Firestop L Rating Chapter 8
      - NO quantified “L” Rating … Healthcare Chapter
      - Continuous, Barrier to Barrier, … through concealed spaces
      - Not always fire-resistance-rated
  - **Smoke Partition** –
    - **IBC** – Continuous barrier, not fire rated…’retard’
    - **NFPA** – Continuous membrane that is designed to form a barrier to ***limit the transfer of smoke***….

Continuity

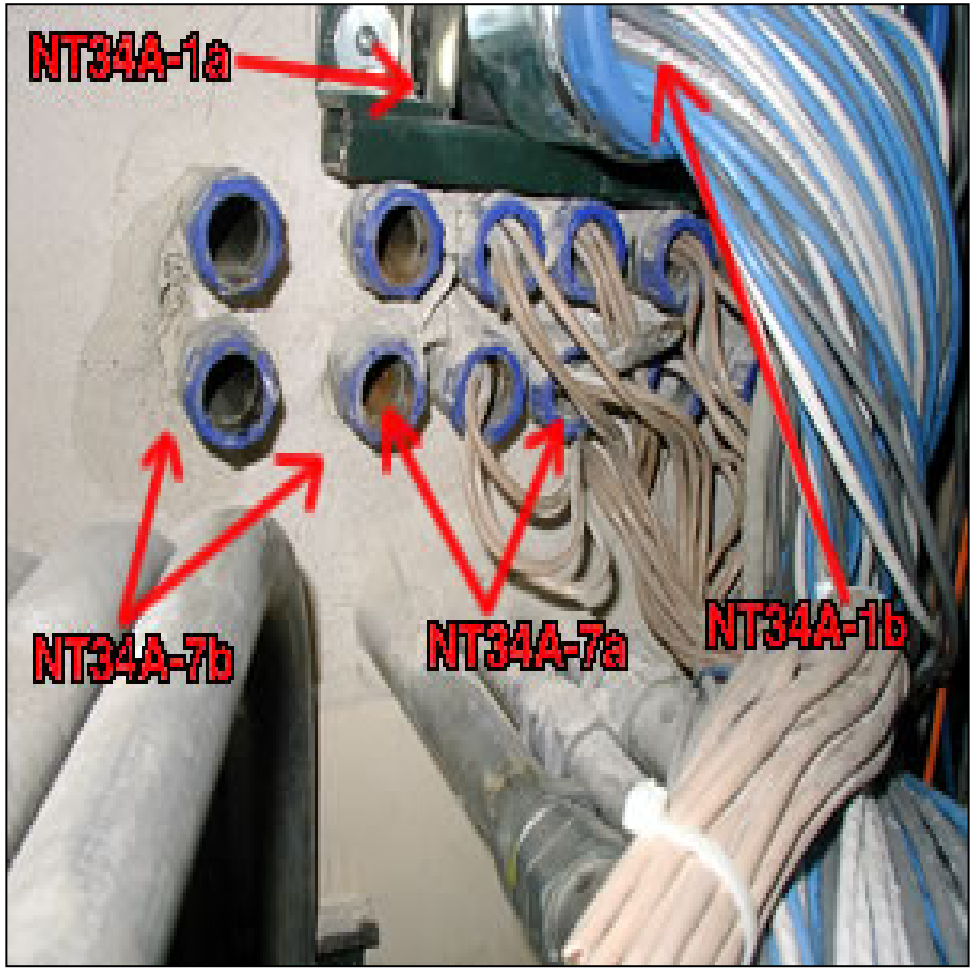
Effective Compartmentation Features

Firestopping for Continuity
I – Classified Systems



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



Breaches in Fire-Resistance-Rated Construction

- Firestop Systems
  - Penetration Firestop Systems
  - Joint Firestop Systems
  - Perimeter Joint Firestop Systems
- Opening Protectives
- Ducts and Air Transfer Openings

“DIIM” – Design, Install, Inspect, Maintain

- Fire Resistance & Smoke Resistant Firestopping
  - **Properly *Designed*** Building Codes
    - FCIA - 07-84-00 – Specification – ***CCS***
    - ***Tested and Listed Systems*** –
    - ASTM E814, UL 1479, ASTM E1966, UL 2079, E2307, E2837, E3037
    - **Movement (M), Smoke (L), Water (W)**
  - Professional ***Installation*** –
    - FCIA Member, UL/ULC Qualified Contractors, FM 4991 Approved
  - Properly ***Inspected*** –
    - ASTM E2174 / E2393, by IAS AC 291 Agencies, UL, IFC, FM Exams
  - ***Protection Maintained*** – Annually – by FCIA Members

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
  - H Hose Stream Test

3M Photo

Conditions of Acceptance
F Rating - MANDATORY

- Passage of Flame
- Hose Stream

Hose Stream Test

UL Photo

Conditions of Acceptance
T Rating MANDATORY

- Passage of Flame
- 325ºF (180ºC) Temperature Rise
- Hose Stream

L Rating (Optional) – 1479 ONLY

- Air Leakage Rate at Ambient Temperature
- Air Leakage Rate at 400ºF (204ºC)

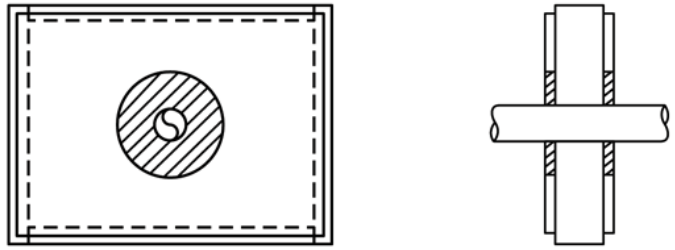
W Rating (Optional) 1479 ONLY

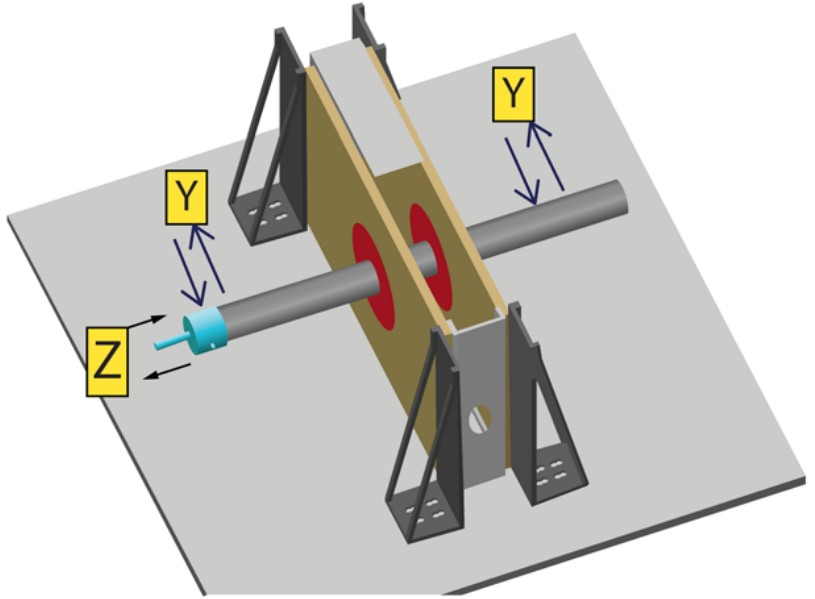
- Optional program, applicable to incidental water
- 3 Ft. WC (0.91 M WC) Pressure Head / 72 Hr Exposure
- Firestop subjected to water exposure, followed by standard fire and hose stream tests
- Firestop systems assigned a W Rating

M Rating (Optional) ASTM E3037

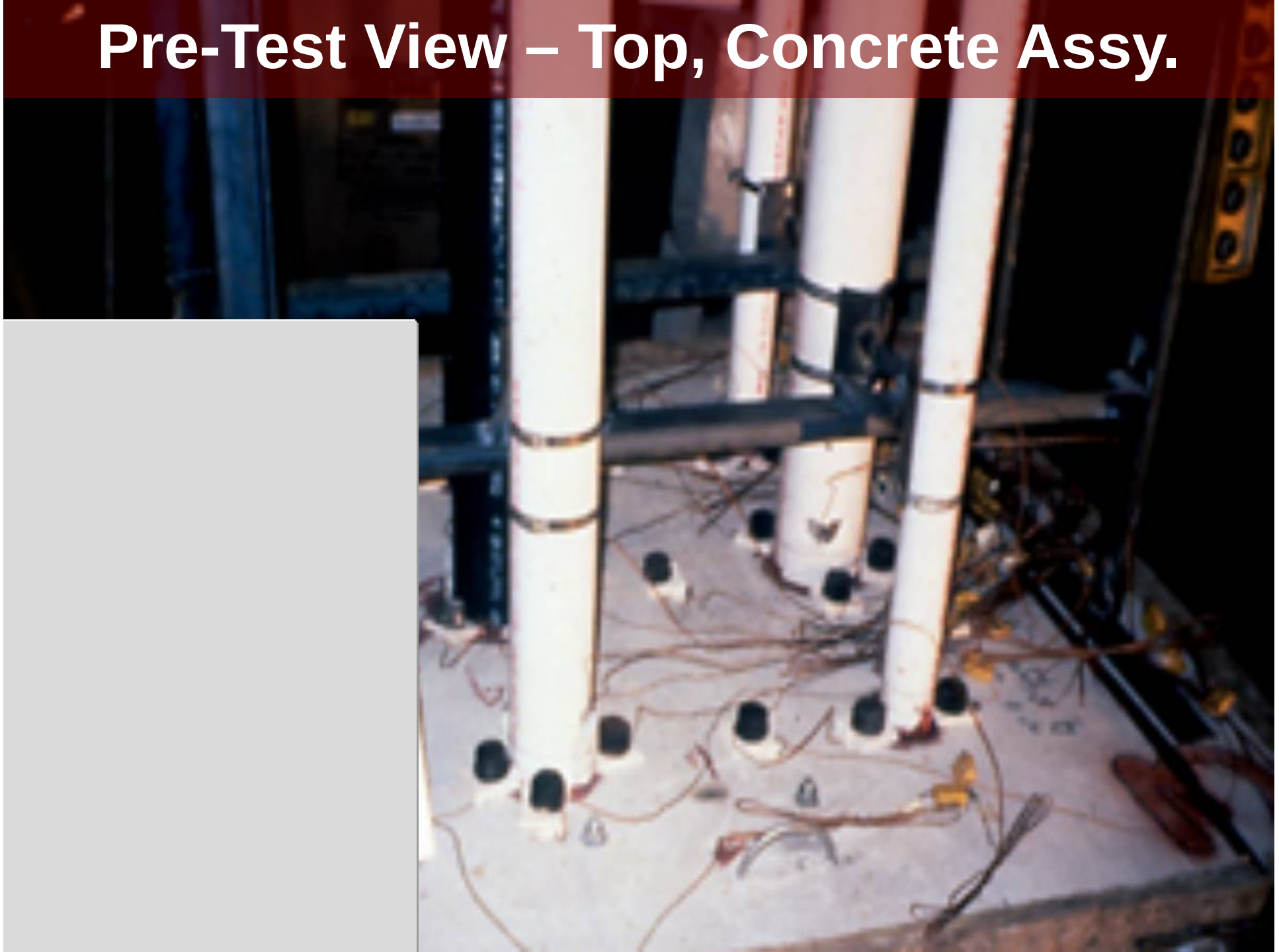
- Applicable to movement of penetrating item/Assembly
- Penetrating item move perpendicular and/or in plane of barrier - ASTM E3037
- After movement, fire and hose stream test
- Firestop systems - M Rating
  - Rating within plane based on percentage of annular space
  - Rating perpendicular to barrier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

M Rating (Optional – ASTM Image)





Pre-Test View – Top, Concrete Assy.

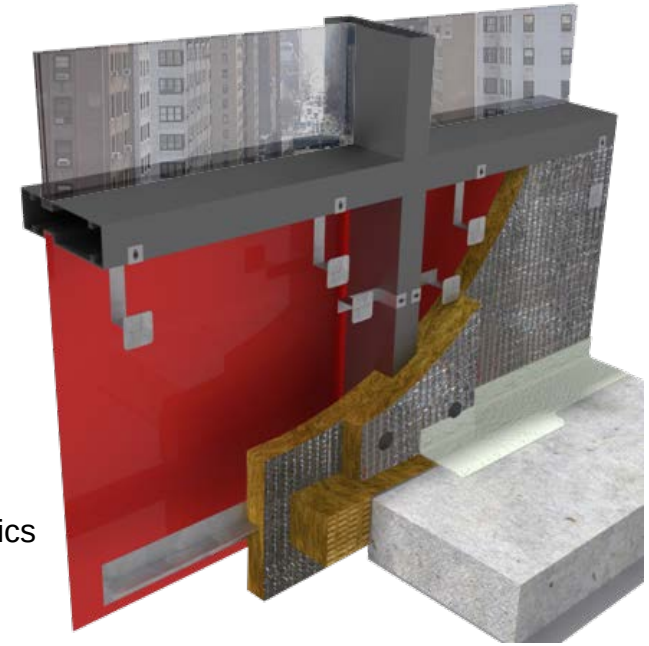


Building & Fire
Worldwide Code Requirements

- *Chemical, Biological, Radiation, Explosion, Germ, etc.*
  - Standards?
    - C – Which Chemicals? Check with manufacturer
    - B – Which Agents? Check with manufacturer
    - R – Nuclear Power Plant Standards? Check with manufacturer.
    - E – Blast Strength? Check with manufacturer
    - G – Germ – Check with manufacturer & industrial hygienist
  - How to Regulate for Unexpected Events?
  - Due Diligence - Review Required by code?
  - ***SPECIFIED …***

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**

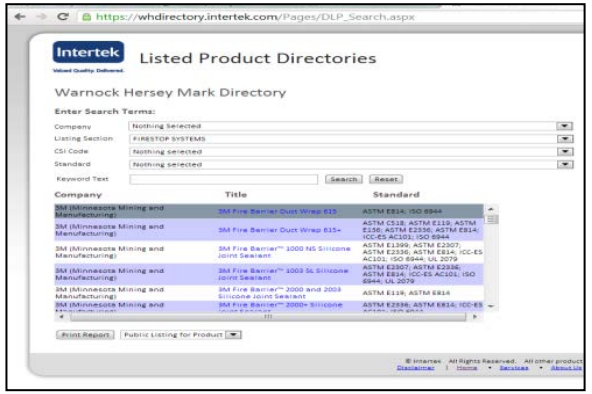


OCF/Thermafiber Graphics

Barrier Continuity
Products become SYSTEMS

- **Fire Rated Systems Directories –**
  - **FM Approvals**
  - **Intertek**
  - **UL/ULC Product iQ Online Directory**

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



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….’

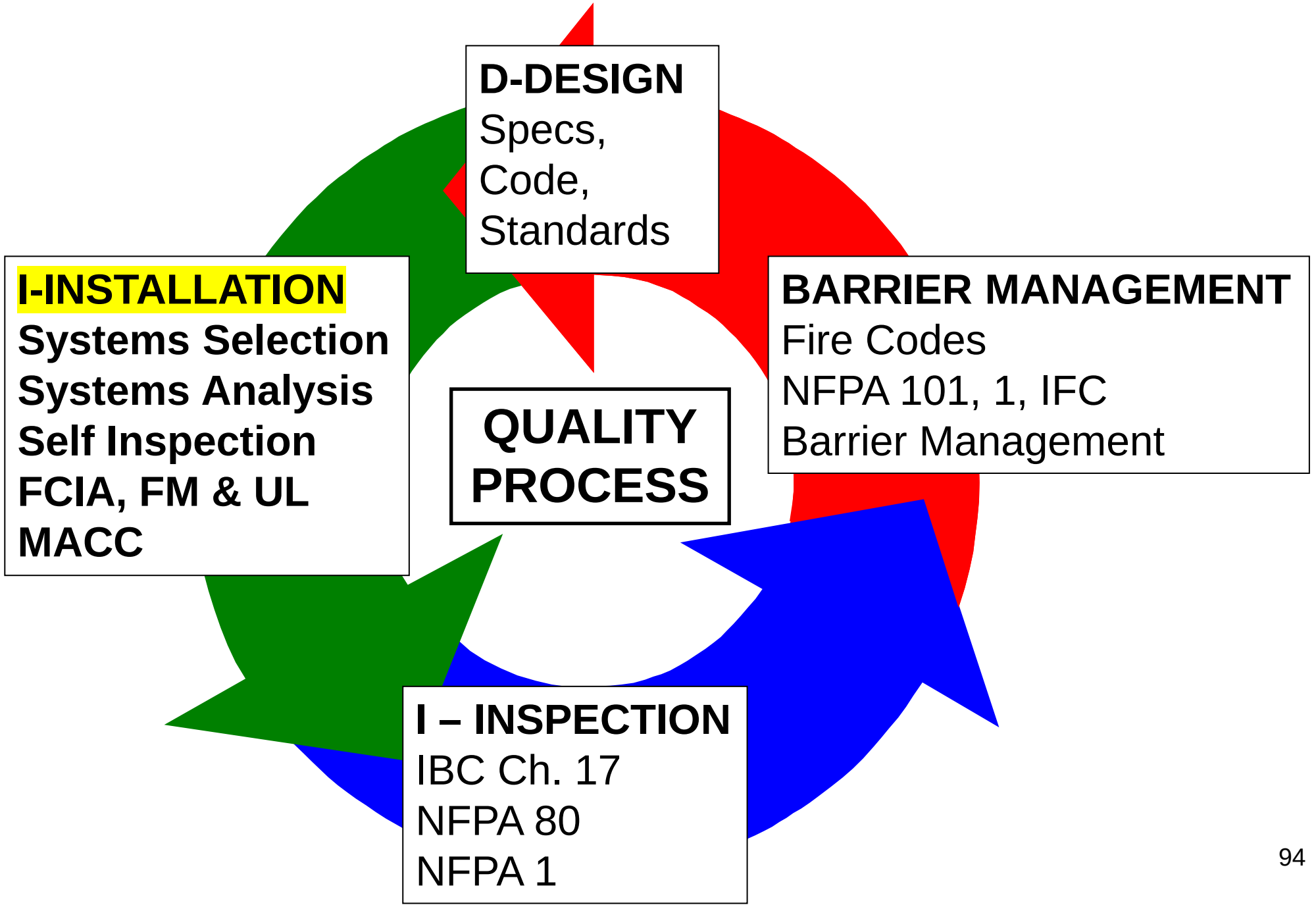
ADD THIS TO EJ’s….“Manufacturer attests this EJ will pass applicable firestop fire test with hose stream test if subjected…”

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


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

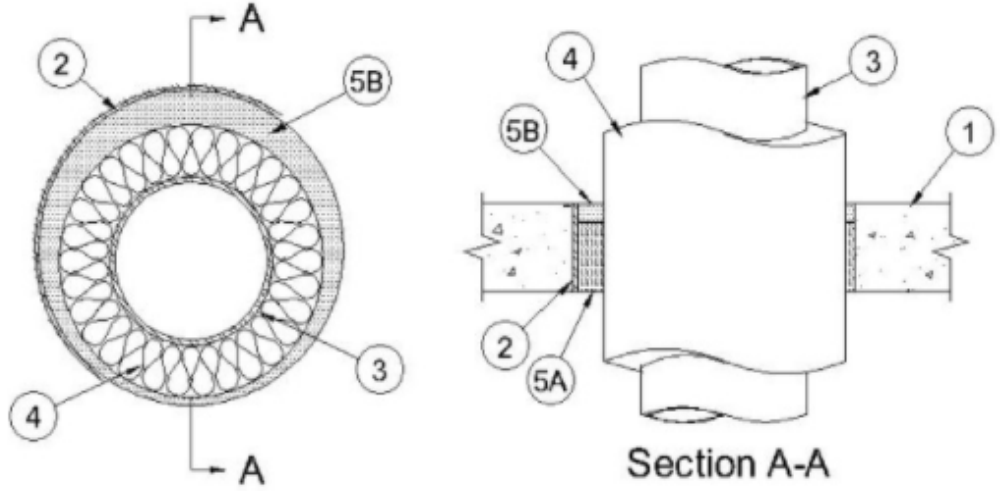
Manufacturers Instructions, Tested and Listed Designs

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.

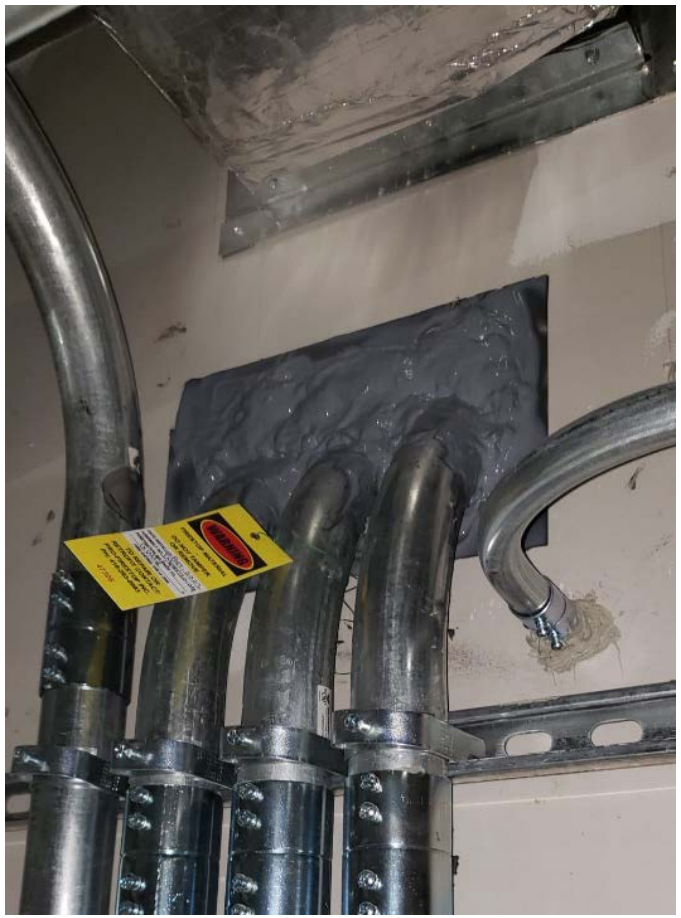
FCIA Recommended Professional Practice Identification Systems

“Labelling”

-On-

Wall/Horizontal Assy. Penetrating Item Hanging


WARNING
FIRESTOP MATERIAL
DO NOT TAMPER OR REMOVE
To repair or retrofit contact:
PRO-FIRESTOP INC. 416-292-0903



Joints and Voids
Head-of-Wall

Firestop Solutions Photo

Sleeved Pipes

Fire/Smoke Dampers & Firestops

- Dampers - UL 555, 555S
  - Listings – ***Systems***
  - Installed to manufacturer's written instructions
  - Systems – Angles…no sealants required
- Firestop sealants – UL 1479, ASTM E814
  - Improper hole sizing or poor installation…

Consult the Damper Manufacturer & the Authority Having Jurisdiction

Greenheck Photo

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





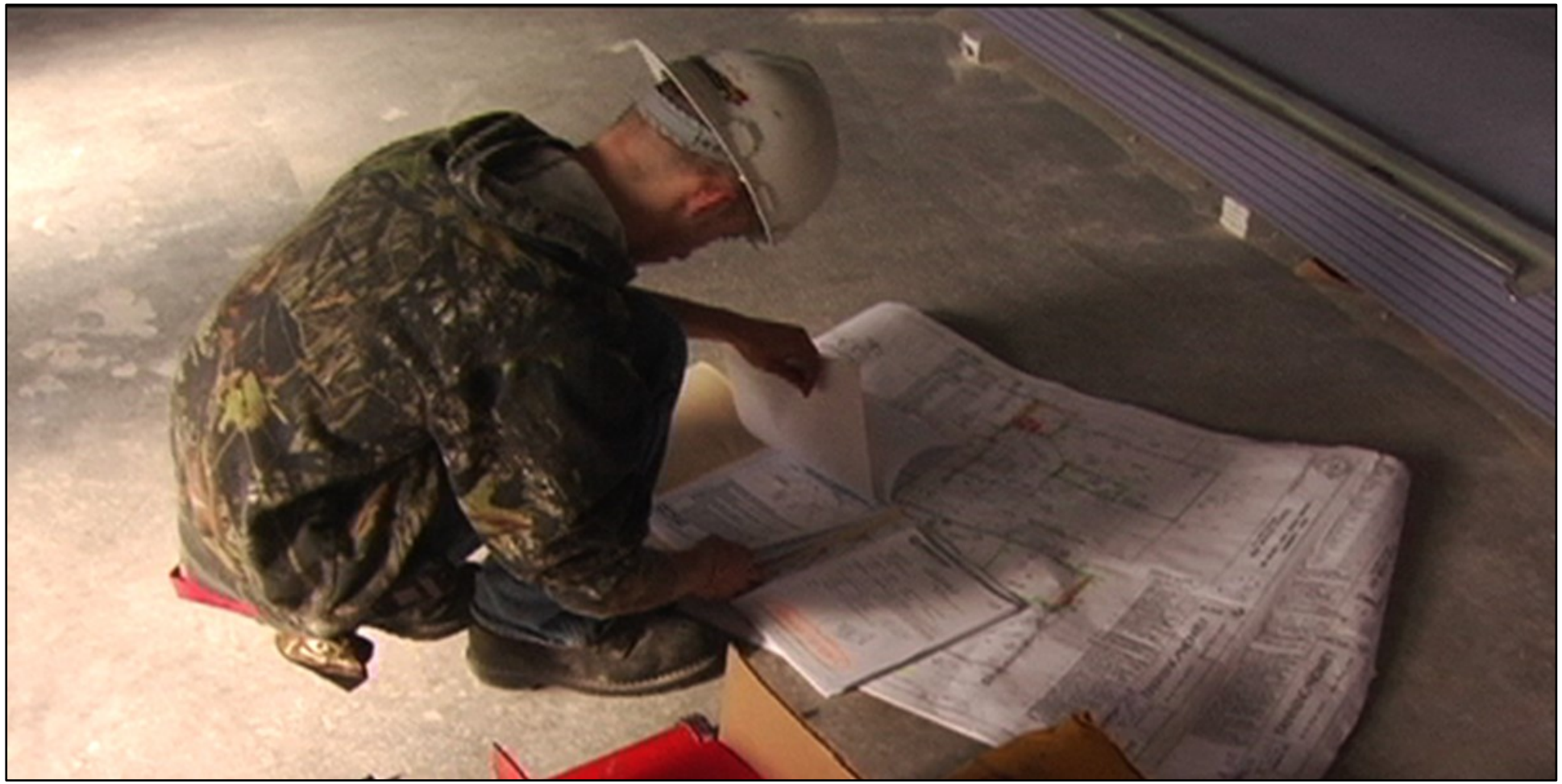


STI, 3M, AD, HILTI, Nelson Photos

Review of UL Firestop and Joint Systems on UL Product iQ

- Review:
- U410
- C-AJ-1155
- C-AJ-3314
- 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

Barrier Continuity
I – Installation – Listed Systems



Firestopping for Continuity – Firestop Products

- Sealants
  - Silicone, Acryic/Latex, Intumescent
- Wrap Strips & Collars
  - “Thick, Thin, Wide, Less Wide”
- Putties
- Pre Fabricated MCT Devices
- Fire Pillows
- Mortar
- Composite Sheets
- Bricks / Plugs
- Spray Products
- Tapes
- Cavity Barriers, Strips

AstroFlame, Fischer, Promat, STI, 3M, AD, HILTI, Nelson Photos

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***

Installation – Who?

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

Conclusion –

Without Single Firestop Installation Contractor….

Fire & life safety risks

Adler Photo

Why Contractor Qualifications?

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

Spec Contractor Qualifications

- **FM 4991 – Standard for the Approval of Firestop Contractors**
- **UL Qualified Firestop Contractors**
- **Other Industries???**
- ***FM 4991 / UL-ULC CONTRACTORS UNDERSTAND SYSTEMS, INVENTORY – DOCUMENTATION***

Underwriters Laboratories Inc.®
Qualified Firestop Contractor Program

FCIA Recommended Professional Practice Identification Systems

“Labelling”

-On-

Wall/Horizontal Assy. Penetrating Item Hanging

Why Contractor Qualifications?

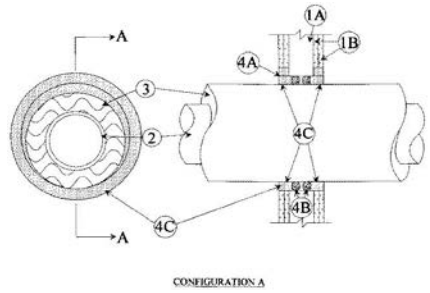
- **Built right the first time…**
- **Documentation = Inventory**
- **Fire-Resistance SYSTEMS Selection**
- **SYSTEMS Analysis & As Builts**
  - F, T, L, W, M Rated Systems
  - Tolerances - Annular Space Sizes, Angles
  - Gap Sizes - Undercuts - Framing
  - Anchors - Spacing – Hardware
  - Closers - Activation Sensors, more…

FM 4991 & UL/ULC QFC

- **FM, UL/ULC Firestop Exam @ 80% min.**
- **Management System (MS) Written**
- **MS Procedures implemented**
- **Audit**
  - Contractor Office – Records & Documents
  - Jobsite – Observation, possible destructive
- **DRI – Appointed by Contractor, CEU's**
- **Listed @ www.FCIA.org & www.UL.com**

Management System & Audit – UL, FM 4991

- **Facility Tour**
- **Review MS Manual**
- **Construction Document Requirements and Review**
  - **Systems Selection & Analysis**
- **Procurement**
- **Storage, Handling, Preservation and Delivery**
- **Labeling**
- **Installation, Application and Field Quality Assurance Procedures**
  - **Systems Installation, Self Inspection/Survey**



CONFIGURATION A

Management System & Audit – UL, FM 4991

- **Inspection, Testing and Calibration**
  - Tape Measures
- **Control of Nonconforming Product**
- **Training and Qualification of Staff**
  - DRI's, Workforce
- **Corrective/Preventive Action**
- **Quality System Monitoring and Improvement**
- **Documentation and Record Keeping**
  - 7 years

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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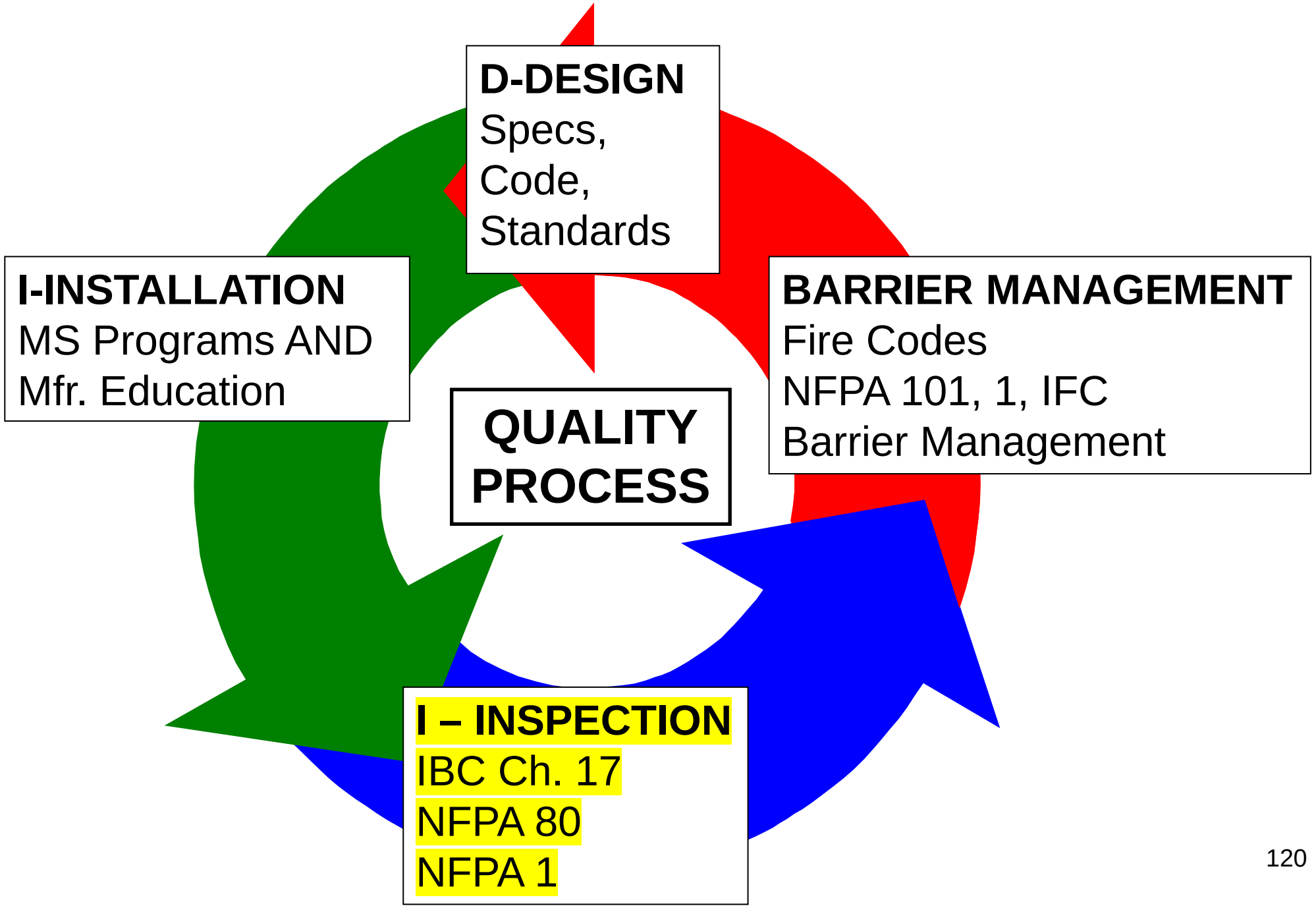
Sample


D-DESIGN
Specs,
Code,
Standards
I-INSTALLATION
MS Programs AND
Mfr. Education
BARRIER MANAGEMENT
Fire Codes
NFPA 101, 1, IFC
Barrier Management
QUALITY
PROCESS
I – INSPECTION
IBC Ch. 17
NFPA 80
NFPA 1

Firestop & Inspection

- ASTM E2174 / ASTM E2393 – *“Inspection Process”*

Firestop & Inspection

Firestop & Inspection

Firestop & Inspection

Firestop & Inspection

Firestop & Inspection

I – Inspection – Options

- **Contractor Self Inspection**
  - Verify Management System validity
  - Not 2%, 10%
  - Required for FM & UL, ULC Contractors
- **Manufacturer Inspection**
  - Does not exist … Survey, maybe
- **ASTM E2174 & ASTM E2393**
  - Independent 3rd Party
  - Destructive, Non Destructive
  - Specified Frequency

Firestop Inspection in Codes
ASTM E2174 – ASTM E2393

- NFPA 1 - Ch. 12
- NFPA 101 / 5000 - Chapter 8 – Annex
- 2012 – 2018 International Building Code
- IBC 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

FCIA & KOFFEL
2002-2020

National Fire Protection Association
NFPA 1 – 2018

- **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

I – Inspection –
IBC Code Requirements

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

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 E2174.**

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 E2393.**

[IBC 1705.17.1 & .2]

Firestop Inspection in Codes

- **Table 1604.5 – Risk III** – *Buildings and other structures that represent a substantial hazard to human life in the event of failure, include but are not limited to:*
  - *Public* ***Assembly, Occupant Load > 300***
  - *Bldgs. Containing* ***Elem.,2nd'ary', day care, > 250***
  - I-2, > 50, no surgery, emergency
  - I-3
  - Occupancy load > 5,000
  - **Power-gen, H2O treatment,** wastewater treatment, public utilities, not in IV
  - Buildings not in IV, with toxic or explosives [IBC 1604.5]

Firestop Inspection in Codes

- **Table 1604.5 – Risk IV** – *Buildings and other structures designated as essential facilities, including but not limited to:*
  - *Group **I-2 occupancies having surgery or emergency** treatment facilities.*
  - *Fire, **rescue, ambulance/police stations**, emergency vehicle garages.*
  - *Designated earthquake, hurricane or other **emergency shelters.***
  - *Designated emergency prep, communications and operations centers and other **facilities required for emergency response**.*
  - *Power-generating stations and other public utility facilities required as emergency backup facilities for Risk Category IV structures.*
  - [IBC 1604.5]

Firestop Inspection in Codes

- **Table 1604.5 – Risk IV** – *Buildings and other structures designated as essential facilities, including but not limited to:*
  - ***Buildings and other structures containing quantities of highly toxic materials that:***
    - *Exceed maximum allowable quantities per control area as given in Table 307.1(2) or per outdoor control area in accordance with the International Fire Code, and are sufficient to pose a threat to the public if released.*
    - *Aviation control towers, air traffic control centers and emergency aircraft hangars.*
    - *Buildings and other structures having critical national defense functions.*
    - *Water storage facilities and pump structures required to maintain water pressure for fire suppression.*
    - [IBC 1604.5]

I – Inspection –
IBC AHJ Approvals – x2

Definitions – Chapter 17, IBC

[A] APPROVED AGENCY. An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been *approved*. [IBC 202 Definitions]

[A] APPROVED. Acceptable to the *building official* or authority having jurisdiction. [IBC 202 Definitions]

I – Inspection –
IBC AHJ Approvals – x2

SPECIAL INSPECTOR. A qualified person employed or retained by an *approved* agency and *approved* by the *building official* as having the competence necessary to inspect a particular type of construction requiring *special inspection.* [IBC 202. Definitions]

Firestop Systems Inspection Introduction
ASTM E2174 – ASTM E2393

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

    = Authorizing Authority

Firestop Inspection Firm & Individual Qualifications – ASTM E2174 – ASTM E2393

- Inspection Firm & Inspectors are:
  - **‘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 independence statements**

Firestop Inspection Firm & Individual Qualifications – ASTM E2174 – ASTM E2393

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

- **Inspection Agency *Company* Qualification –**
- **IAS AC 291 – w / Individual *Competencies***

INTERNATIONAL ACCREDITATION SERVICE®

Firestop Inspection Firm & Individual Qualifications – IAS AC 291

- **Inspection Firm shall have staff..**
  - PASS UL or FM Firestop Exam, IFC Exam
  - 1 year Quality Assurance

  Or…

  - PASS UL/FM Firestop Exam, IFC Firestop Exam, *and* PE, FPE, Registered Architect, or
  - PASS UL/FM Firestop Exam, IFC Firestop Exam, *and* Education by Certified Agency

Firestop Inspection Firm and Individual Qualifications – IAS AC 291

- **Specify IAS AC 291 –**
  - Quantified Qualifications
  - Helps AHJ with “Approved Agency”
  - Not in ASTM Standards, Code
- **Specify Individual Certifications**
  - 3rd Party, Independent Exams verify Knowledge
    - FM Firestop Exam,
      - OR
    - UL Firestop Exam,
      - AND
    - IFC Exam

Firestop Inspection Process
ASTM E2174 – ASTM E2393

- **Inspection Documents**
  - 07-84-00 Specifications and Drawings
  - Manufacturer Product Data Sheets and Installation Instructions
  - Safety Data Sheets
  - Listed Systems and EJ's/EFRRA's

Firestop Inspection Process
ASTM E2174 – ASTM E2393

- **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 E2174 – ASTM E2393

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

Affinity Firestop Photo

Firestop Inspection Process
ASTM E2174 – ASTM E2393

- **Observation Reviews**
  - **During construction**
  - **Witnessed randomly of the installed systems on each floor**
  - **E2174 - 10%, each type** of Service Penetration Firestop System
    - **Type = By System, By Firestop Installation Contractor**
  - **E2393 - 5% of Total Lineal Feet** for each **type** of Fire Resistance Rated Joint System
    - **Type = By System, By Firestop Installation Contractor**

Affinity Firestop Photo

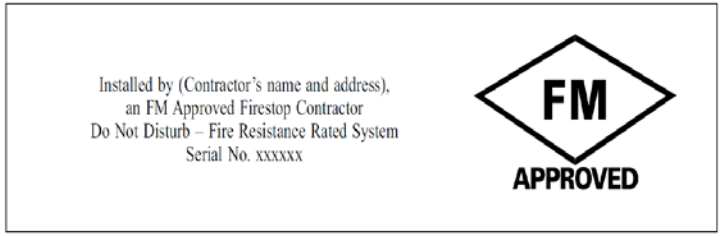
Firestop Inspection Process
ASTM E2174 – ASTM E2393

- Destructive Reviews (Testing)
  - Performed Post-Construction
  - **E2174** - Minimum 2%, no less than 1, each **type** per 930 m^2 (10,000 SF) of floor area
    - **Type = By System, By Contractor**
  - **E2393** - Minimum 1 / 152 LM (500 LF) of Joint Area, by **type**, mandatory; Exception mechanical joints
    - **Type = By System, By Contractor**

Affinity Firestop Photo

Firestop Special Inspection
ASTM E2174 – ASTM E2393

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



Firestop Inspection Process
ASTM E2174 – ASTM E2393

- **Variances / Deviations**
- ASTM E2174 & ASTM E2393
  - FS Contractor is notified of any deficiencies within **one day**
- IBC 1704.2.4
  - Work is in conformance to the documents
  - Otherwise it is **immediately** brought to the attention of the FS Contractor
  - If not corrected, AHJ and AA will be informed to take action

Affinity Firestop Photo

Firestop Inspection Process
ASTM E2174 – ASTM E2393

- Both Methods
  - If any type does not comply
    - Repair
    - Replace
    - 1 additional inspection
  - If 10% variance per firestop type
    - Inspection stops
    - Installer inspects, repairs
    - Inspector re-inspects
- Document all Deficiencies

Affinity Firestop Photo

Firestop Inspection Process
ASTM E2174 – ASTM E2393

- **Inspectors shall**
  - **Not supervise or direct FS Contractors**
    - Systems Selection = Supervision
  - Commence reviews at the start of FS installation
  - Review installation based on manufacturers and system requirements

Affinity Firestop Photo

Firestop Inspection Process
ASTM E2174 – ASTM E2393

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

Firestop Evaluation & Repairs

- **Installation Evaluations basis…**
  - Manufacturers Installation instructions
  - Acceptable methods to review installed systems
  - Listed SYSTEM requirements for installations
  - ***IFC Document on Sealant Thickness Measurement, Shrinkage***

Firestop Contractors International Association

International FireStop Council

Firestop Repairs

- Instruction requirements by manufacturer
- Listed systems
- Patch/Infilling
  - Adhesion to Old Sealant
  - **F, T, L, M, W Ratings**
  - ***As recommended by MFR***

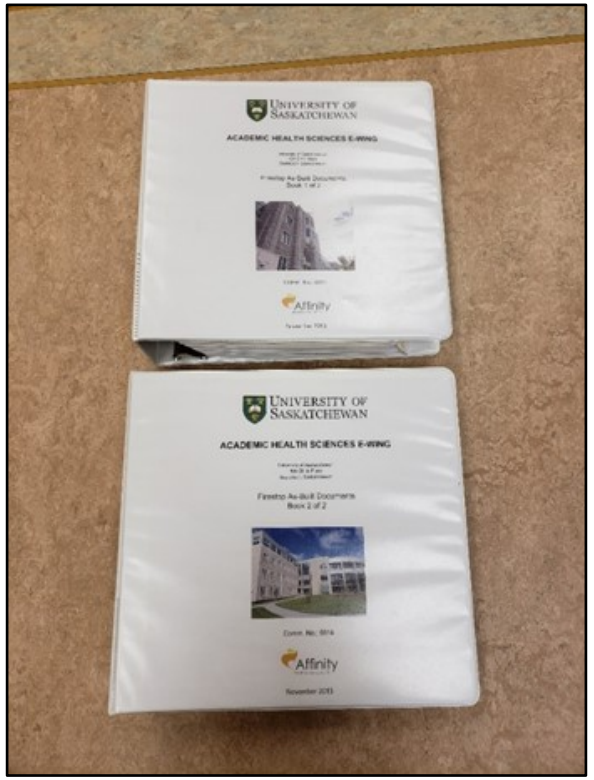
Affinity Firestop Photo

Firestop Inspection Forms & Variance Notices

- **Minimum one FS system for each type;**
- ***(By Type of System, By Contractor)***
- ASTM E2174 and ASTM E2393 require reports to be submitted to AA one day after review
- **IBC requires IMMEDIATE NOTICE**
- Numbered – Controlled
- Required – During/post construction methods

Firestop Inspection Final Report
ASTM E2174 - ASTM E2393

- Project name and location
- Project team contact info
- Firestops reviewed (inspected)
  - Type and quantity
  - Verification method
  - Percentage of total deficiencies
- All documents submitted to AA

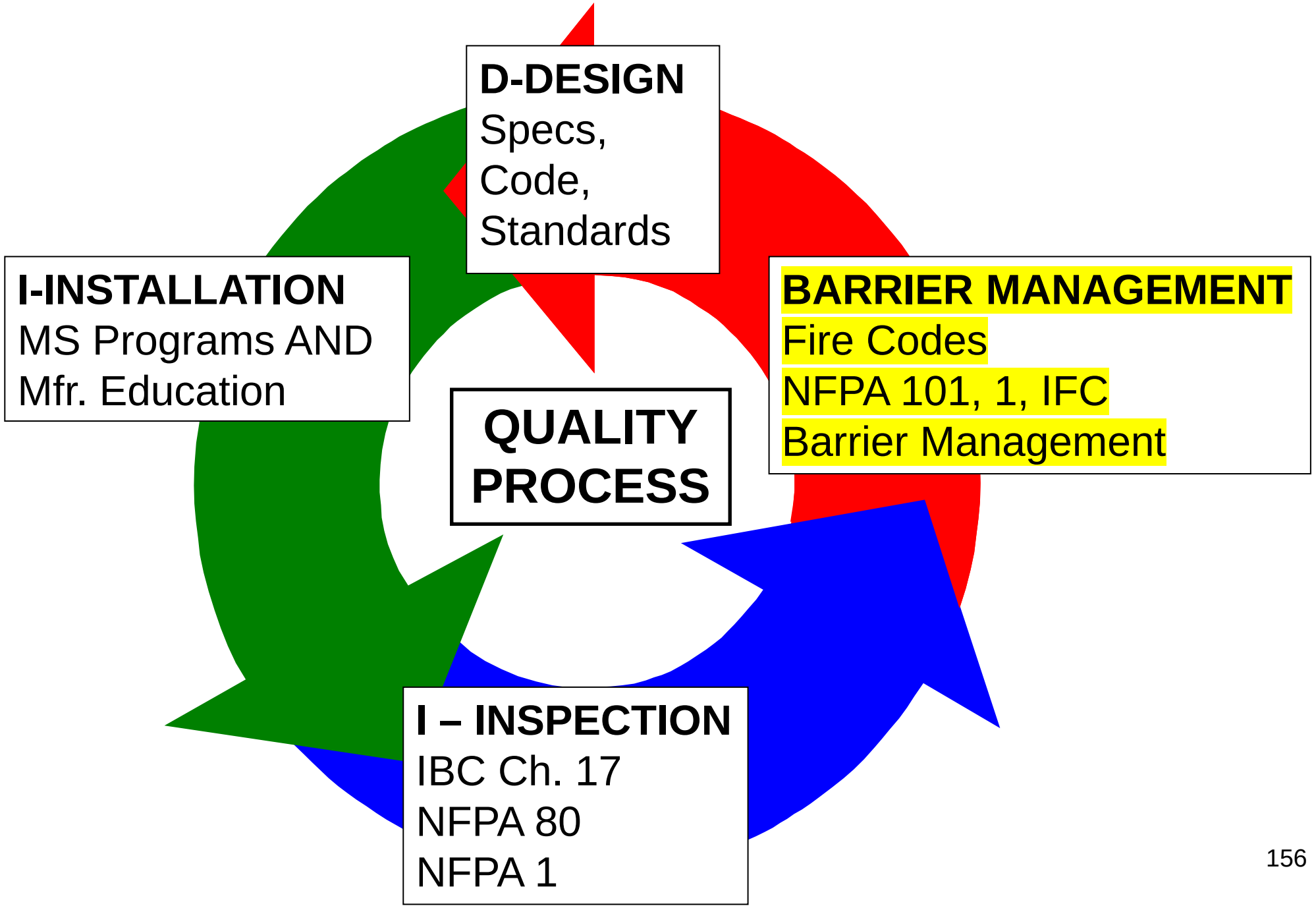


Affinity Firestop Photo

Firestop Repairs

- Repairs & Patching
  - Manufacturer Repair Instructions
    - Tested & Listed System Design
    - Adhesion
    - Movement
    - Air Leakage
    - Water Resistance Ratings
  - ***As recommended by MFR***

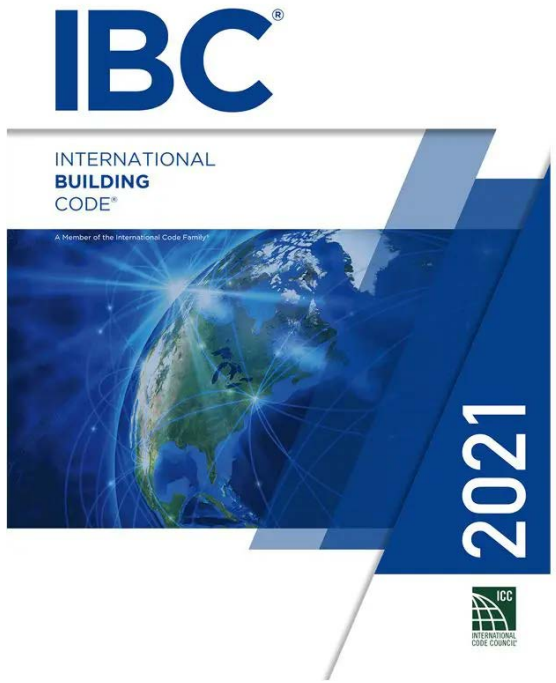
Affinity Firestop Photo


D-DESIGN
Specs,
Code,
Standards
I-INSTALLATION
MS Programs AND
Mfr. Education
BARRIER MANAGEMENT
Fire Codes
NFPA 101, 1, IFC
Barrier Management
QUALITY
PROCESS
I – INSPECTION
IBC Ch. 17
NFPA 80
NFPA 1

Existing Buildings? Did you know…

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

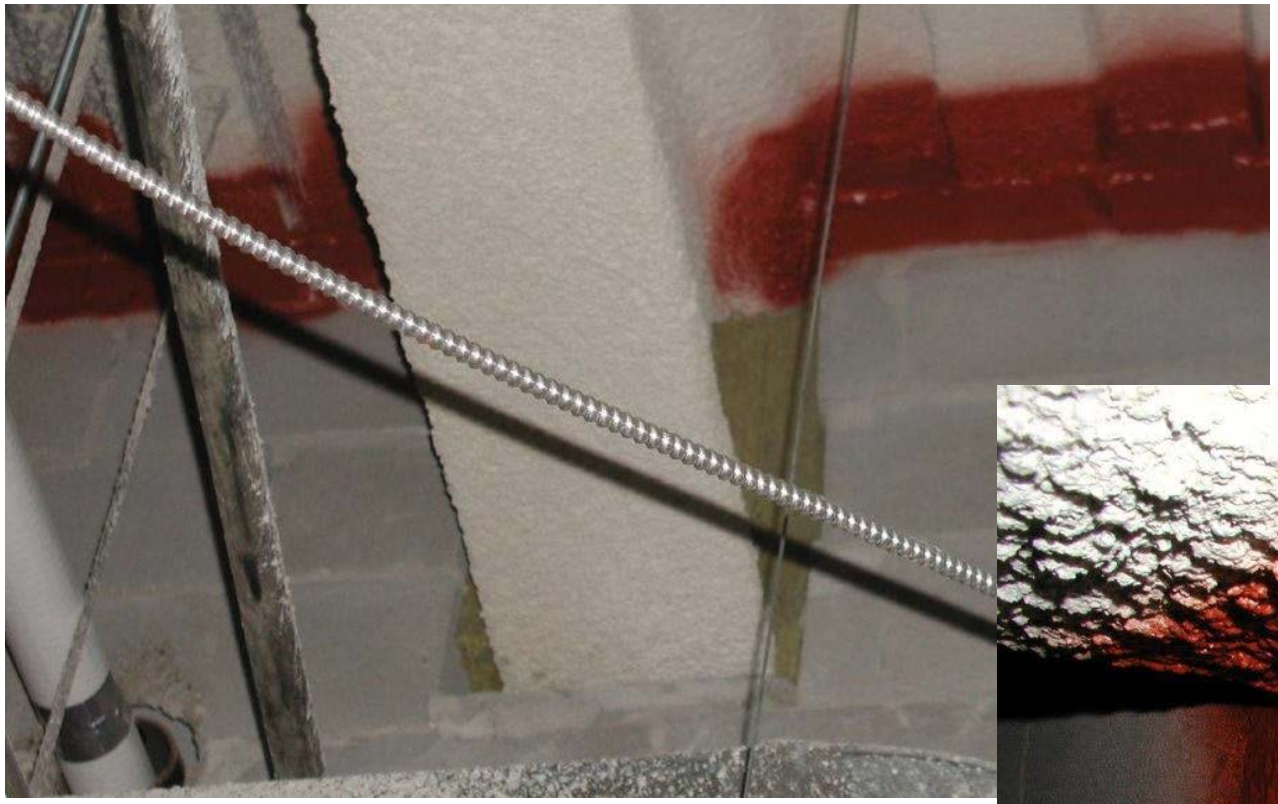
- Fire Codes dictate maintaining protection of structural fire-protection and fire-resistance-rated compartmentation

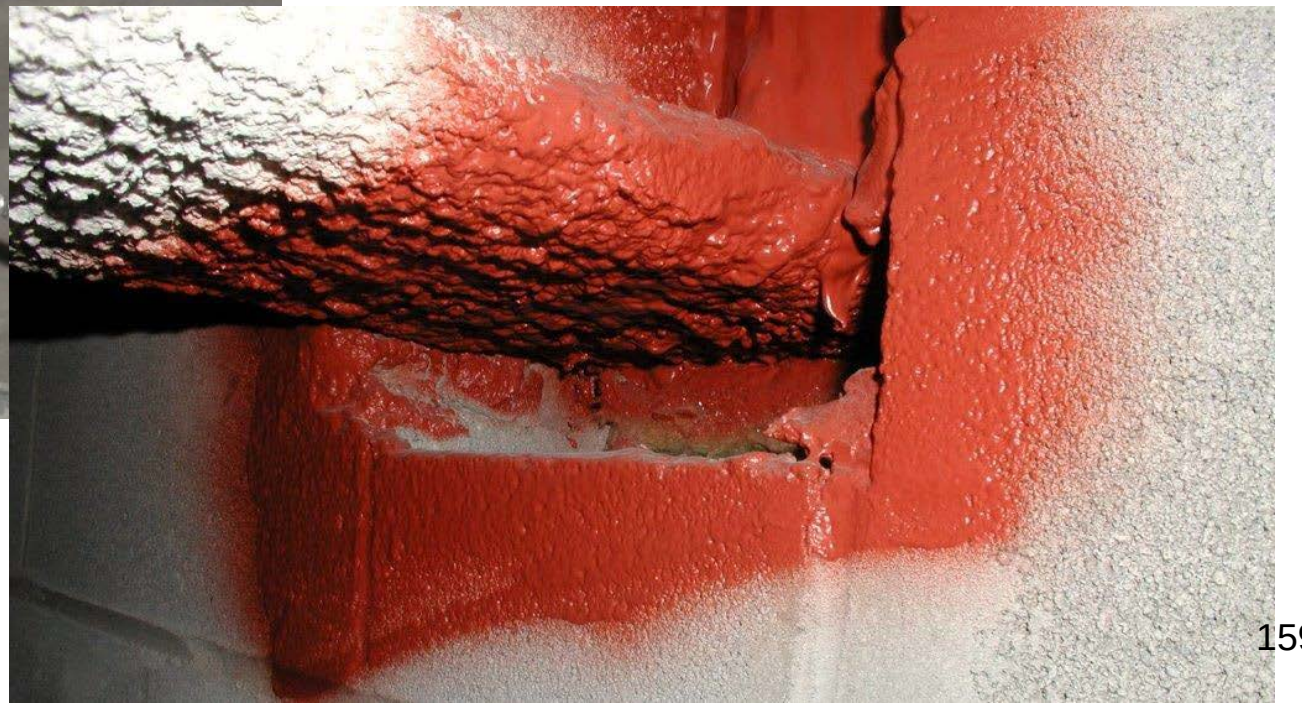


Facility Budget Line Items…

- Fire-Sprinklers, Pumps, etc…**YES**
- Fire-Detection & Alarms…**YES**
- Fire Separations / Barriers? **WHAT?**
  - Fire-Resistance Rated Walls/Floors
  - Penetrations & Joints
  - Fire Doors
  - Fire/Smoke Dampers
  - Fire-Rated Glazing
- In-House Staff?
- Barrier Services Contractor?

Firestopping & Compartmentation
Do we have a Problem??





Firestopping & Compartmentation
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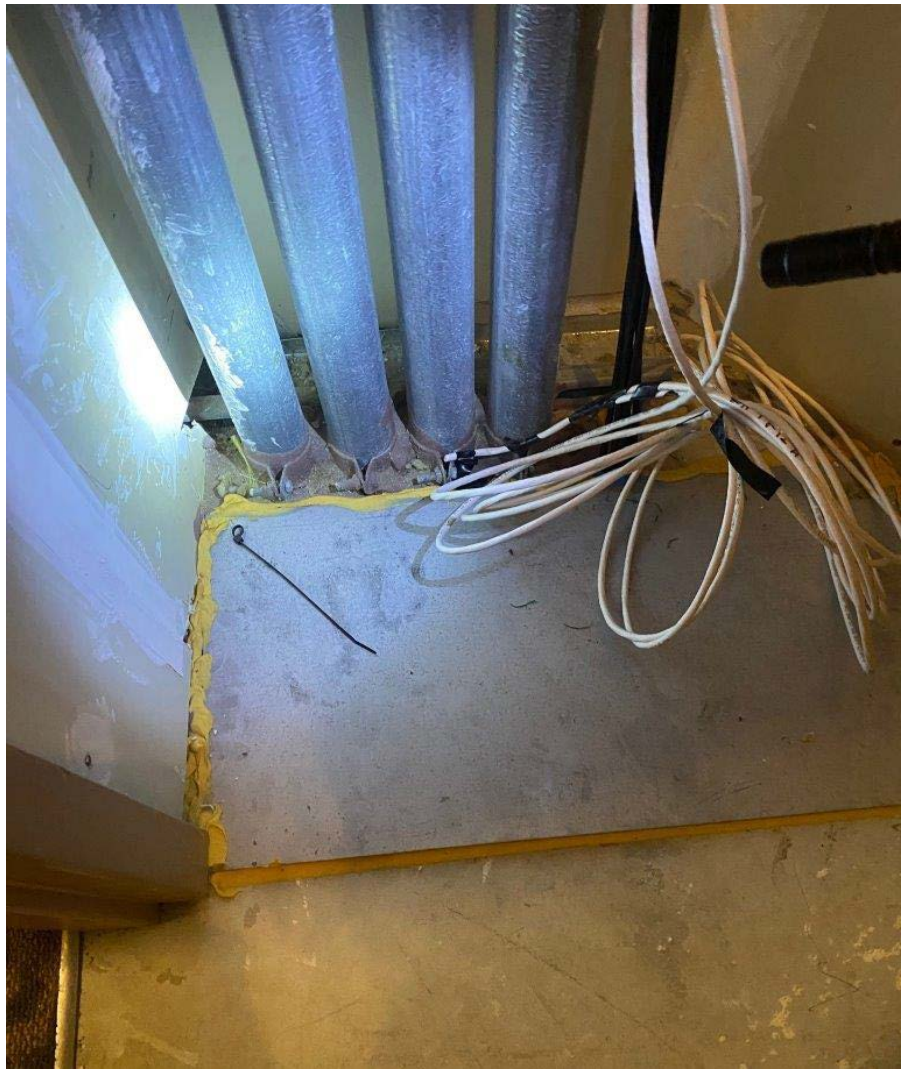

Firestopping & Compartmentation
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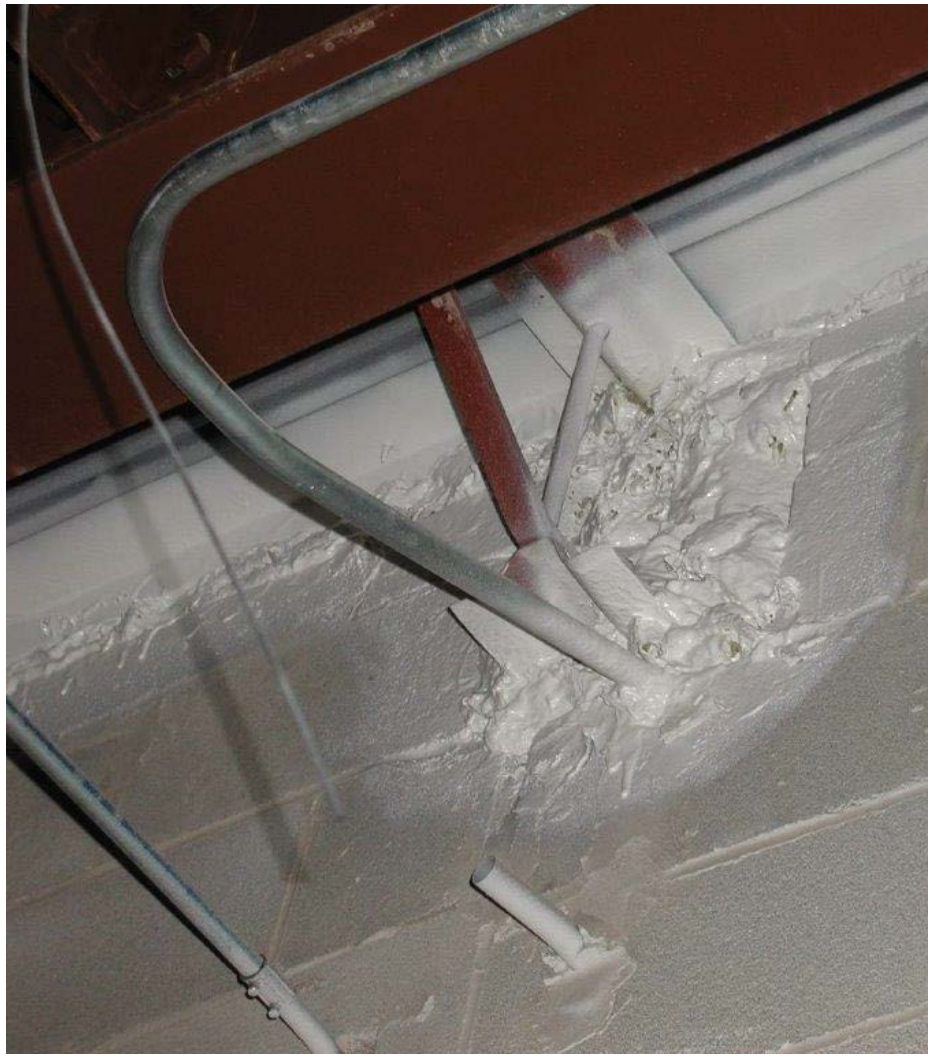

Firestopping & Compartmentation
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Firestopping & Compartmentation
Do we have a Problem??

Fire Resistance Barrier SYSTEMS

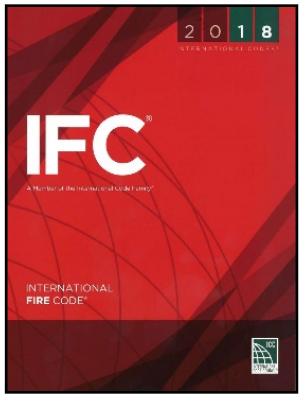
- **Products Become Systems Through….**
- **Test Standard References**
  - **Structural Elements & Assemblies** – ASTM E119, UL 263
  - **Fire & Smoke Barriers** – ASTM E119, UL 263
  - **Firestopping** – ASTM E814 / UL 1479, ULC-S115**,** UL 2079, ASTM E1966, E2307, E2837, E3037, **…**test method…"
  - **Fire/Smoke Dampers** – UL 555, UL 555S, UL 555C
  - **Swinging/Rolling Fire Doors** – UL 10B, 10C, NFPA 257
  - **Fire Rated Glazing** – UL 9, NFPA 252
- **SYSTEM Testing = Suitability statement for use of a product in a specific *system*/design application**

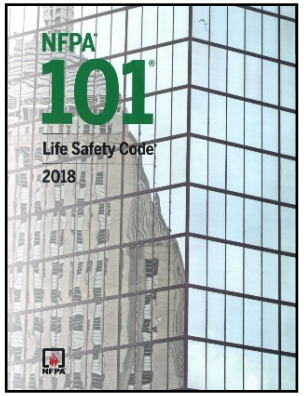
Facility Budget Line Items…

- Fire-Sprinklers, Pumps, etc…**YES**
- Fire-Detection & Alarms…**YES**
- Fire Separations / Barriers? **WHAT?**
  - Fire-Resistance Rated Walls/Floors
  - Penetrations & Joints
  - Fire Doors
  - Fire/Smoke Dampers
  - Fire-Rated Glazing
- In-House Staff?
- Barrier Services Contractor?

Fire Codes Require Maintenance

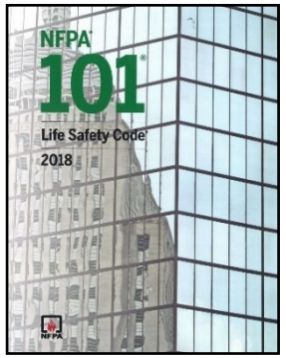
- NFPA 101
- NFPA 1
- International Fire Code
  - Minimum Requirements Stated
  - Frequency





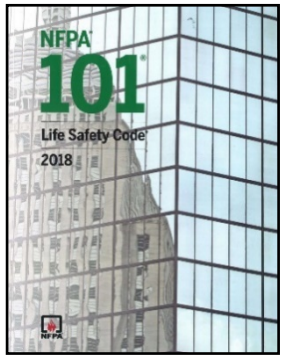
National Fire Protection Association NFPA 101 – 2018

- **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

- **12.3.3* 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

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 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

International Property Maintenance Code

[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.

703.3 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 joint systems, shall be maintained. Such elements shall be visually inspected annually by the owner and repaired, restored or replace where damaged, altered, breached or penetrated. Records of inspections and repairs shall be maintained. [IPMC 2018, 703]

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 and Life Safety Code of Practice
Maintenance & Management

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.

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 and Life Safety Code of Practice]
In Saudi Arabia, Section 107.1, Maintenance states;

Saudi Arabia
Maintenance & Management

Fire-resistance

In Saudi Arabia, Section 107.1, Maintenance states;

107.1 Maintenance 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 be continuously maintained in accordance with this code and applicable referenced standards. [Saudi Arabia Fire Code]

Fire Codes Require Maintenance - INDIA

- 9 BUILDING MAINTENANCE – METHODS AND MANAGEMENT
- 9.1 General – “Any building (including its services) when built has certain objectives and during its total economic life, it has to be maintained in proper condition to meet those objectives. Maintenance is a continuous process requiring a close watch and taking immediate remedial action. It is interwoven with good quality of housekeeping. It is largely governed by the quality of original construction. The owners, engineers, constructors, occupants and the maintenance agency are all deeply involved in this process and share a responsibility….”.

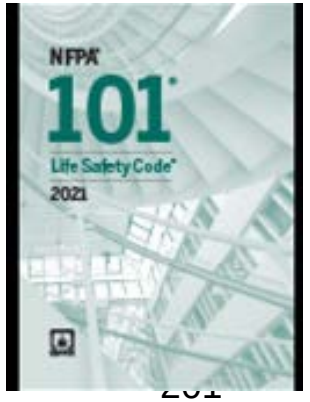
Existing Buildings? Educate

- **NFPA 1, NFPA 101, IFC – Decades in place.**

- **New IFC “maintaining protection” requirements**
  - Inventory of fire-resistance-rated assemblies?

- **What’s inventory?**
  - Life Safety Drawings with Fire-Resistance Ratings
  - Tested and Listed Systems Designs
  - Manufacturers Instructions/Product Data Sheets

- **What’s risk –**
  - Fire and Smoke Spread means life, property, continuity of operations losses



What type of Repair is NEEDED??

703.2 Repair of penetrations. Where damaged, materials used to protect membrane- and through-penetrations shall be replaced or restored with materials or systems that meet or exceed the code requirements applicable at the time when the assembly was constructed, remodeled or altered.

Where the system design number is known, the system shall be inspected to the listing criteria and manufacturer's installation instructions.

704.2 Repair of joints and voids. Where damaged, materials used to protect joints and voids shall be replaced or restored with materials or systems that meet or exceed the code requirements applicable at the time when the assembly was constructed, remodeled or altered.

Where is Firestopping & Fire-Resistance Needed Most to Protect??

- Hospitals, nursing homes
- Apartments, Condos
- Universities
- Warehousing
- Manufacturing – Paper, others
- More …..

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

M–Barrier Management Systems

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

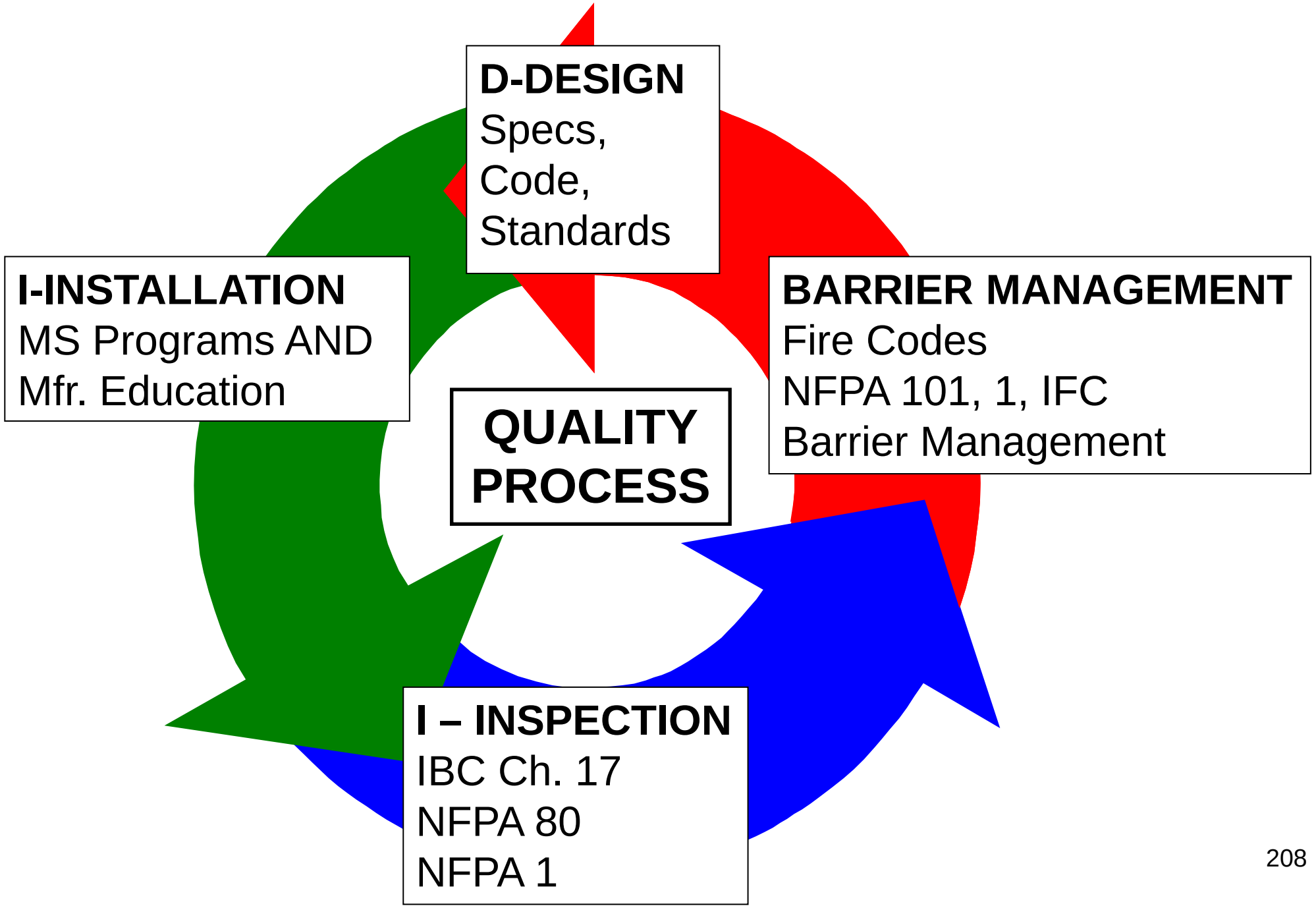
Firestop (& Other Fire-Resistance Repairs)

- Repairs
  - Instruction requirements by manufacturer
  - TESTED AND LISTED SYSTEMS
  - Patching
    - Systems….Ratings
    - Adhesion
    - Movement
    - T, L, W Ratings
    - ***As recommended by MFR, Liisting***

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**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RESOURCES

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Firestopping DIIM

Bill McHugh, FCIA Executive Director

Firestop Contractors International Association
4415 W. Harrison St., #540 - Hillside, IL 60162 USA
+1 (708) 202-1108 – **Bill@FCIA.org**

www.FCIA.org

INFO@FCIA.org

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