FCIA Webinar Series 2024

FCIA Firestop DIIM 1999-2024

Presented by:

Bill McHugh, FCIA Exec. Director

Rich Walke, CTI, Consultant to FCIA

FREE STUFF - INFO@FCIA.org

Contact Me - Bill@FCIA.org

FCIA
Firestop Contractors International Association

FCIA – Firestop Contractors International Association

- **UL/ULC, FM 4991 Contractor Programs**
- **IAS AC 291 Inspection Agency Accreditation Program**
- **ASTM Firestop Inspection Standards**
- **Firestop Education Program**
  - **Contractor, Inspection Agency, AHJ, Others**
- **Tools @ FCIA.org** for Specifiers, AHJ's, Building Owners, Facility Directors, Firestop Contractors & Inspection Agencies

FREE RESOURCES

- Info@FCIA.org for FREE Webinars
- Info@FCIA.org FREE Life Safety Digest
- INFO@FCIA.org FREE MOP

FCIA – Firestop Contractors International Association

- Canada – Symposiums, National Prescence, NBCC, NFC
- Qatar - Doha FCIA Symposium; Members
- India - Mumbai/Ahmadabad – Fire Safe Build India – IIT-G
- UAE - Dubai – FCIA Symposium; Civil Defence
- Saudi Arabia - Riyadh – BIG5 Show; UL, ICC, T
- Mexico/LATAM - CONAPCI/AMRACI
- Australia/New Zealand – FPA, Etc.

Outline –

- FCIA – DIIM – Firestopping
  - Maintain Protection - Fire-Resistance
  - Design – Specs, Codes, Testing, Products
  - Installation –
    - FM 4991, UL/ULC Qualified Firestop Contractor Programs
  - Inspection –
    - ASTM E2174 / E2393 Inspection Standards
    - IAS AC291, Inspector Qualifications
  - Maintain Protection – Fire Codes; Barrier Management
  - Repairs??
  - Firestopping for Safety –

Firestopping, Fire Resistance & Compartmentation for Safety

- Total Fire Protection Stats…***North America***

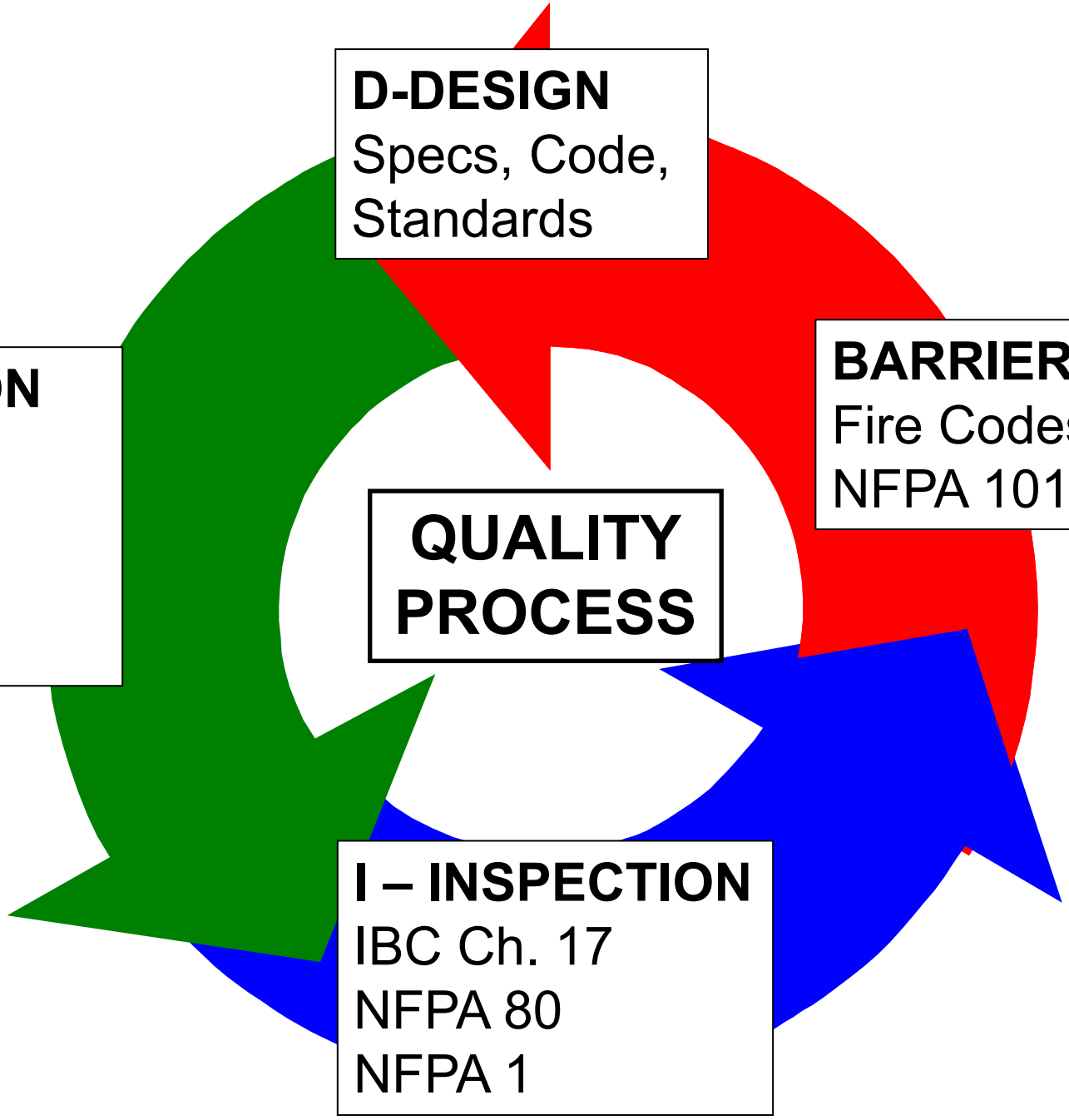
- ***Approx. 11,000 20 story + Buildings, 70% in ….***
- ***NY, SF, LA, CHI, HI, Toronto…6 Cities***
  - ***Older buildings***
  - ***Earthquakes***

- ***Compartmentation & Structural Fire-Resistance … Primary ADDED Sprinklers & Detection/Alarms***

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

“TOTAL FIRE PROTECTION”

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


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

ALL BUILDINGS HAVE FIRE-RESISTANCE!

- Hospitals
- Offices
- Educational
- Medical Office Buildings
- Dorms
- Hotels
- High Rise (75’)
- Underground buildings
- More….

ALL BUILDINGS HAVE FIRE-RESISTANCE!

- Fire-Sprinklers, Pumps, etc…
- Fire-Detection & Alarms…
- Fire-Resistance?
  - Fixing Walls and Floors
  - Firestopping
  - Fire Dampers
  - Fire Doors – Rolling/Swinging
  - Trash Chutes
  - Fire Rated Glazing

ALL Codes have FIRE-RESISTANCE Required

- NFPA 5000 – 101 – Chapter 8
- International Codes –
  - New and Existing Buildings International Building Code – Chapter 7
  - International Fire Code – Chapter 7
- Chicago Building Code 2019 [= IBC 2018, with AMENDMENTS]
- National Building Code of Canada
- UAE Fire and Life Safety Code
- National Building Code of India
- Other Worldwide Codes….

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

Firestopping / Barrier Management for Safety “DIIM”

- Properly ***Designed*** and Specified Firestopping
  - Firestopping – 07 84 00 ; Fireproofing – 07 81 00 ; ETC.
- ***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, 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

Building & Fire Code Requirements

- Fire Smoke Compartments – **IBC/NFPA = USA**
  - ***Fire Barrier – Fire-Rated, SYSTEMS Repairs***
  - ***Fire Walls – Fire-Rated, Structural SYSTEMS Repairs***
  - ***Smoke Barriers – Fire-Rated, Smoke, SYSTEMS Repairs***
  - ***Smoke Partitions – NO Fire-Rating, MATERIALS***
  - ***Fire Partitions (Not in NFPA)***
  - ***Archaic Assemblies – Ratings Found in Books…***
  - ***Exterior Walls***
  - ***Fire Compartment (UK/IN)***
  - ***Fire Separations (CAN)***

Existing Buildings

- Archaic Assemblies
  - Clay Tile Block
  - Gypsum Block
  - Plaster
  - Clay Tile/Concrete
  - Unidentified Assemblies
- Tested … Calculated … Prescriptive
- ALL EJ's/EFRRA's

Building & Fire Codes – Assemblies/Breaches
Similar Fire Test Time-Temperature Curves

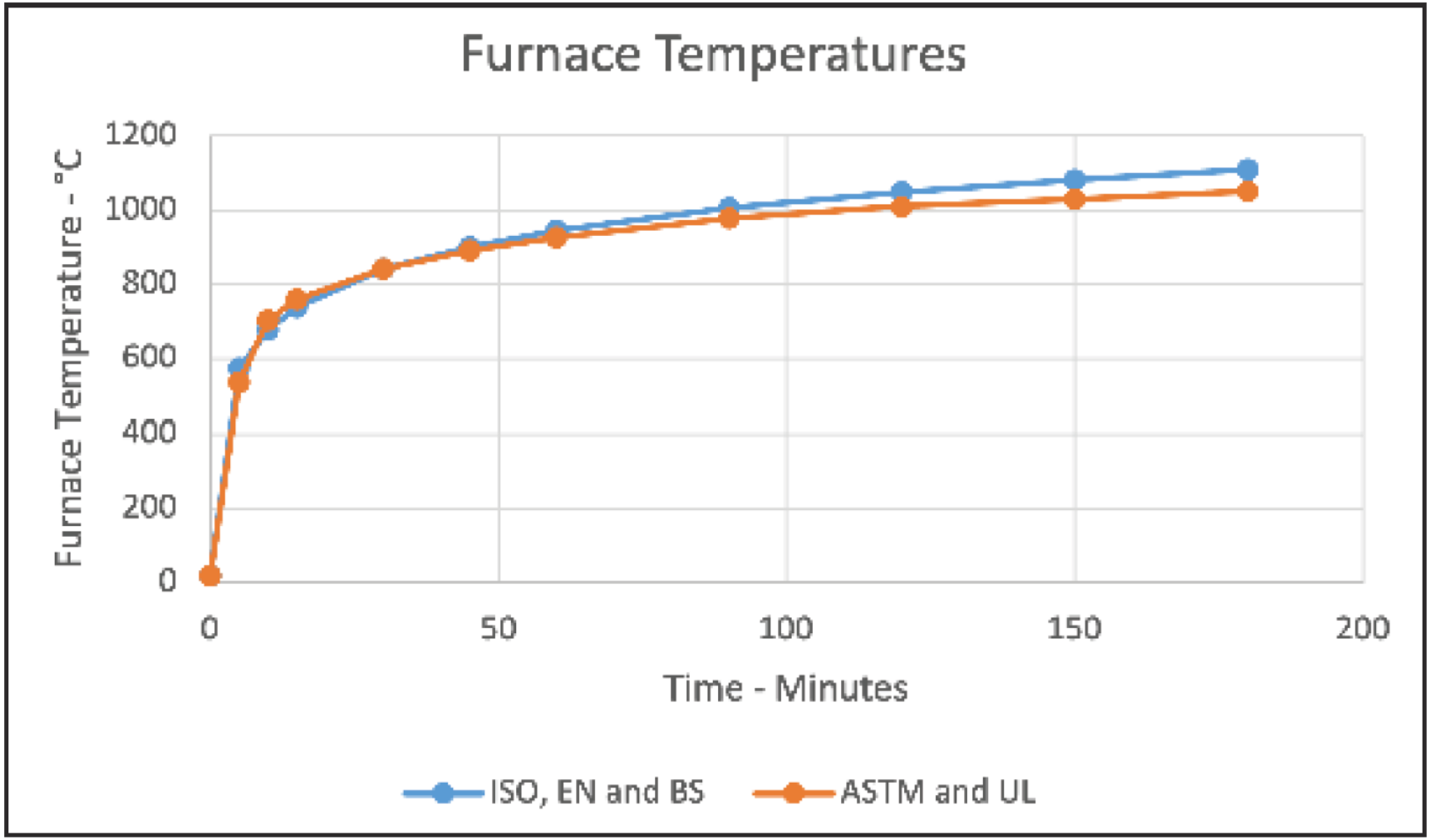


Figure 1 - Comparison of furnace temperatures, the time/temperature curve Berhinig Image

Wall Testing Furnace

USG Photo

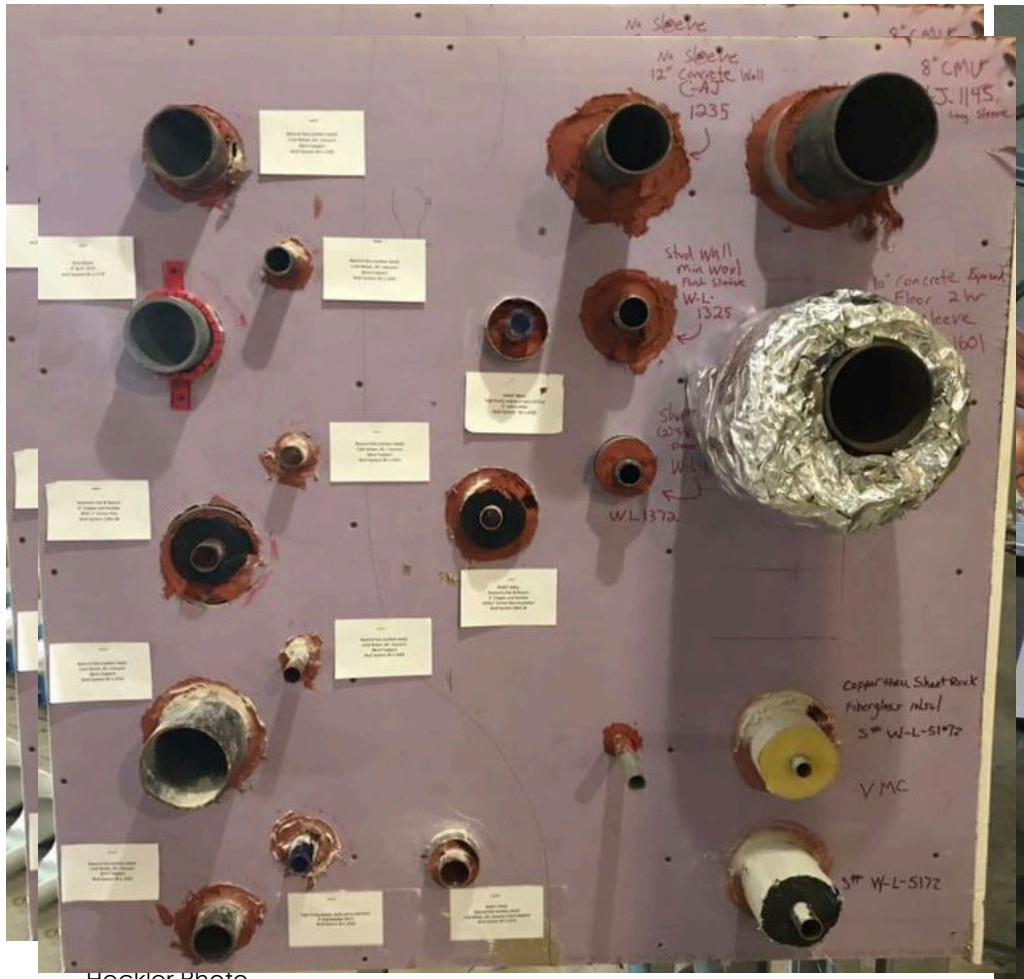
Hose Stream Test

USG Photo

What is a Firestop System?

- Firestop Sealant?
- Firestop Products??
- Fire-Resistance-Rated Floors, Walls?
- Manufacturer's Product Data Sheets?
- Manufacturers Sell Sheets?
- Safety Data Sheets?
- UL Listings?
- ***Materials, plus assembly = FIRESTOP SYSTEM***
- ***Wouldn't it be cool if…..***

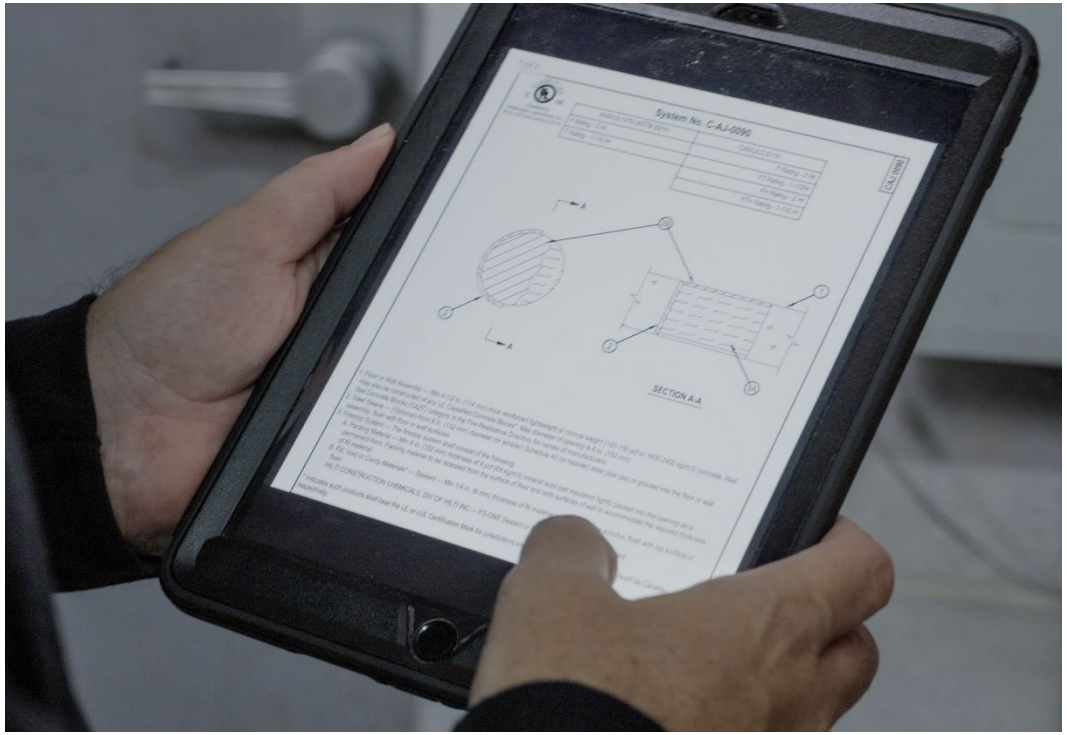
Mockup Review BEFORE Construction….



Heckler Photo

C. Zussman Pepper Photo

Systems & Materials …
Structural & Effective Compartmentation

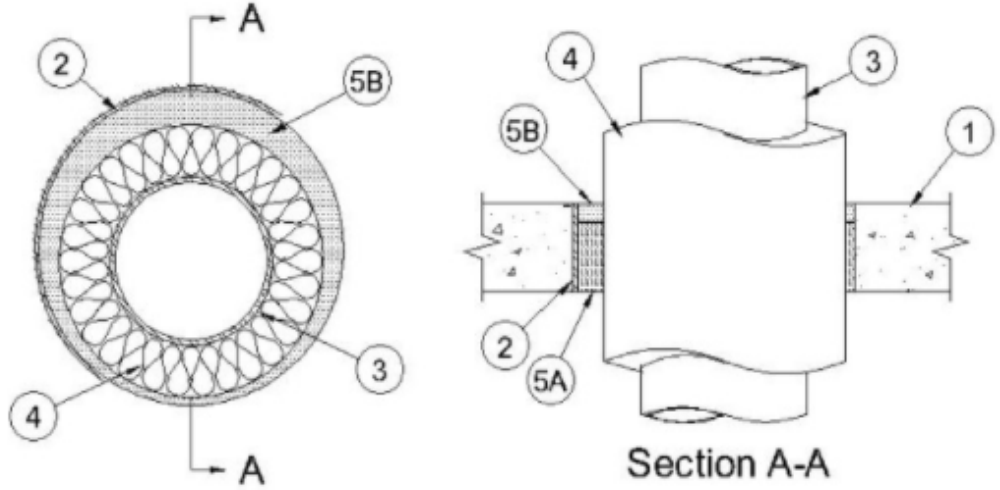


Affinity Firestop Photo

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.

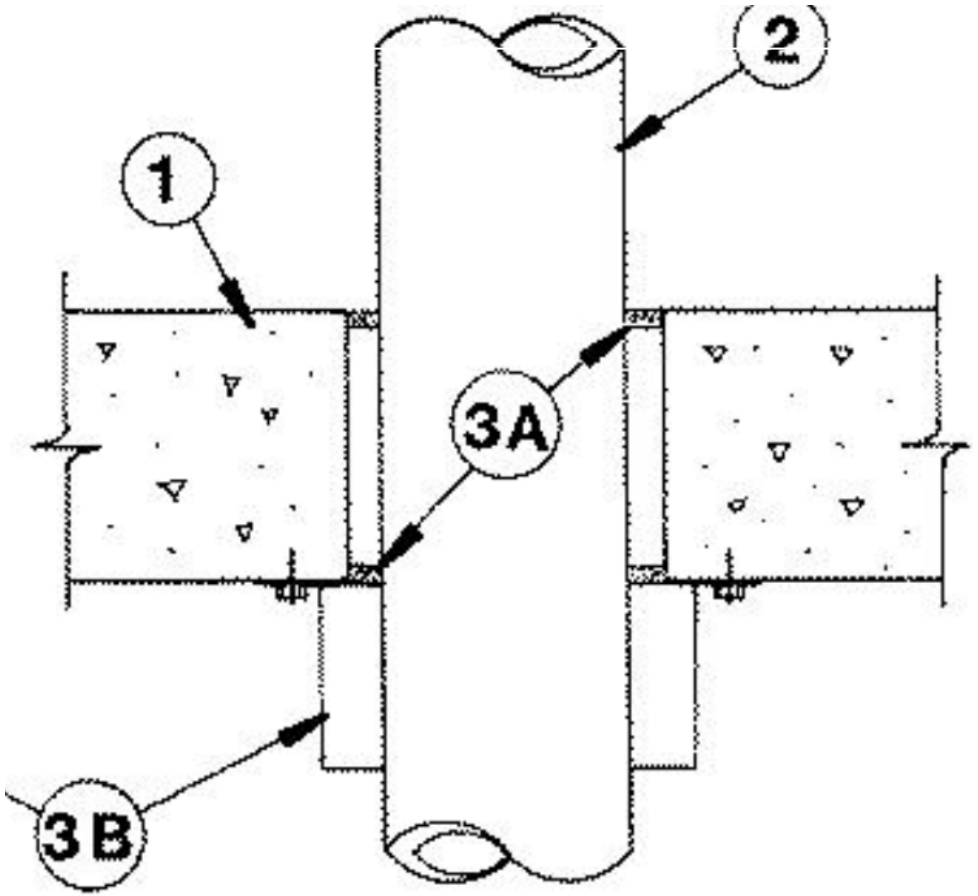
T Rating is 3/4 Hr for nom 1-1/2 in. (38 mm) thick pipe covering for penetrants A and B. T Rating is 1 Hr for nom 1-1/2 in. (38 mm) thick pipe covering for Penetrants C and D. T Rating is 0 Hr for all Penetrants when pipe coverings less than nom 1-1/2 in. (38 mm) thick.

IBC - Install in Accordance with Listing & Manufacturers Installation Instructions

What's wrong with this picture?

Heckler Photo

C-AJ-2038
https://iq.ulprospector.com/en/profile?e=173569



What's wrong with this picture?

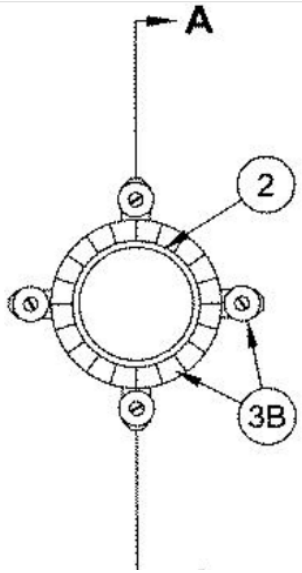
Sleeve?
Rags?
No Sealant?

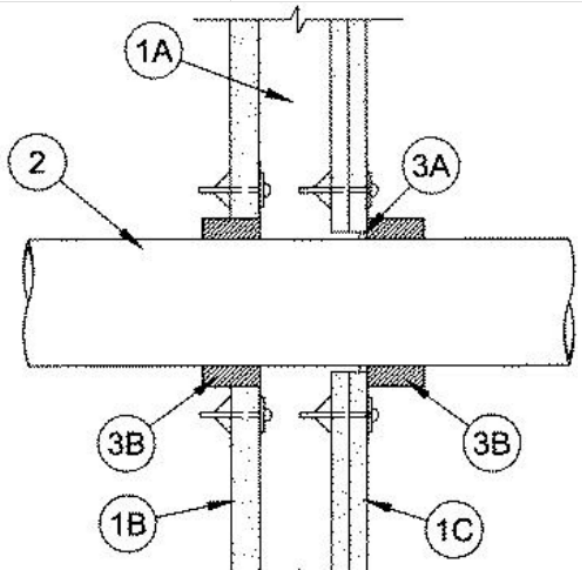
D. Falconer Photo

What's wrong with this picture?

W-L-2257
https://iq.ulprospector.com/en/profile?e=176962

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
	F Rating — 2
	FT Rating — 2
	FH Rating — 2
	FTH Rating — 2





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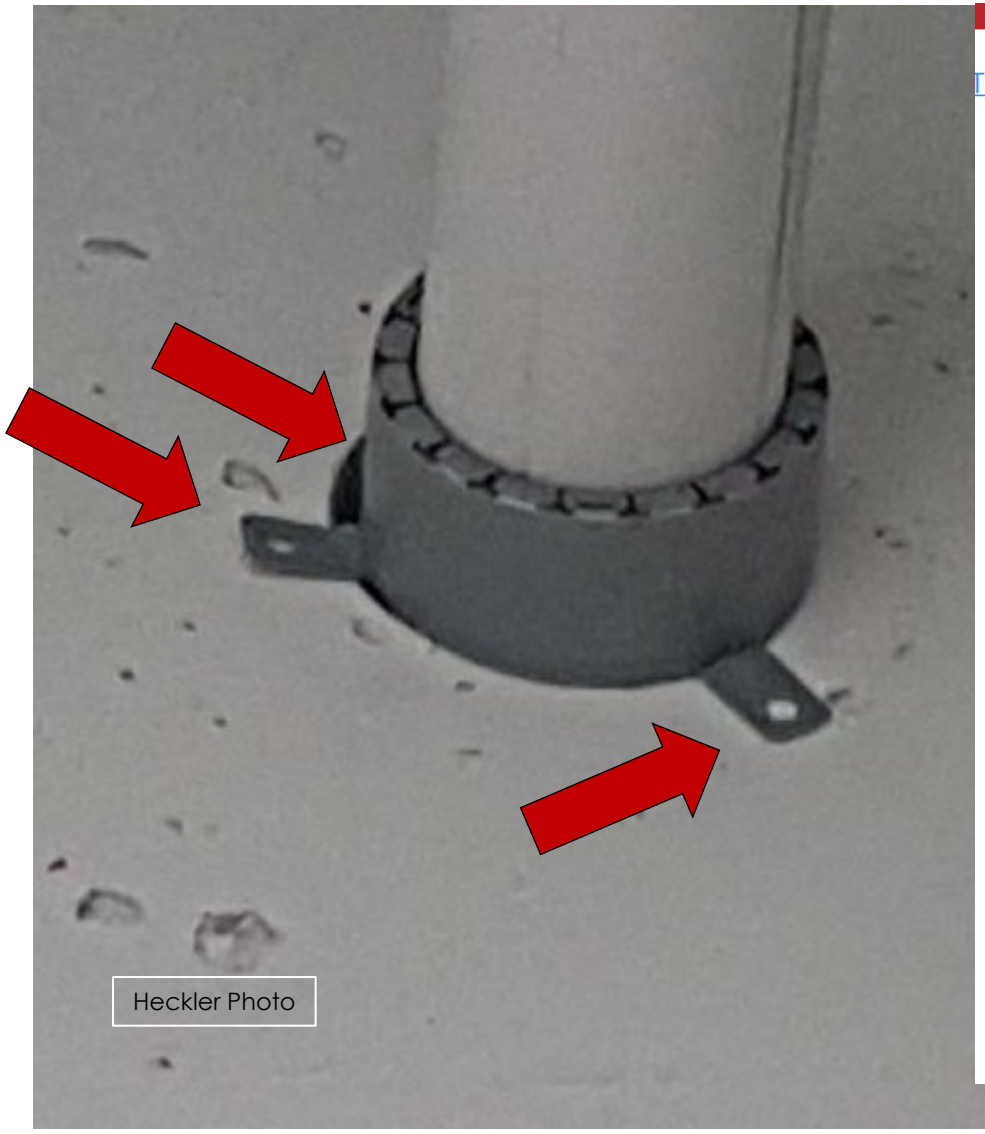


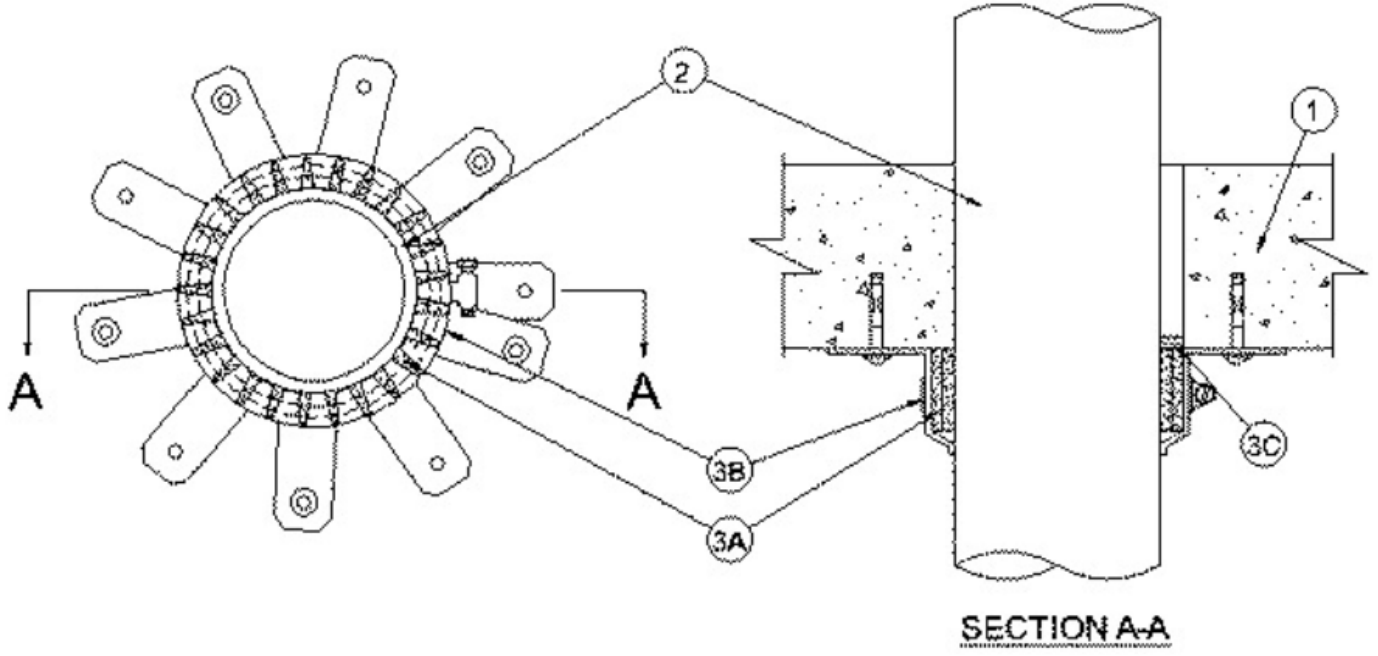
Through-penetration Firestop Systems

System No. C-AJ-2371

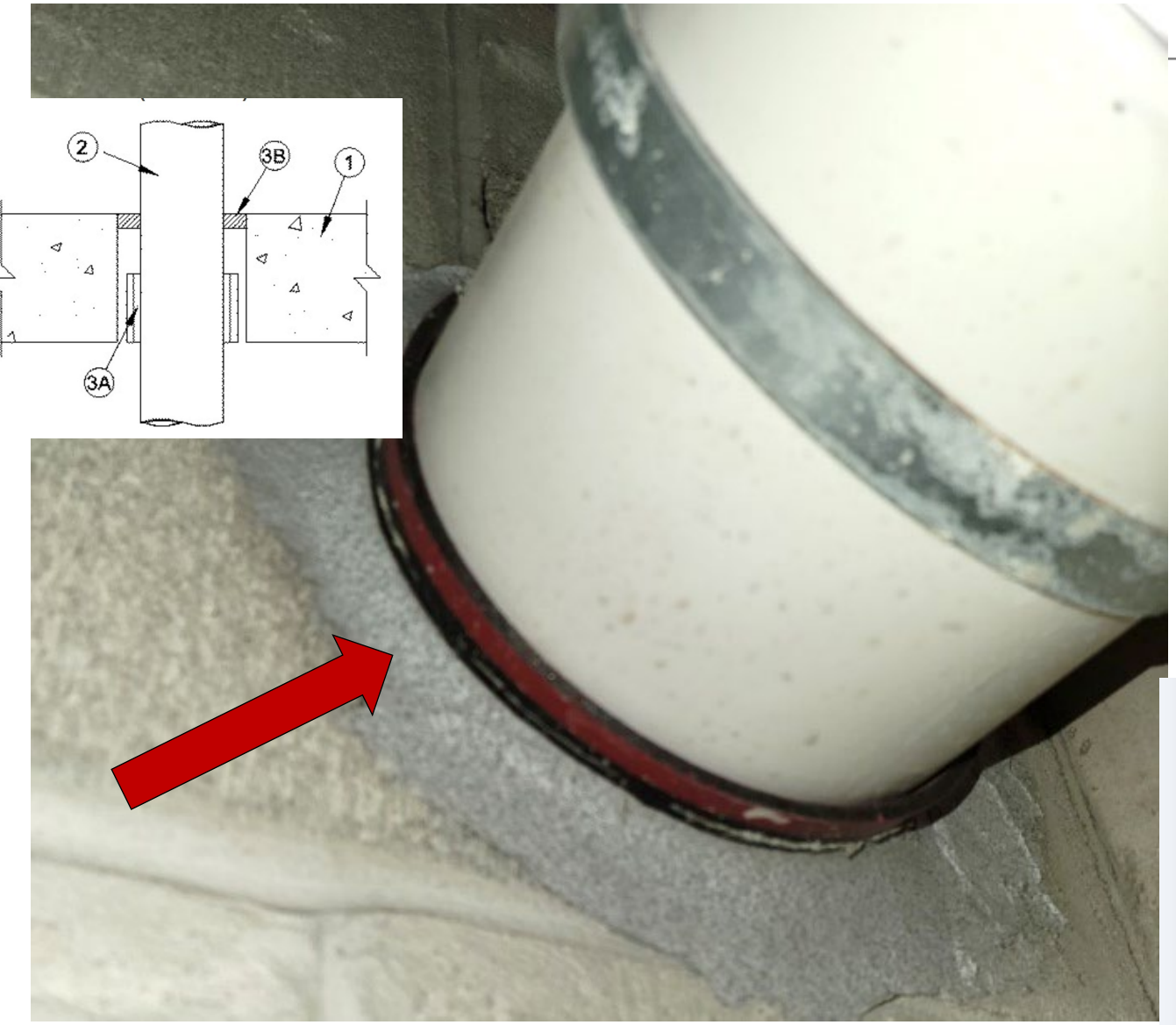
January 09, 2015

F Rating - 3 Hr

T Ratings - 2 and 3 Hr (See Item 3)



C-AJ-2048?? No



C-AJ-2048
https://iq.ulprospector.com/en/profile?e=178770

System tested with a pressure differe[illegible] of 50 Pa between the exposed and the unexposed surfaces with the higher pressure on the exposed side.

1. **Floor or Wall Assembl[illegible]** [illegible]14 mm (4-1/2 in.) thick reinforced lightweight or normal weight (1600-2400 kg/cu meter or 100-150[illegible]e. Max diam of opening is 152 mm (6 in.).

1A. **Stee[illegible]loor Assembly —** (Not Shown) — As an alternate to Item 1, the floor assembly may consist of a fluted steel deck/concrete floor assembly. The floor assembly shall be constructed of the materials and in the manner described in the individual Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:

A. **Steel Floor and Form Units* —** Min 64 mm (2-1/2 in.) deep galv fluted units.

2. **Through Penetrants —** One nonmetallic pipe or conduit centered within opening with a nom 19 mm (3/4 in.) annular space between penetrant and periphery of opening. Penetrant to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of penetrants may be used:

A. **Polyvinyl Chloride (PVC) Pipe —** Nom 102 mm (4 in.) diam (or smaller) Schedule 40 solid core or cellular core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems. **FT and FTH Ratings are 1-1/4 Hr.**

B. **Fire Retardant Polypropylene (FRPP) Pipe —** Nom 102 mm (4 in.) in. diam (or smaller) Schedule 40 FRPP pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems. **FT and FTH Ratings are 1/4 Hr.**

4. **Firestop System —** The firestop system shall consist of the following:

A. **Fill, Void or Cavity Materials* - Wrap Strip —** Nom 6.4 mm (1/4 in.) thick intumescent material supplied in 51 mm (2 in.) wide strips. Min two layers of wrap strip individually wrapped tightly around the nonmetallic penetrant with ends butted and held in place with masking tape. Butted ends in successive layers shall be offset. Bottom edge of wrap strip to be flush with the bottom surface of floor or with both surfaces of wall assembly. When used with the steel deck floor assembly, bottom edge of wrap strip shall be flush with the crest of the steel

4. **Firestop System —** The firestop system shall consist of the following:

A. **Fill, Void or Cavity Materials* - Wrap Strip —** Nom 6.4 mm (1/4 in.) thick intumescent material supplied in 51 mm (2 in.) wide strips. Min two layers of wrap strip individually wrapped tightly around the nonmetallic penetrant with ends butted and held in place with masking tape. Butted ends in successive layers shall be offset. Bottom edge of wrap strip to be flush with the bottom surface of floor or with both surfaces of wall assembly. When used with the steel deck floor assembly, bottom edge of wrap strip shall be flush with the crest of the steel form units.

RECTORSEAL — Biostop Wrap Strip

B. **Fill, Void or Cavity Material* — Caulk —** Min 13 mm (1/2 in.) thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall assembly.

RECTORSEAL — Biostop 500+

C-AJ-2048?? No

F-A-2162 – NO 50pa, NOT CANADA!!!
https://iq.ulpro[illegible]ctor.com/en/profile?e=178770

System No. F-A-2162

January 27, 2009

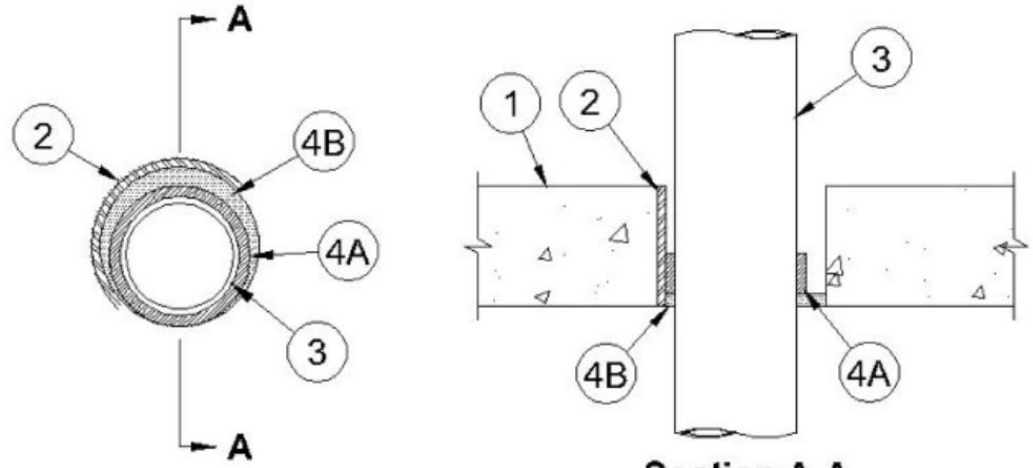
F Rating — 2 Hr

T Rating — 0 Hr

L Rating At Ambient — Less Than 1 CFM/sq ft

L Rating At 400 F — Less Than 1 CFM/sq ft

W Rating — Class 1 (See Item 4B)



Section A-A

What's wrong with this picture? NOTHING

Superl Photo

UL Product iQ® SEARCH MY SEARCHES MY TAGS BILL UL Solutions

XHEZ7 - Through-penetration Firestop Systems Certified for Canada

See General Information for Through-penetration Firestop Systems

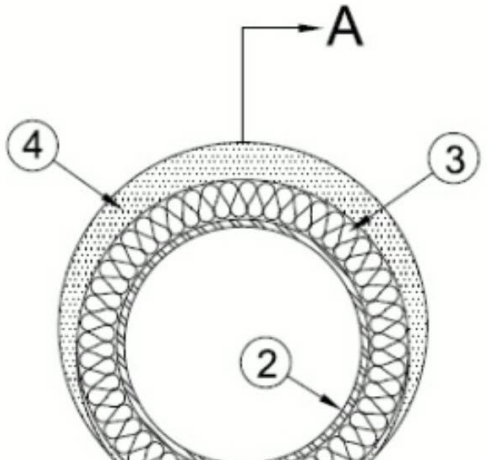
See General Information for Through-penetration Firestop Systems Certified for Canada

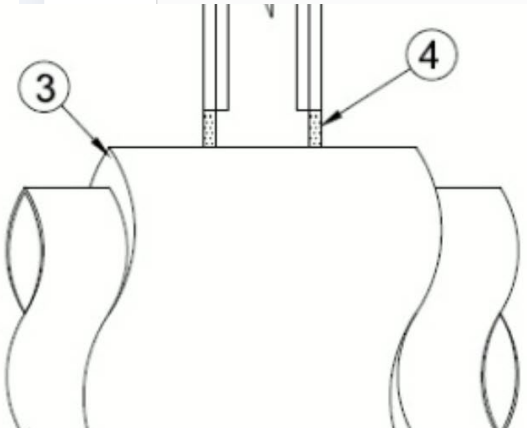
System No. W-L-5029

July 17, 2015

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1, 2 and 3 Hr (See Items 1, 3 and 4)	F Ratings — 1, 2 and 3 Hr (See Items 1, 3 and 4)
T Ratings — 0, 1/2, 1 and 1-1/4 Hr (See Item 3)	FT Ratings — 0, 1/2, 1 and 1-1/4 Hr (See Item 3)
L Rating At Ambient — 4 CFM/Sq Ft	FH Ratings — 1, 2 and 3 Hr (See Items 1, 2 and 4)
L Rating At 400 F — Less Than 1 CFM/Sq Ft	FTH Ratings — 0, 1/2, 1 and 1-1/4 Hr (See Item 3)
	L Rating At Ambient — 4 CFM/Sq Ft
	L Rating At 400 F — Less Than 1 CFM/Sq Ft

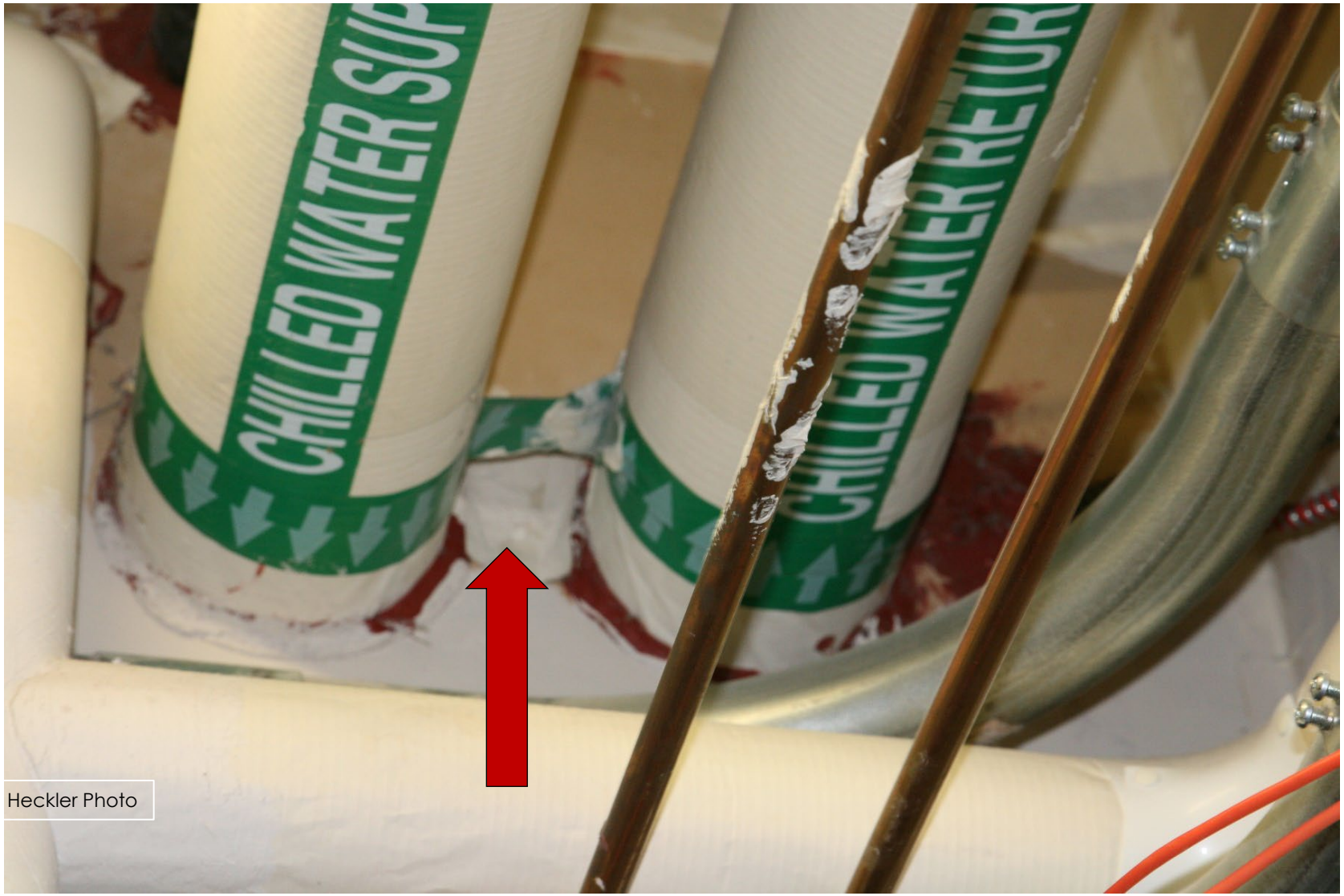
Feedback



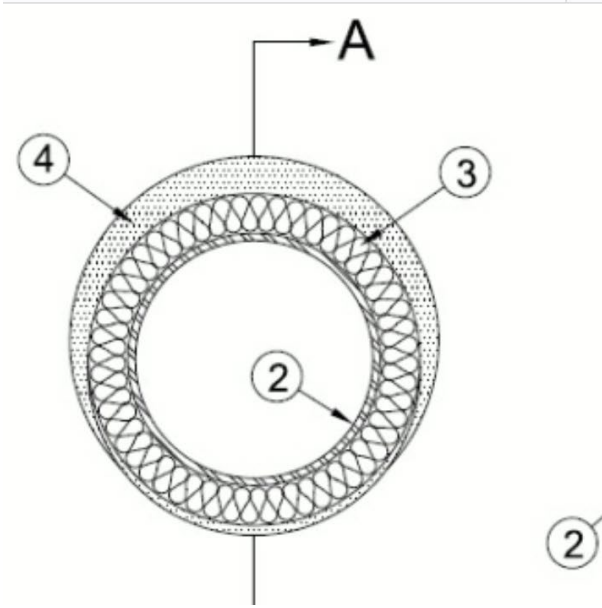


W-L-5029
https://iq.ulprospector.com/en/profile?e=177655

What's wrong with this picture? MIX??



Heckler Photo



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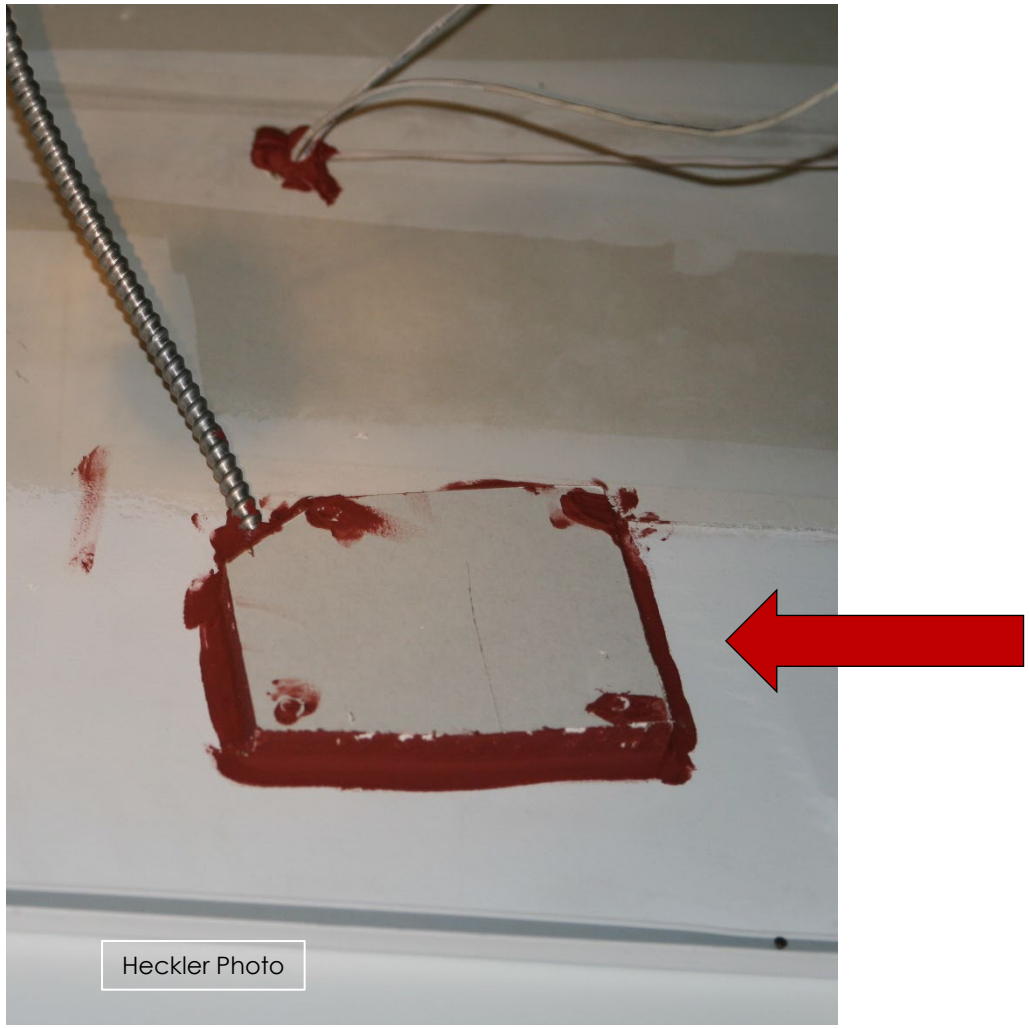


What's wrong with this picture?

Multiple Manufacturers

Separate Joint/Penetration

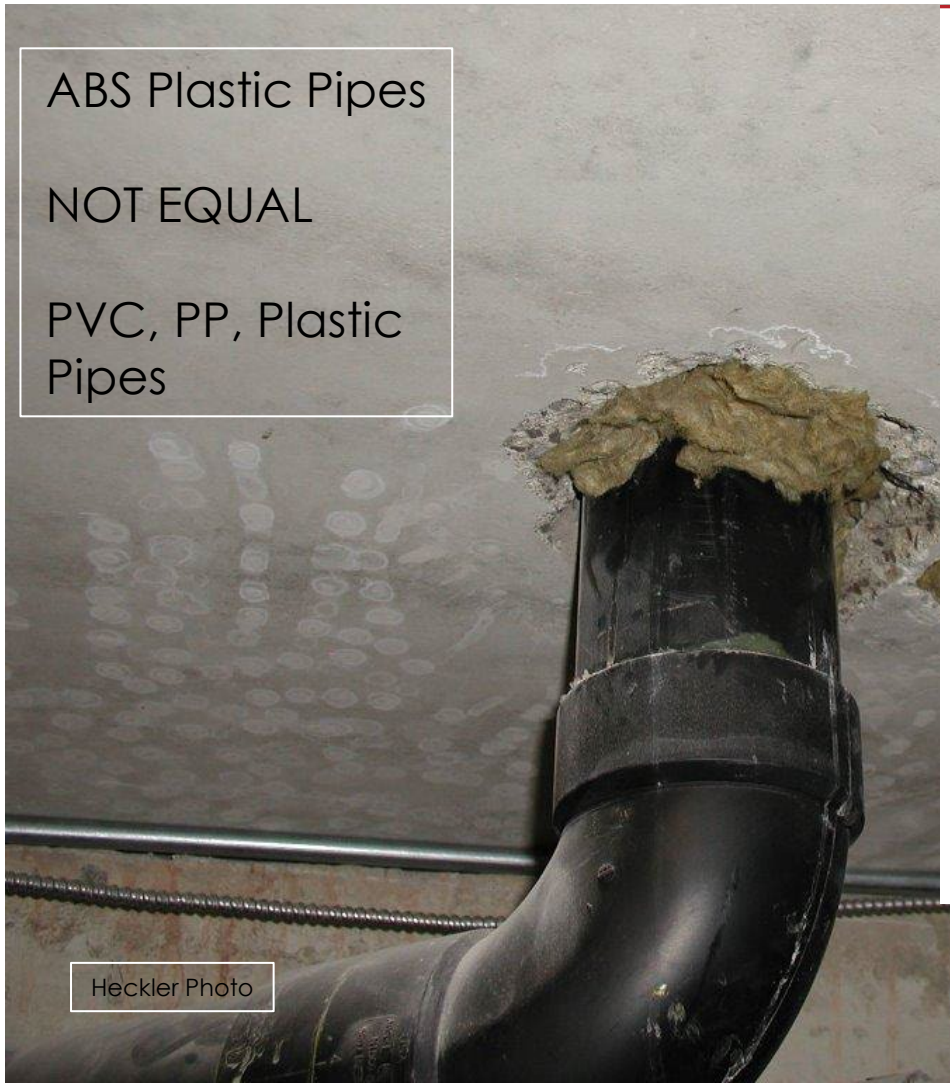
Collar on Metal Piple?

Plastic to Metal Junction?

Bags? Caulk??

Coupling?

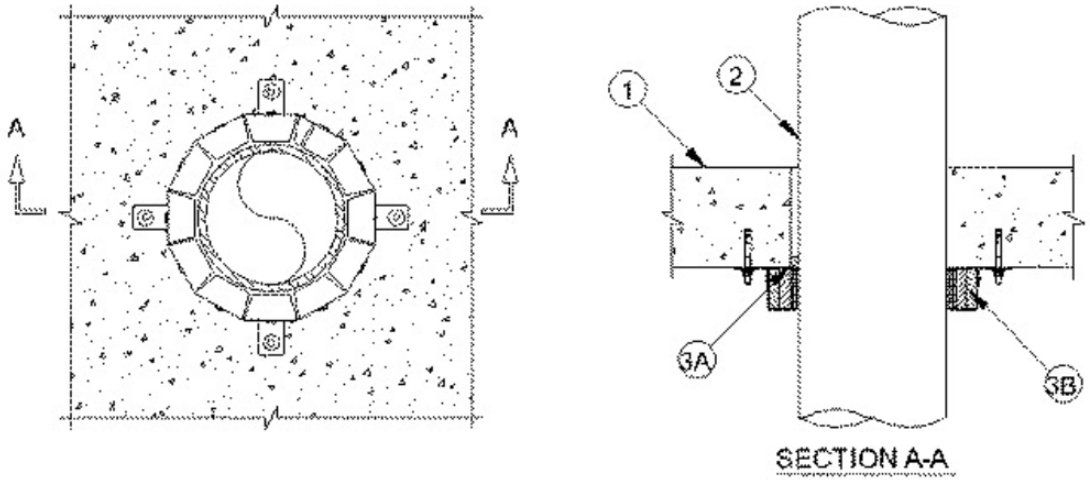
What's Wrong? COLLAR?



System No. C-AJ-2035

October 26, 2021

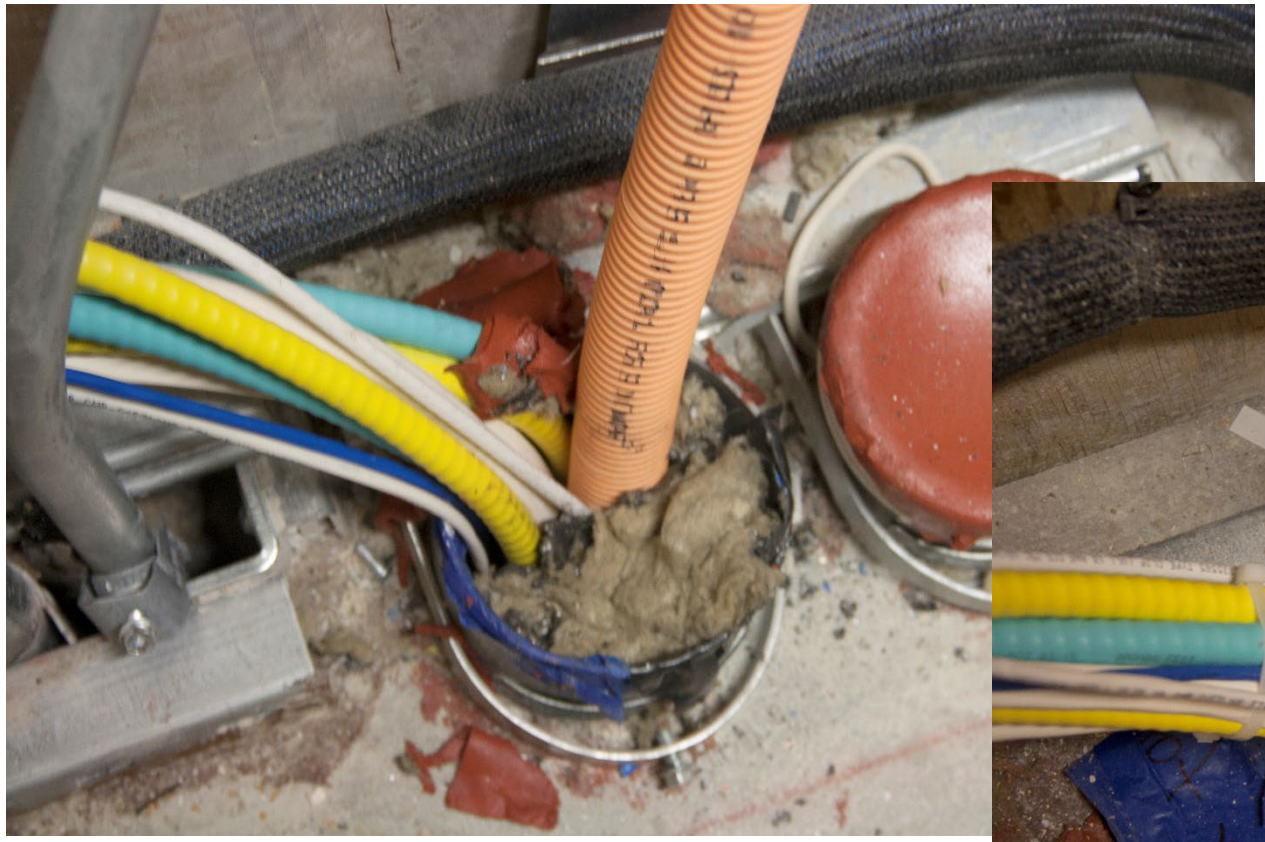
F Ratings — 2 and 3 Hr (See Items 1 and 2H)
FT Ratings — 1 and 2 Hr (See Item 1)
FH Ratings — 0 and 2 Hr (See Item 2H)
FTH Ratings — 0 and 2 Hr (See Item 2H)
L Rating at Ambient — Less Than 1 CFM/sq ft
L Rating at 400 F — Less Than 1 CFM/sq ft



System tested with a pressure differential of 50 Pa between the exposed and the unexposed surfaces with the higher pressure on the exposed side.

C-AJ-2035
https://iq.ulprospector.com/en/profile?e=178762

What's wrong with this picture?



Listings???
Not Likely…

Heckler Photo

What's wrong with this picture?

Couplings?

No Firestop?

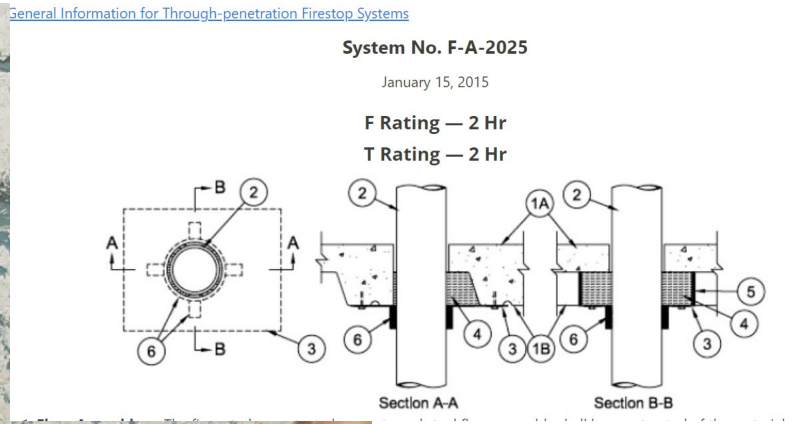
Sheet metal?

End Cap Sealants?

Spacing?

Mixing manufacturers?

Heckler Photo



Firestopping & Compartmentation
Which is Correct??

Sheet Metal?

Composite Sheet?

What's wrong with this picture? NOTHING

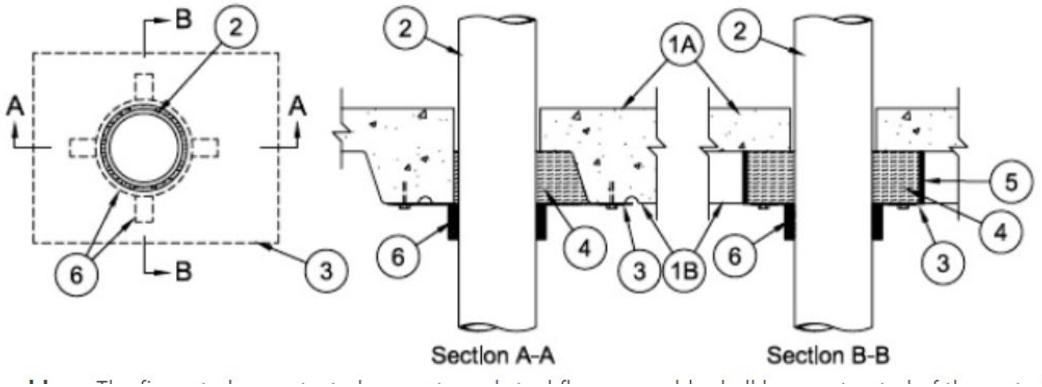
General Information for Through-penetration Firestop Systems

System No. F-A-2025

January 15, 2015

F Rating — 2 Hr

T Rating — 2 Hr



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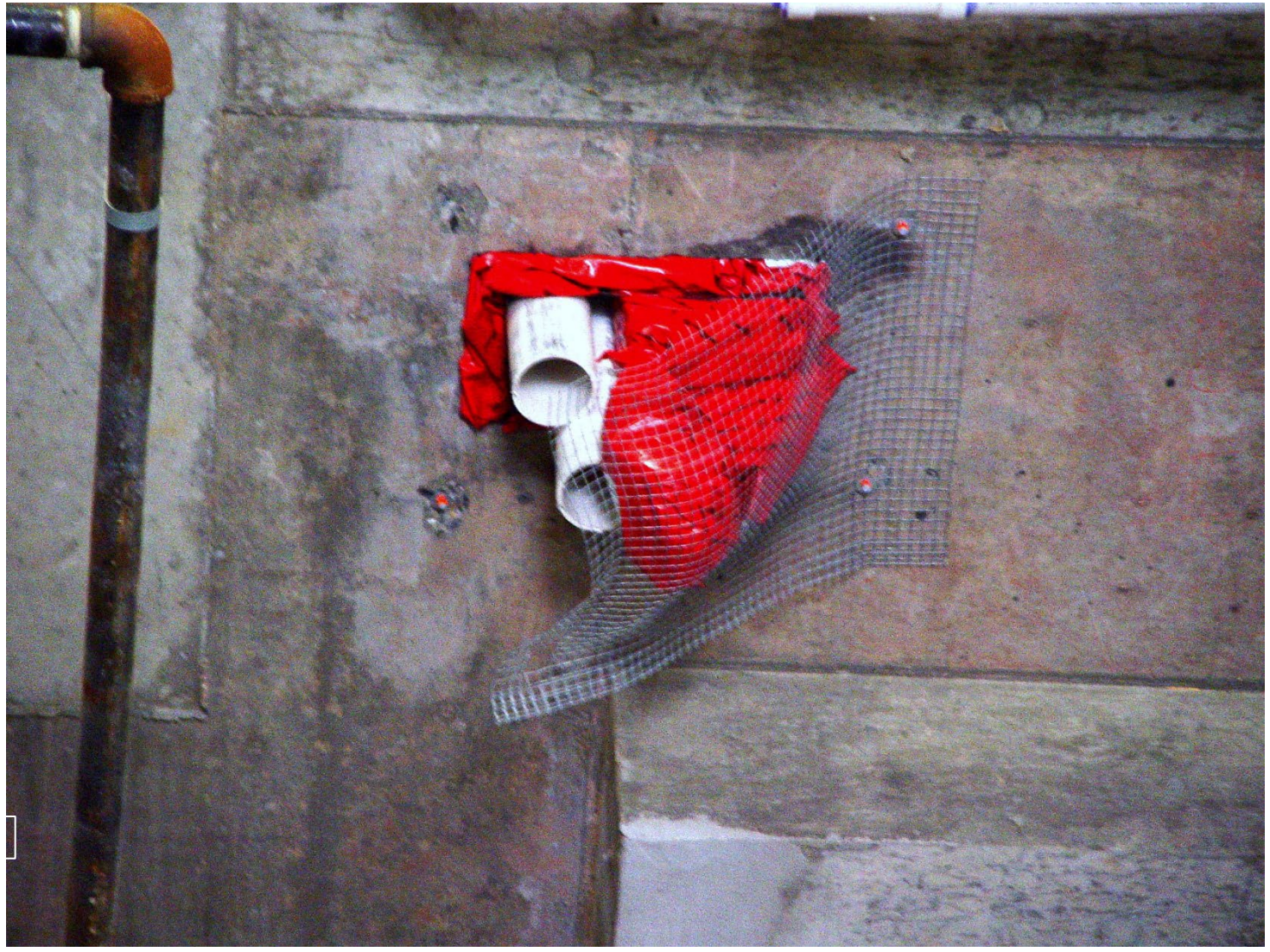
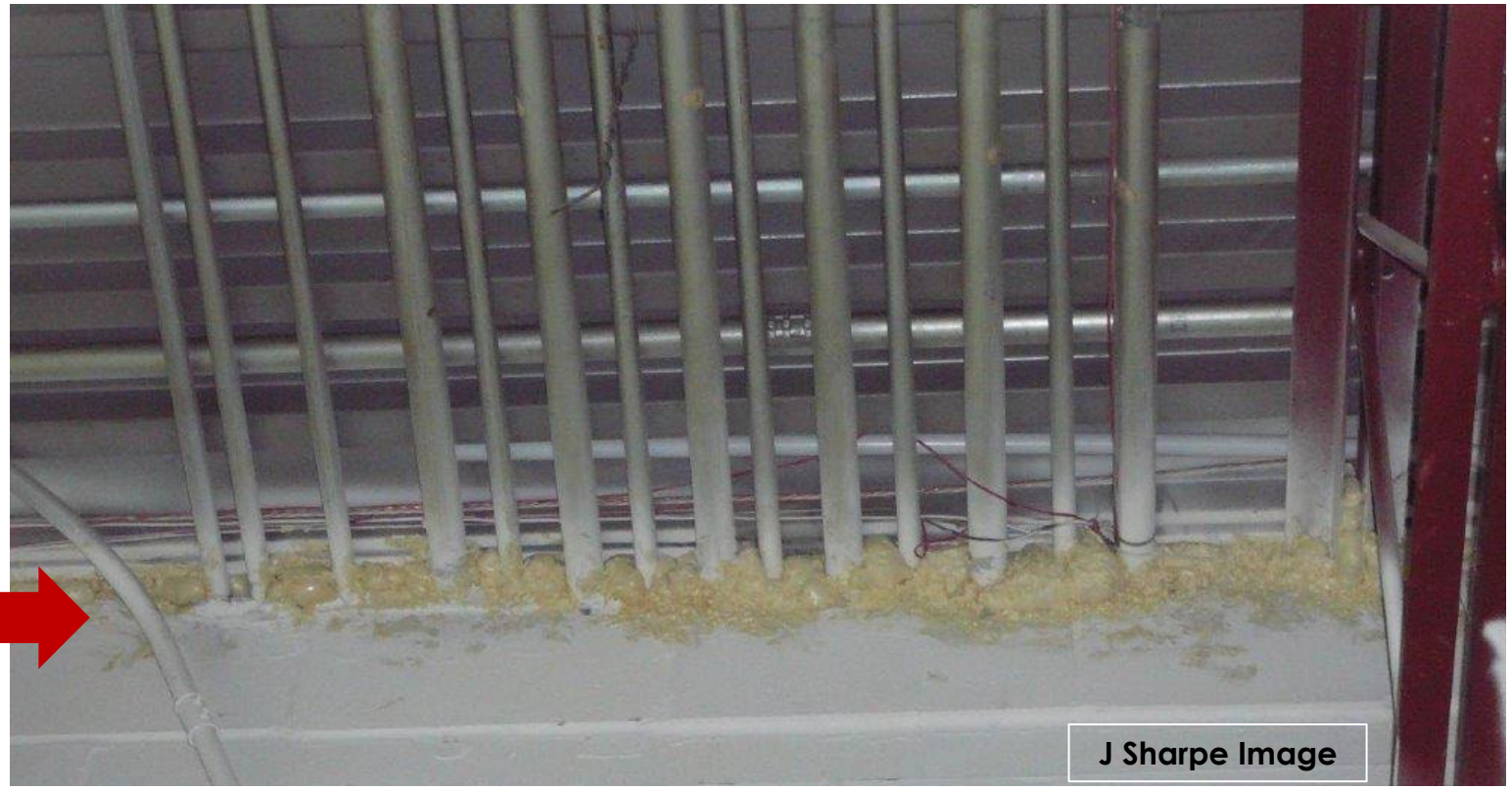


Heckler Photo

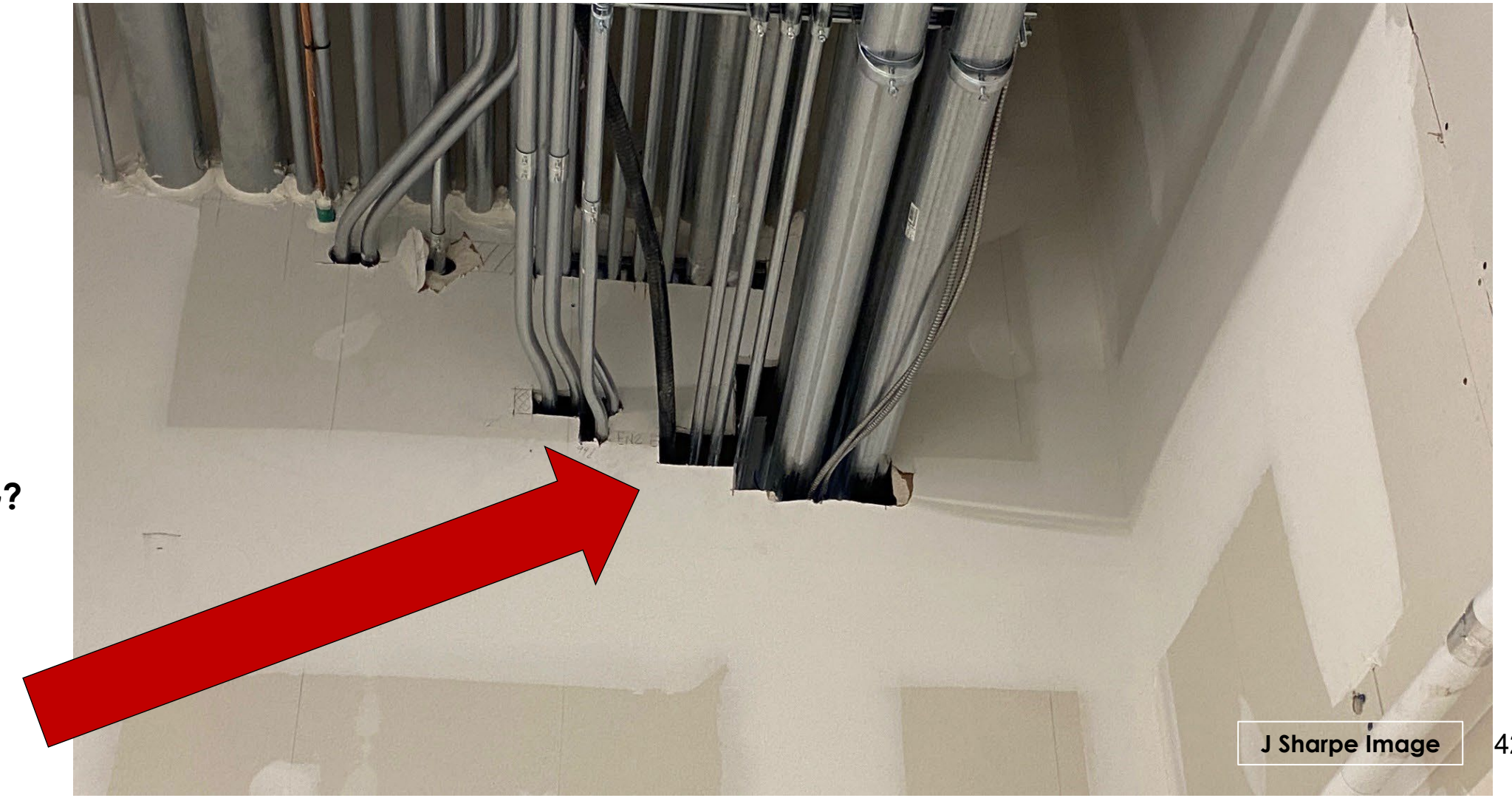
Firestopping & Compartmentation
Do we have a Problem??

FOAM STILL???



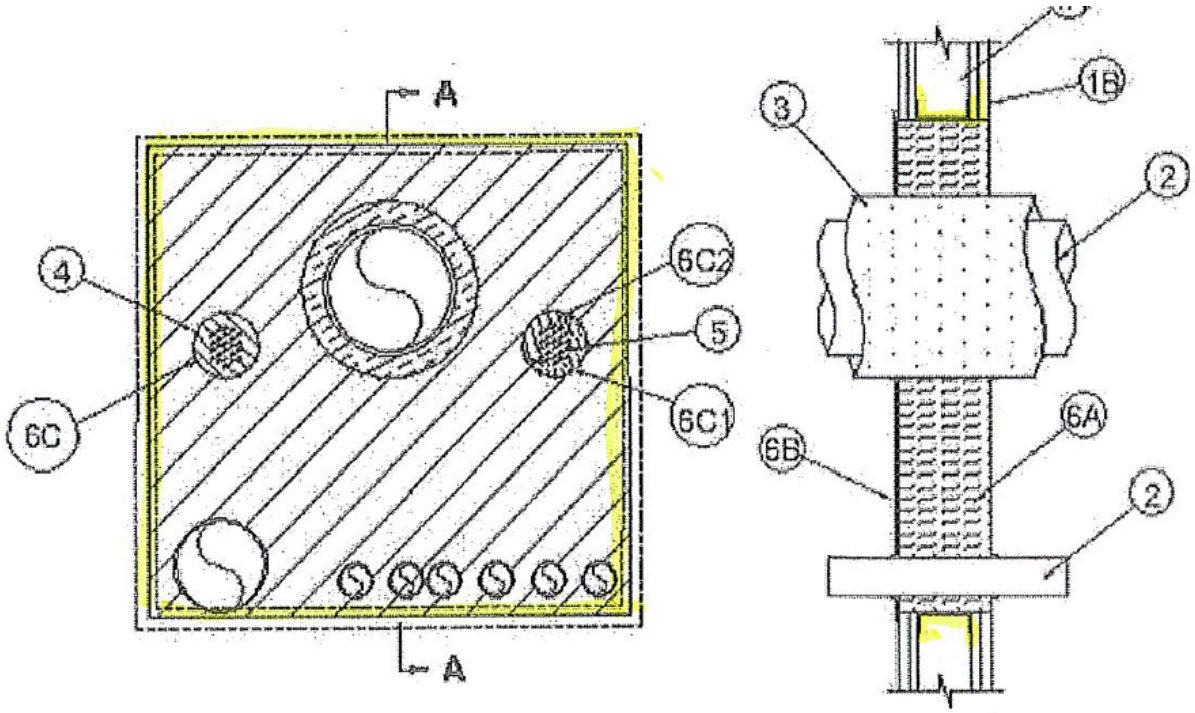
Firestopping & Compartmentation
Do we have a Problem??

FRAMING?



J Sharpe Image

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.

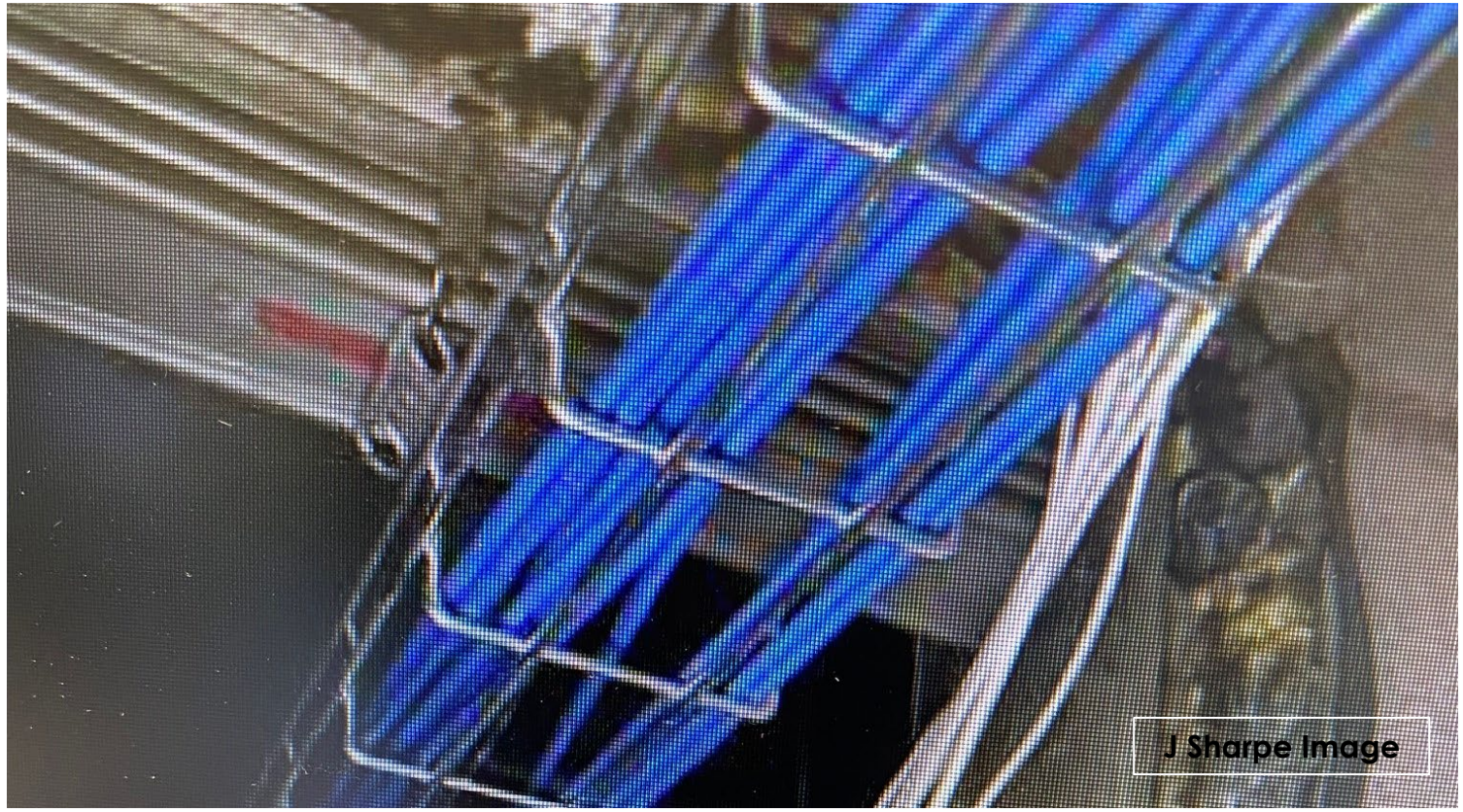
Firestopping & Compartmentation
Do we have a Problem??

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

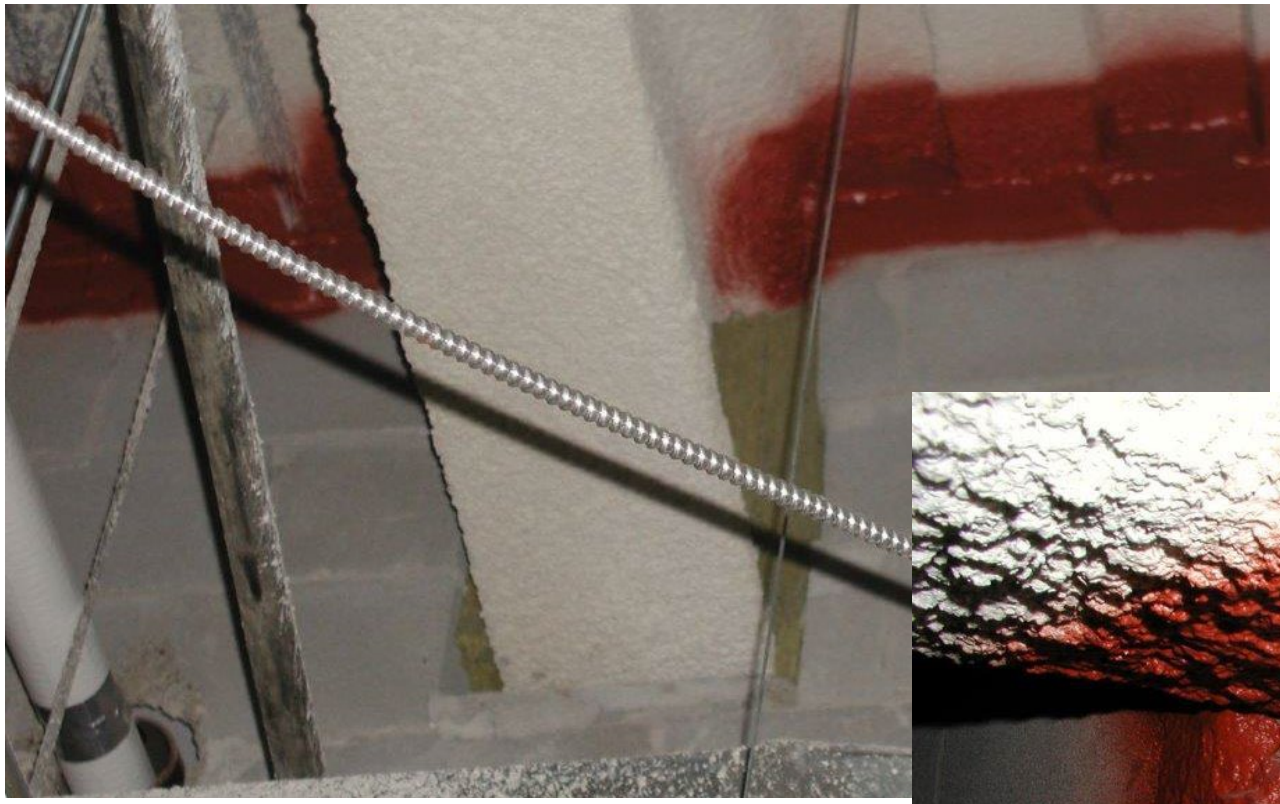
Firestopping & Compartmentation
Do we have a Problem??

Firestopping & Compartmentation
Do we have a Problem??

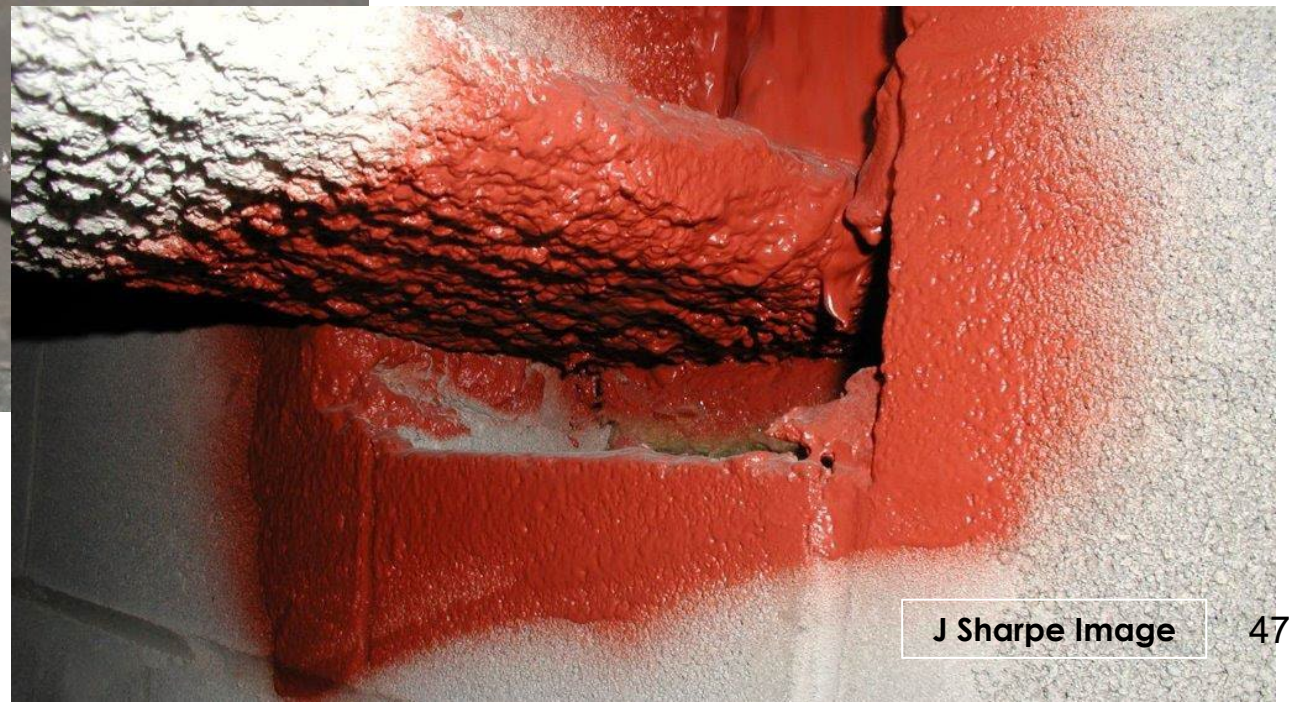
Cable Tray through a FIRE DAMPER?



Firestopping & Compartmentation
Do we have a Problem??



Beam Pocket SYSTEM NOT COMPLETED?



J Sharpe Image

Firestopping & Compartmentation
Do we have a Problem??

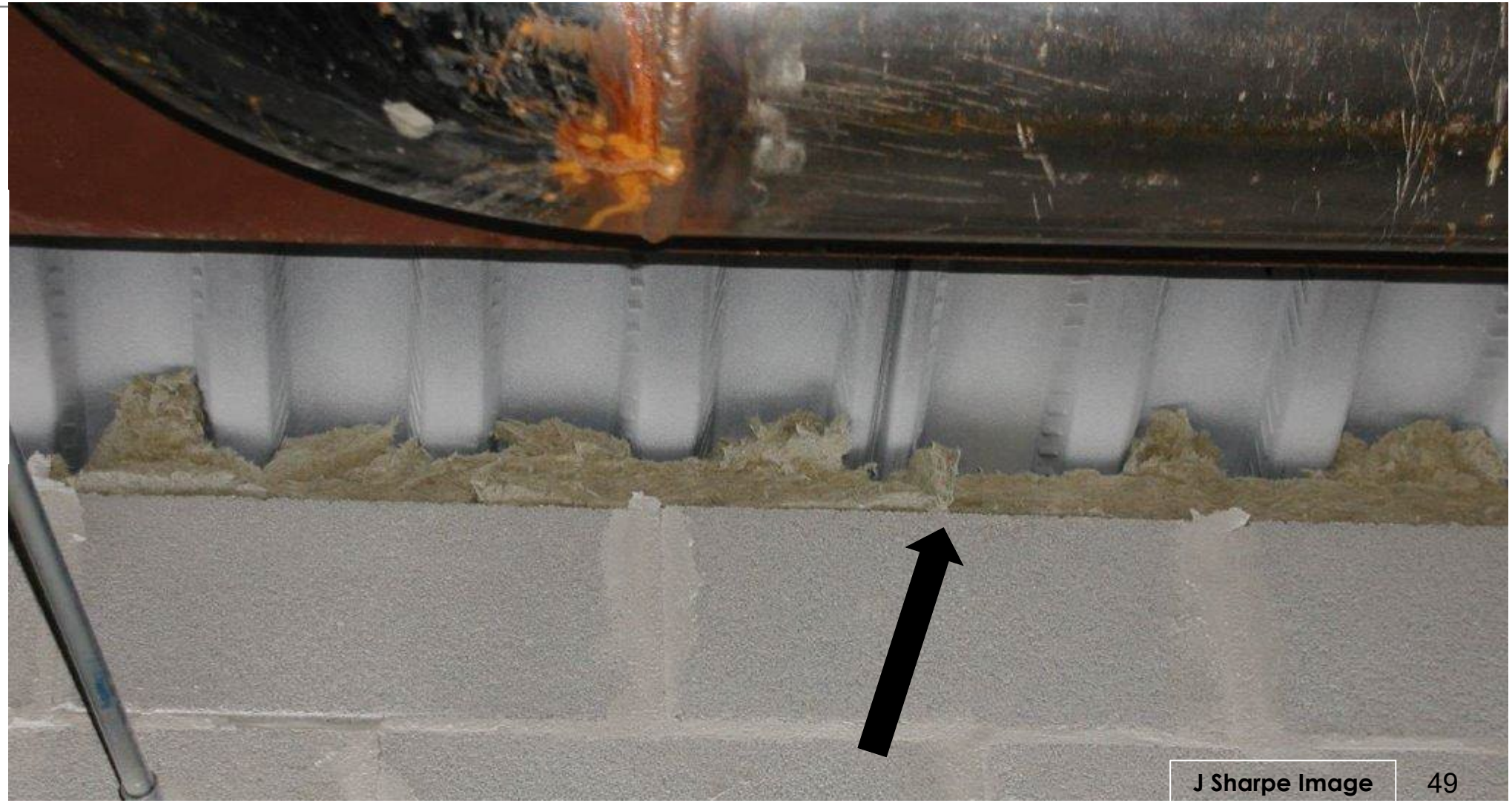
J Sharpe Image

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

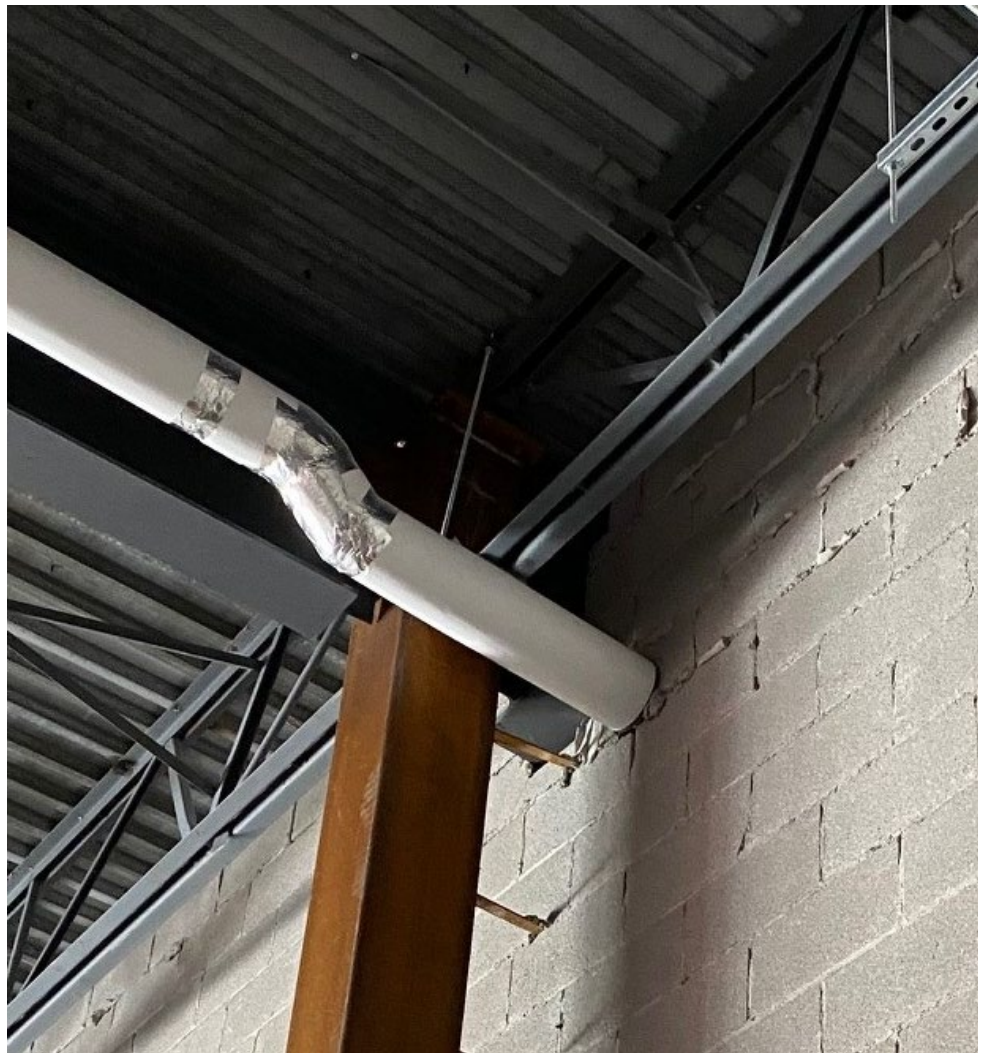
Firestopping & Compartmentation
Do we have a Problem??

Insulation
HIDING
Penetrating
Item

BIG Plastic
Pipes
NEED
COLLARS

Insulated
Metal
NEED
SEALANT
ONLY - MOST
CASES

BIG $$$$
Difference



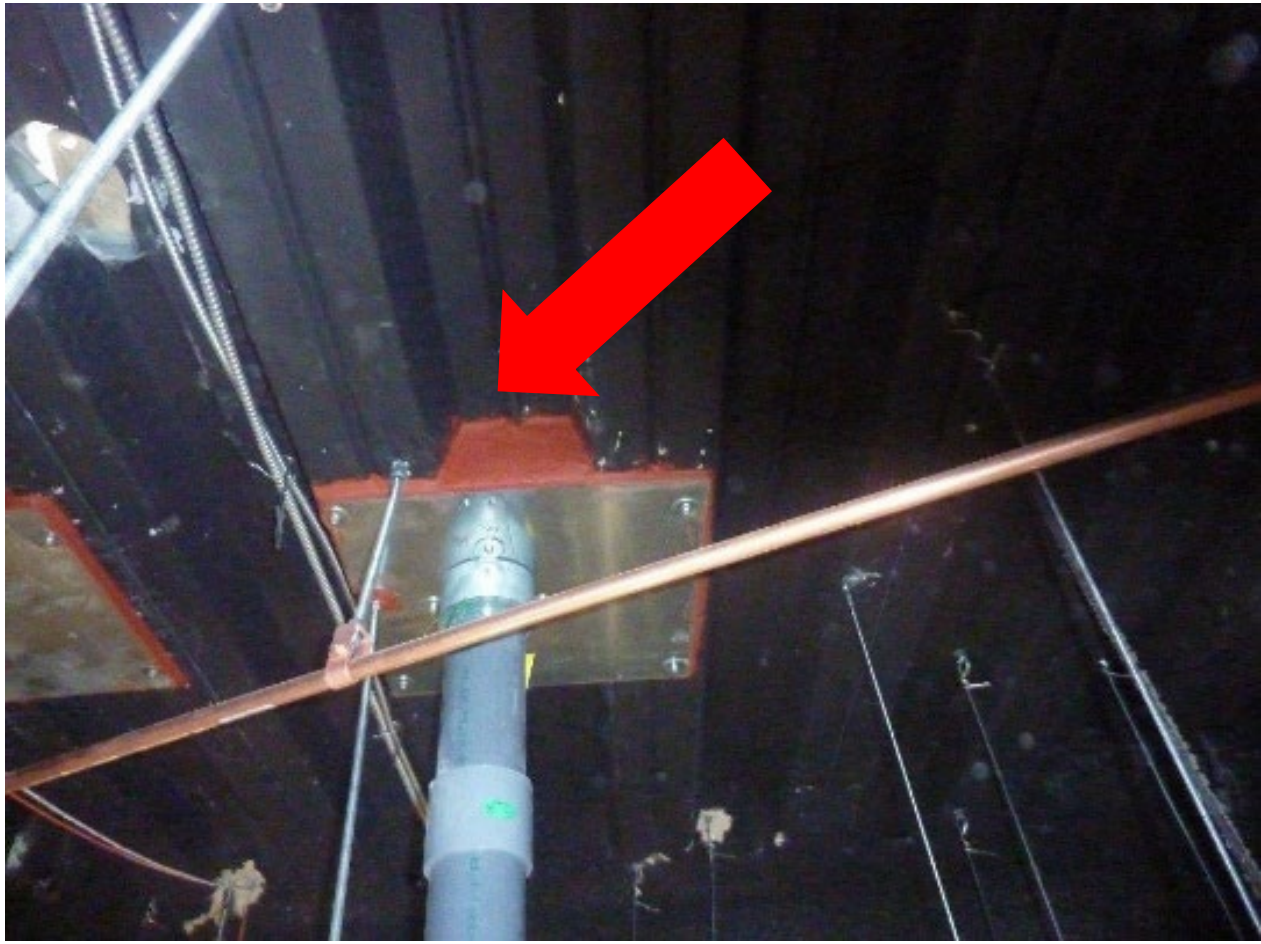
Firestopping & Compartmentation
Do we have a Problem??

Transitions

Metal Pipe
Plastic Pipe

UNSAFE

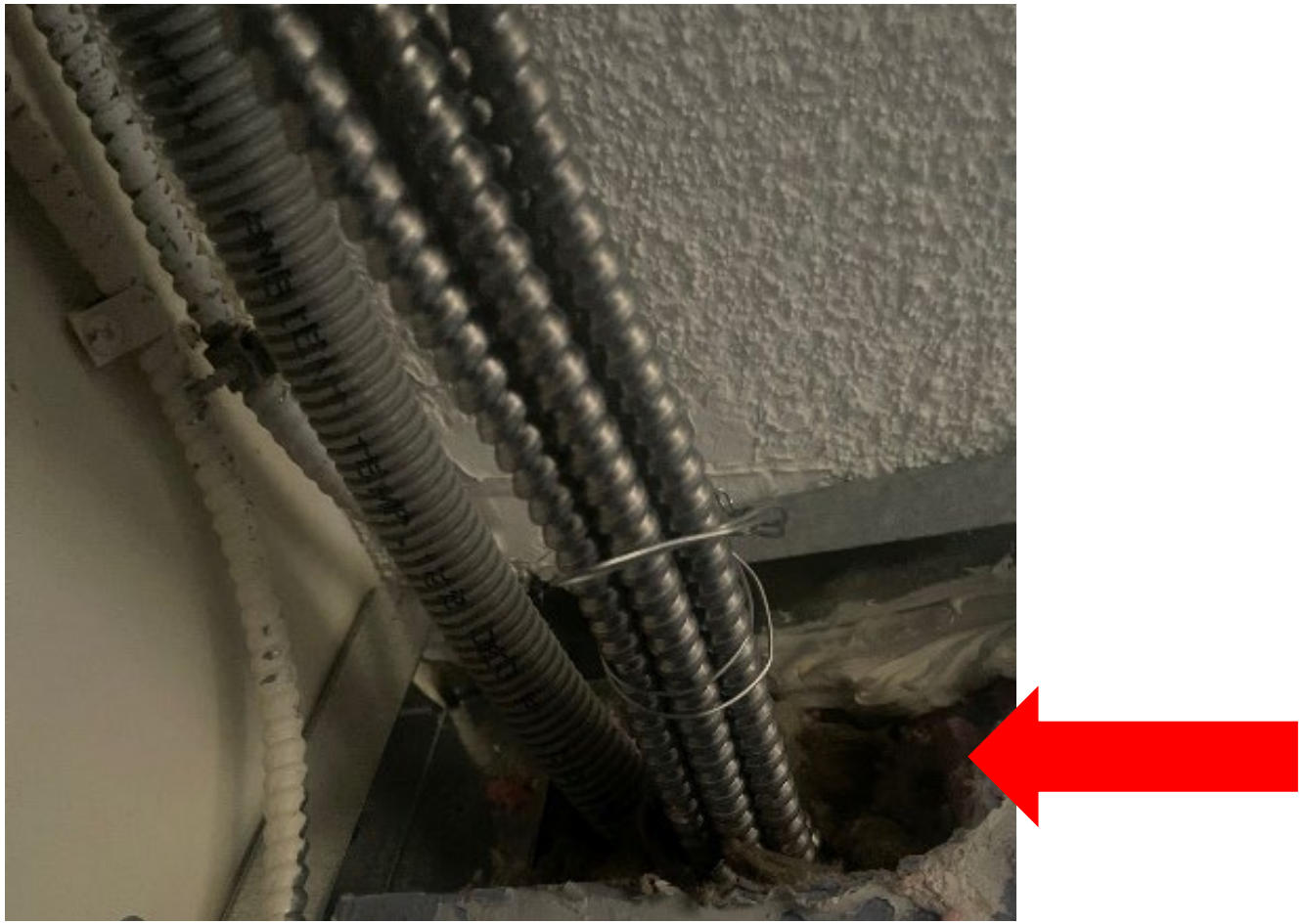
Firestopping & Compartmentation
Do we have a Problem??



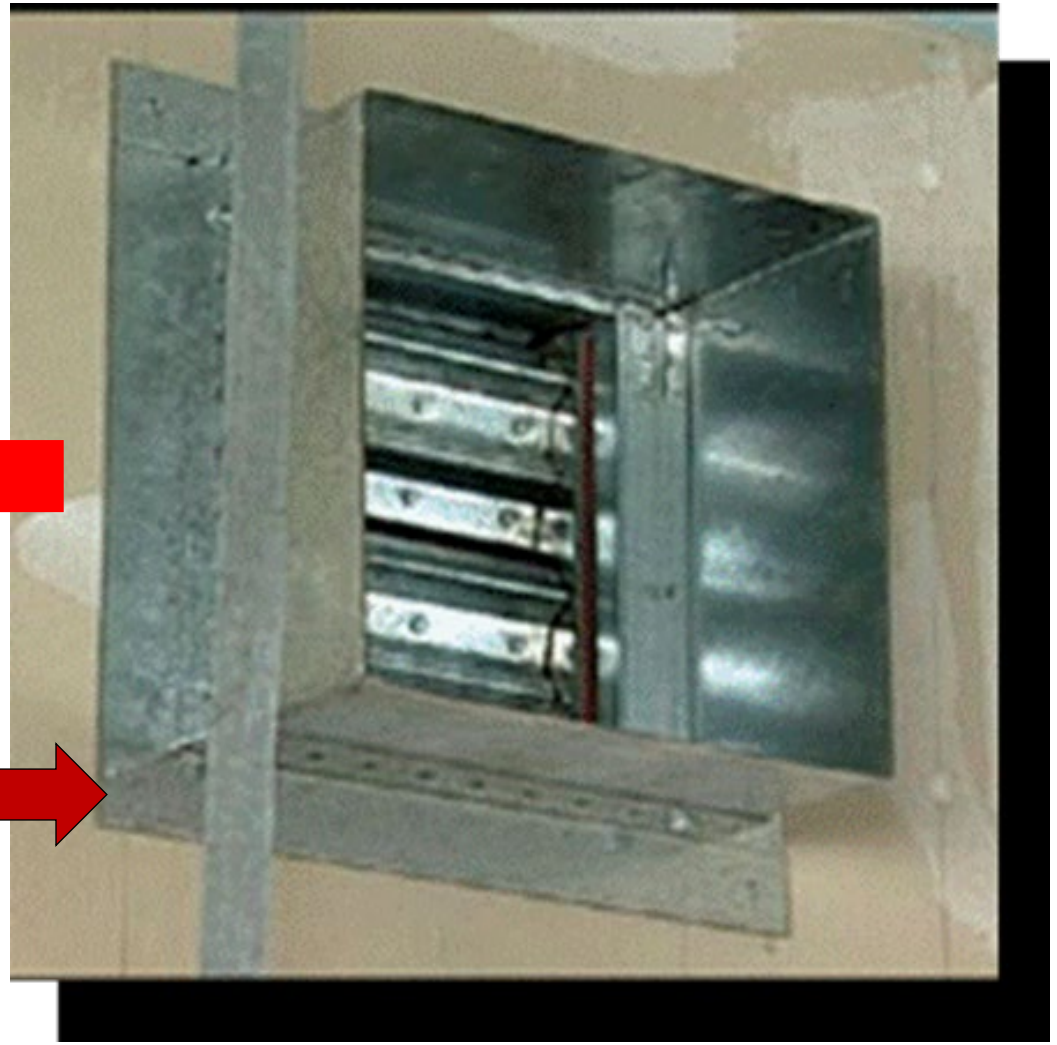
Sheet Metal? Composite Sheet?

Firestopping & Compartmentation
Do we have a Problem??

Nothing…



Firestopping & Compartmentation
Do we have a Problem??



Fire Damper Annular Space?

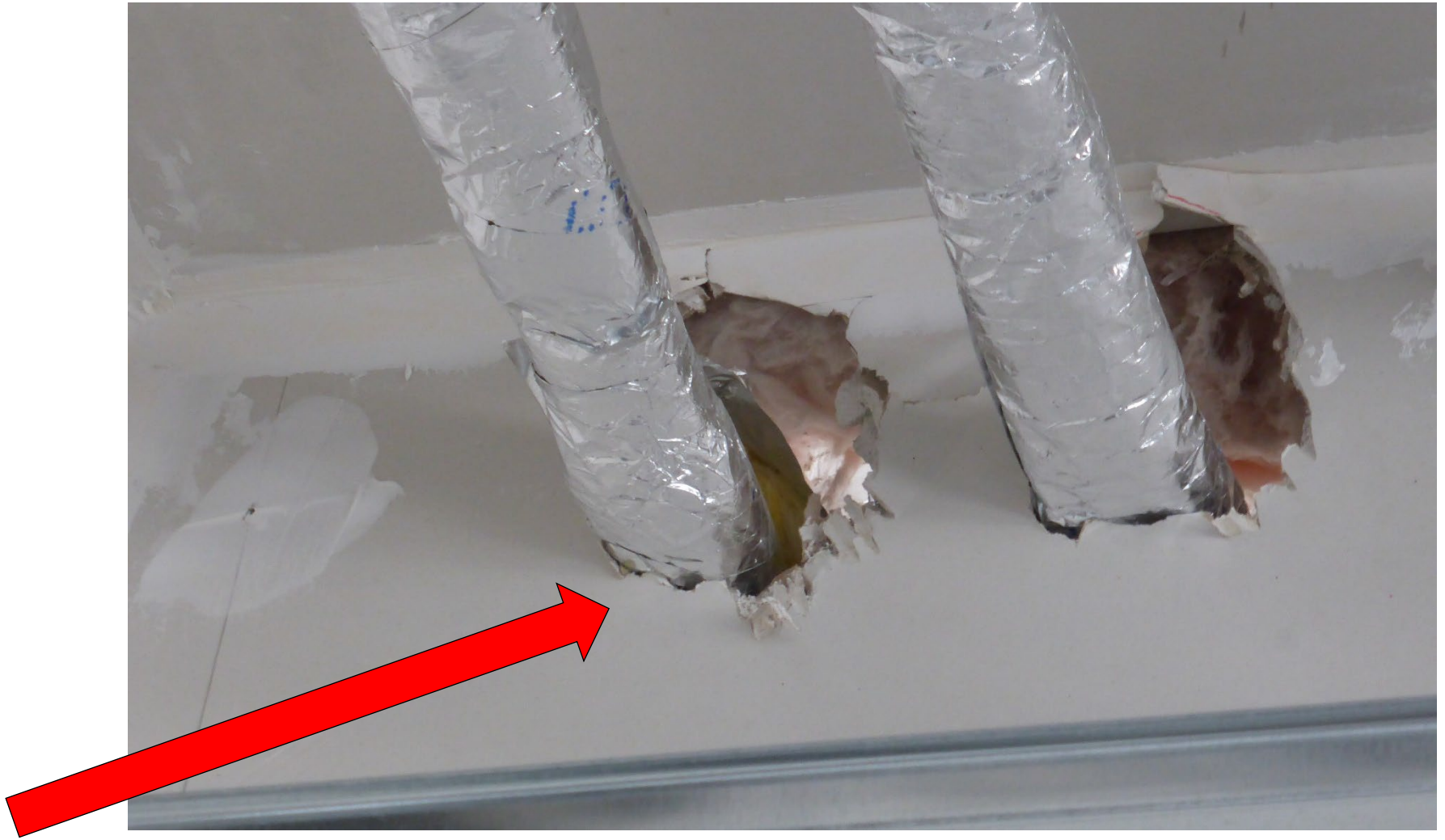
Firestopping & Compartmentation
Do we have a Problem??

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??

Lots of Gypsum Wallboard Compound & NO FIRESTOP SYSTEM

Firestopping & Compartmentation
Do we have a Problem??

Surface Patches?

Red STUFF?

FCIA Recommended Professional Practice Identification Systems

“Labelling”

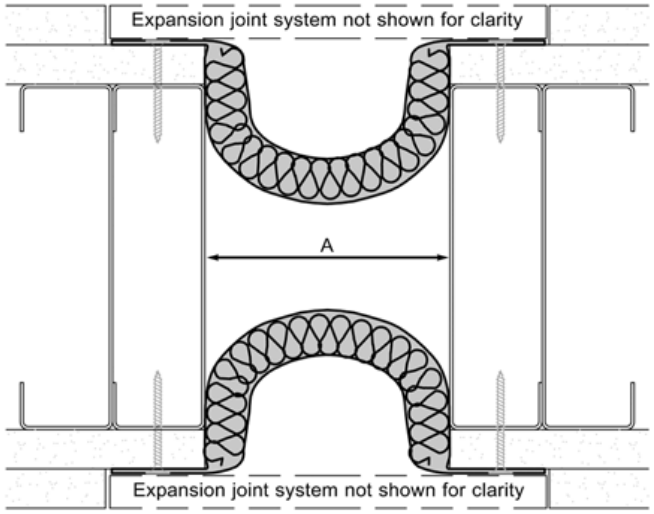
-On-

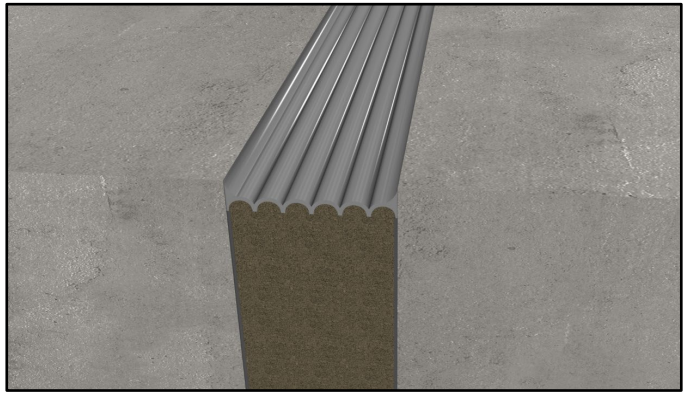
Wall/Horizontal Assy. Penetrating Item Hanging

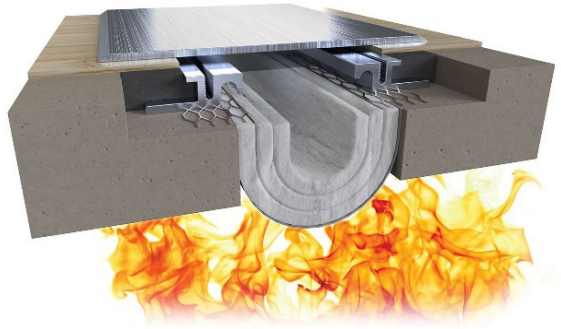

WARNING
FIRESTOP MATERIAL
DO NOT TAMPER OR REMOVE
To repair or retrofit contact:
PRO-FIRESTOP INC. 416-290-0903

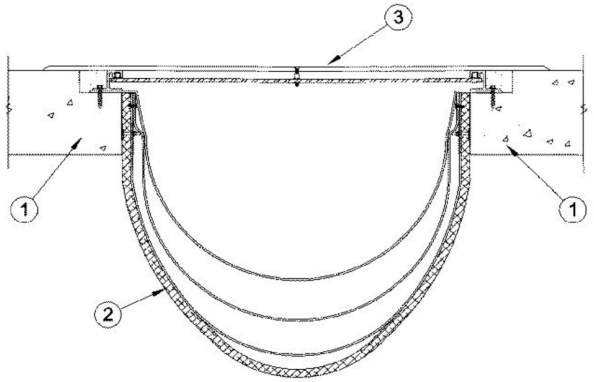

WARNING

Firestop & Inspection - Fire Rated Expansion Joints = FF-D-4001, -1201, -1204…more









Balco, Construction Specialties, Inpro, MM Systems, UL Solutions

Firestop - FF-D-4001

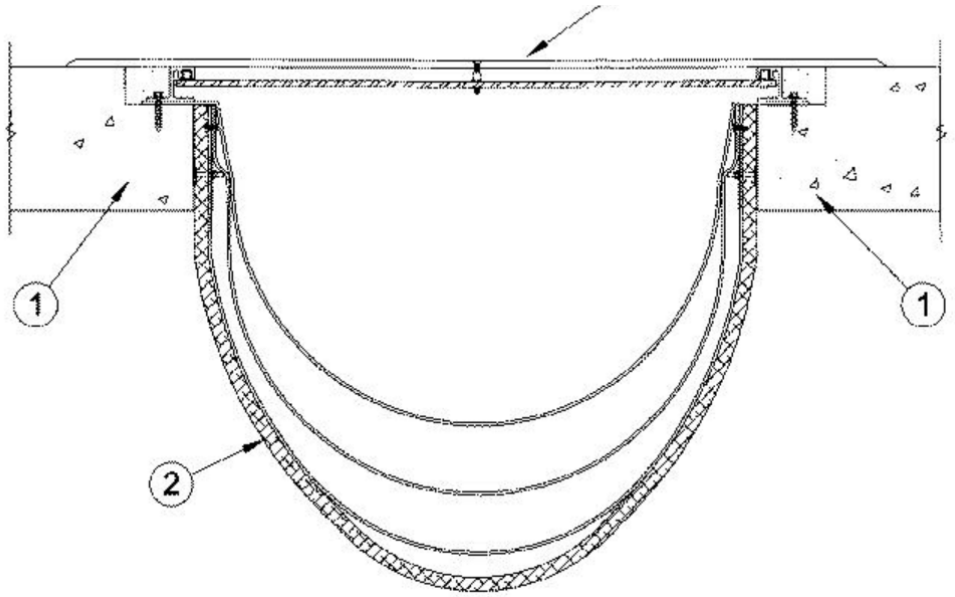
System No. FF-D-4001

September 20, 2000

Assembly Rating — 2 Hr

Nominal Joint Width — 25 to 36 in.

Class II and III Movement Capabilities — 50% Compression or Extension

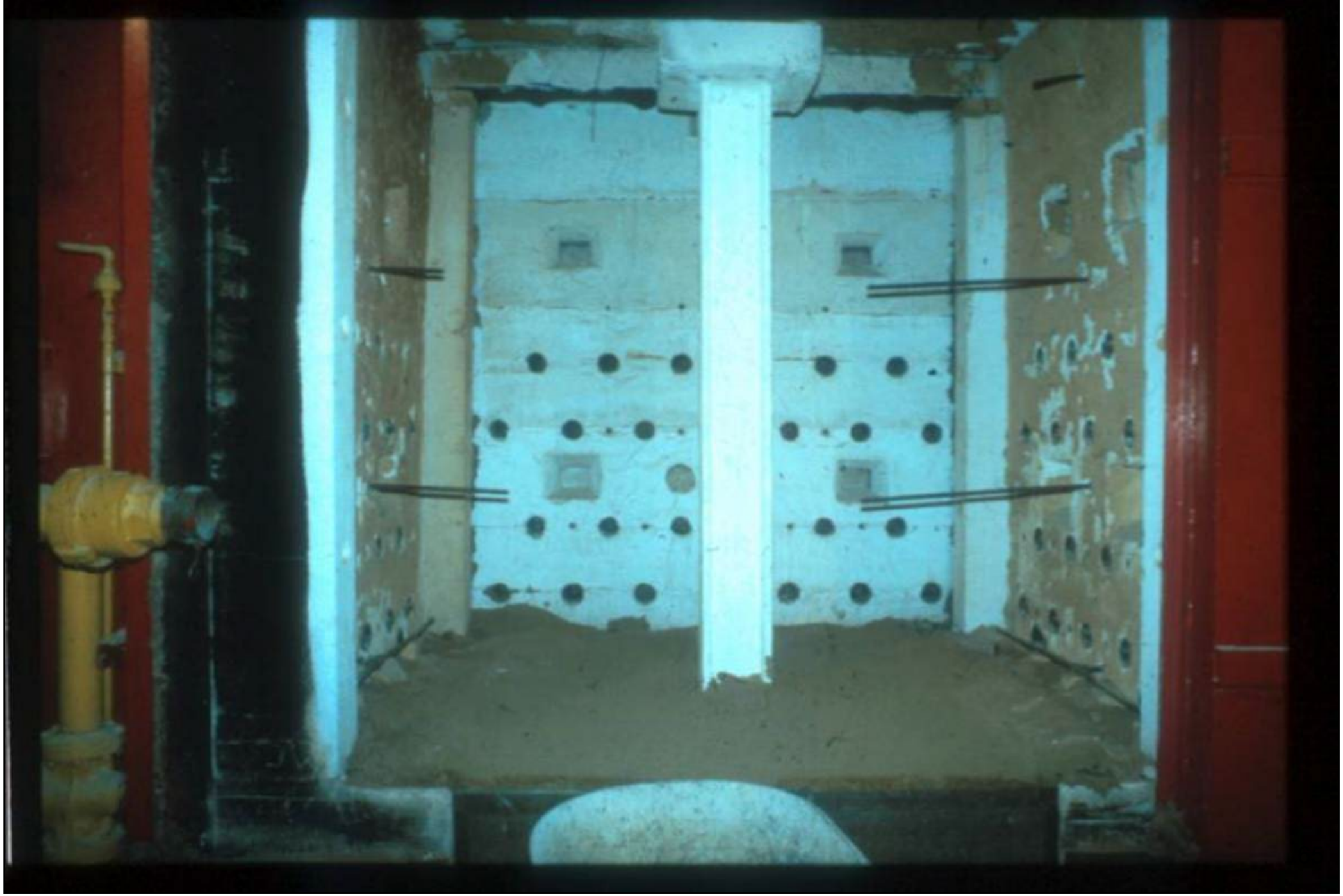


1. **Floor Assembly —** Reinforced lightweight or normal weight (100-150 pcf) structural concrete having a min thickness of 4-1/2 in. at stepped-edges receiving joint cover (Item 3).

2. **Mechanical Joint Assembly* — Nom width of joint is 25 to 36 in.** Flexible multilayer mat material with galv steel mounting angles on longitudinal edges. The mechanical joint assembly shall be installed in accordance with the installation instructions accompanying the units.

CONSTRUCTION SPECIALTIES INC — FB97-25F-++ through FB97-36F-++ (++=max width of joint opening)

3. **Joint Cover —** Min 0.030 in. thick joint cover formed of aluminum, bronze, stainless steel or galv steel. Joint covers anchored to floor slabs on each side of joint opening, continuous over entire length of joint, in accordance with the manufacturer's installation instructions.
As an alternate, where the linear joint opening is enclosed within a chase wall and is non load bearing, a cover consisting of a creased sheet of min 2 mil stainless steel foil secured with 1 in. wide continuous galv steel washer strips along each side of the joint opening may be used.



UL Image

Conditions of Acceptance – Columns

- **1000ºF / 1200ºF**

OR

Support load if tested load bearing

UL Image

UL Image

UL Image

UL Image

UL Image

What is a Firestop System?

- Firestop Sealant?
- Firestop Products??
- Fire-Resistance-Rated Floors, Walls?
- Manufacturer’s Product Data Sheets?
- Manufacturers Sell Sheets?
- Safety Data Sheets?
- UL Listings?
- ***Wouldn’t it be cool if…..***

LISTINGS + Manufacturer Instructions
INSTALLED & INSPECTED = SYSTEMS

- **Products Become Systems – Test Standards**
  - **Fire & Smoke Barriers – Fire Separations - Structural**
    - ASTM E119, UL 263, CAN/ULC-S101
  - **Firestopping –**
    - UL 1479, ASTM E814, FM 4990, 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**

Firestopping for Continuity
Products become SYSTEMS Based on Testing

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

3M Image

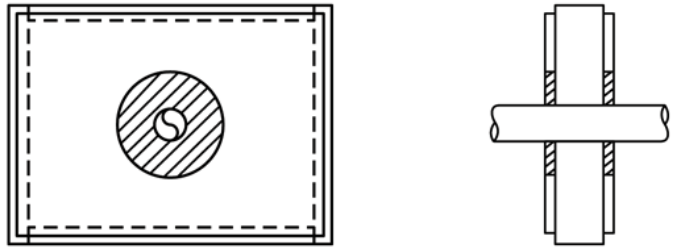
Hose Stream Test

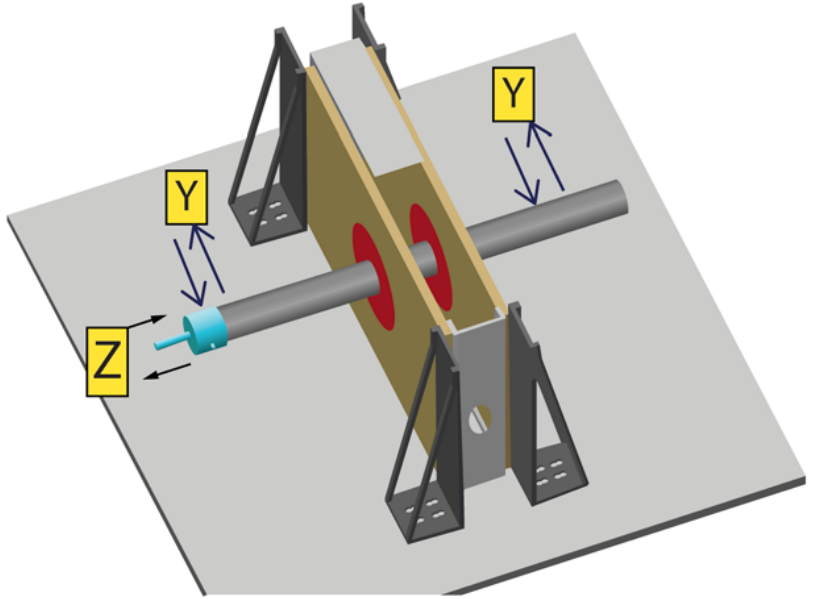
UL Photo

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***….

M Rating (Optional)





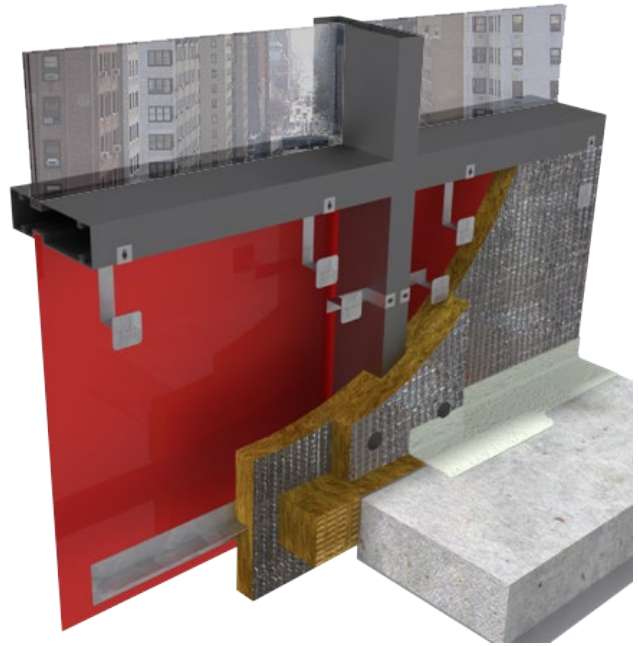
ASTM Image

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



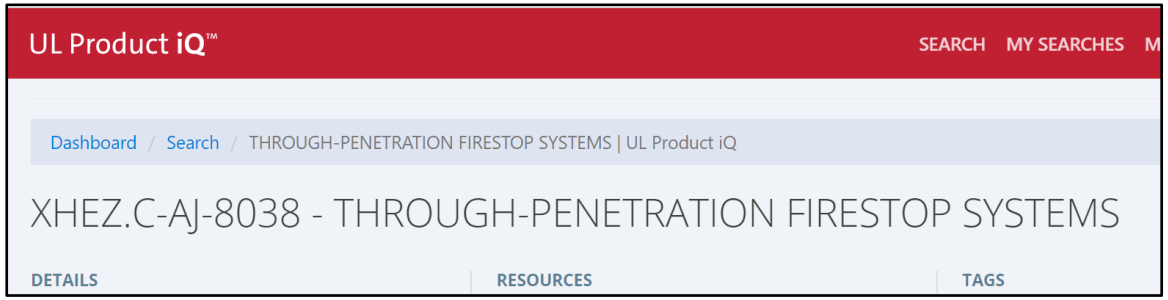
OCF/Thermafiber Graphics

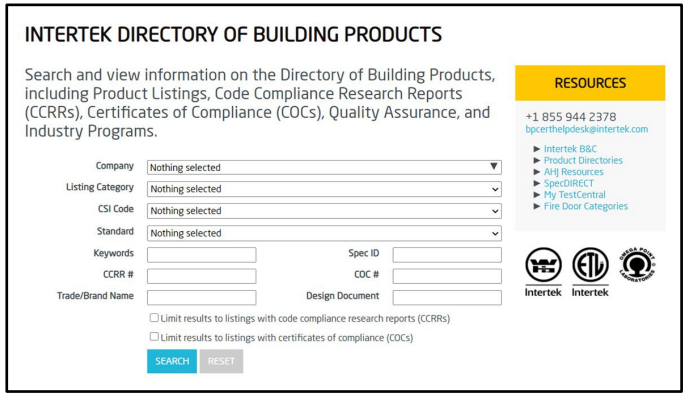
Barrier Continuity
Products become SYSTEMS

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

ApprovalGuide

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 Image

C. Zussman – Pepper Image

EJ/EFRRA – Consider language….

- ***System Performance*** - *Engineering Judgements, Equivalent Fire-Resistance-Rated Assemblies*

- Where there is no specific third party tested and listed, classified firestop system available for a particular firestop configuration, the firestopping contractor shall obtain from the firestop manufacturer, an Engineering Judgment (EJ) or Equivalent Fire Resistance Rated Assembly (EFRRA) for submittal.

- All EJ/EFRRA's shall state that the manufacturer attests the EJ will pass applicable fire tests, when subjected to the fire test.

EJ/EFRRA's….

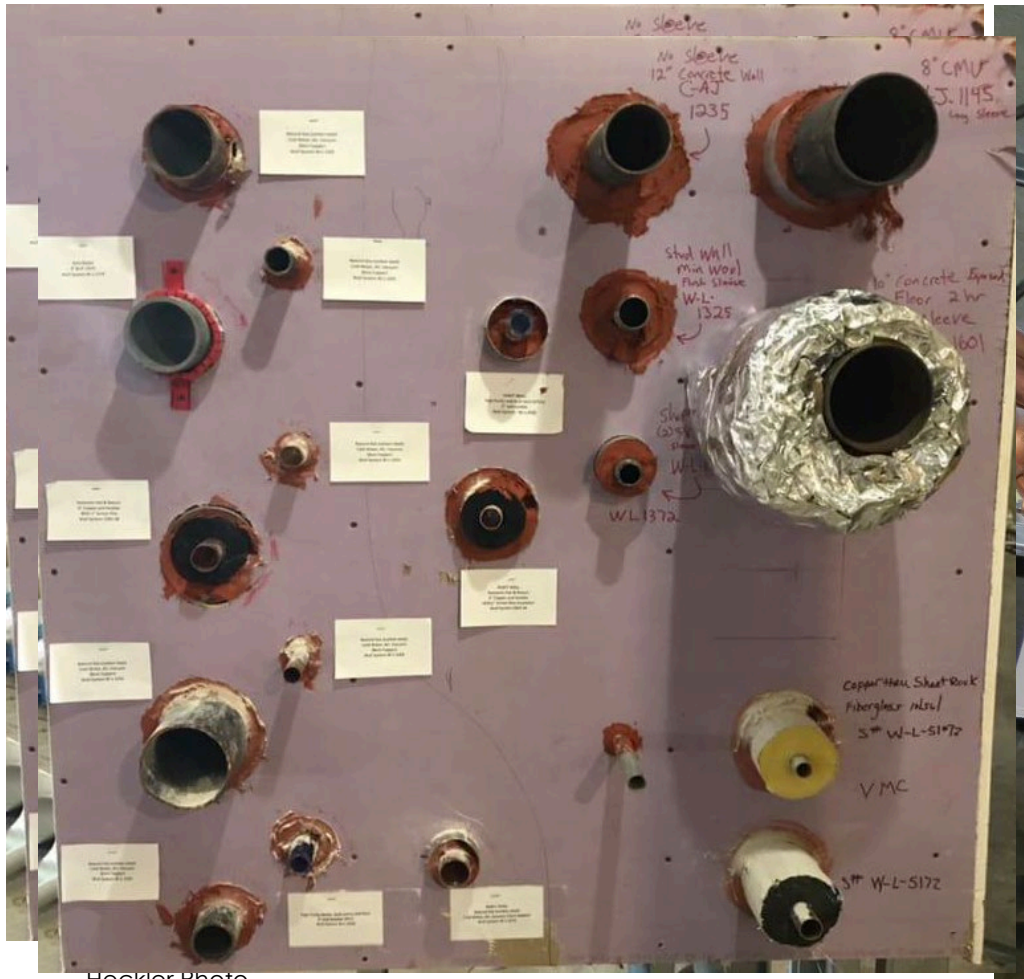
- **Single Source Responsibility**: *Obtain firestop systems for each kind of penetration, fire-resistive joint system, perimeter fire containment system and construction condition indicated from a single primary firestop system manufacturer,* ***to the greatest extent possible.***

- **Tested and listed, classified firestop systems are to be used**. If another manufacturer has a tested and listed system, then that system shall be used prior to an Engineering Judgment (EJ) or Equivalent Fire Resistance Rated Assembly (EFRRA).

- Materials of different manufacture than allowed by the tested and listed **system shall not be intermixed** in the same firestop system, void, breach, gap, intersection or opening.

- **Field Constructed Mockup – DON'T FORGET THIS!!**

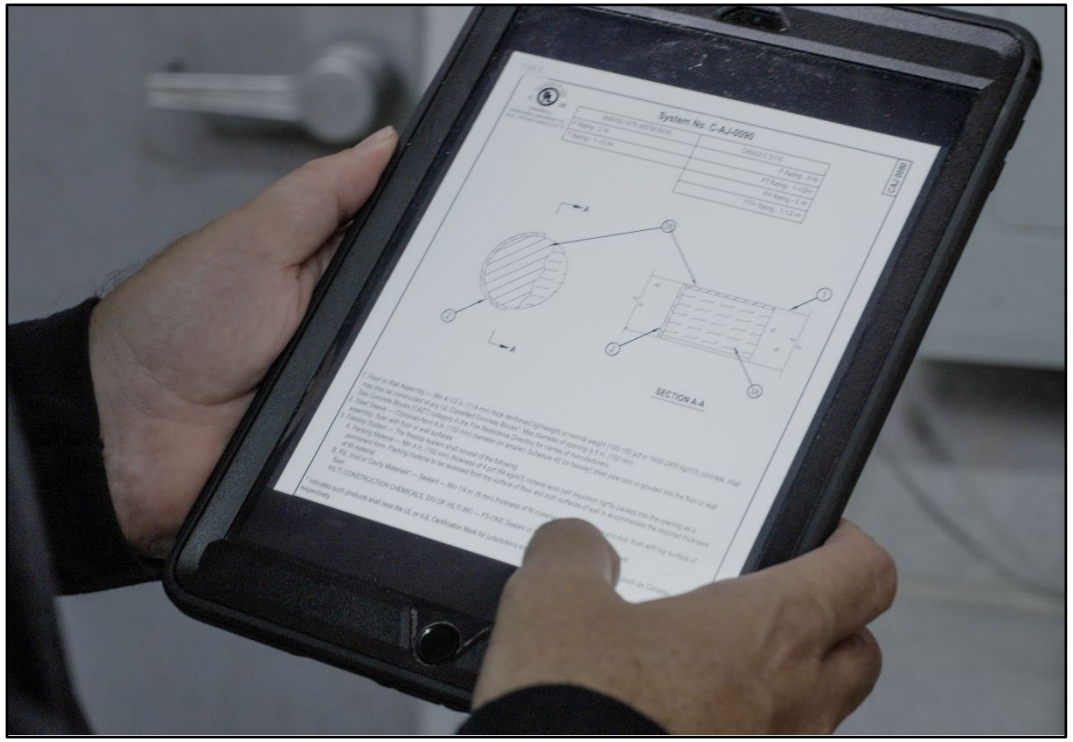
Mockup Review BEFORE Construction….



Heckler Photo

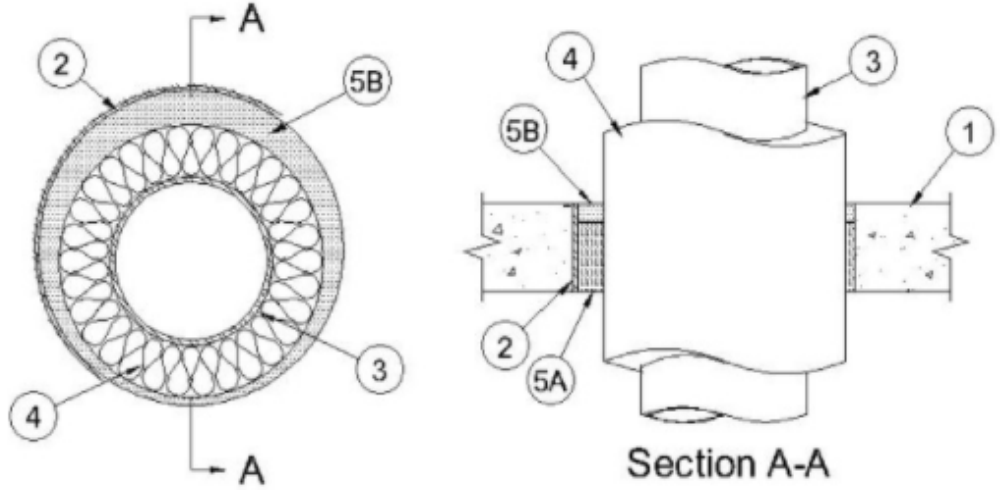
C. Zussman Pepper Photo

Systems & Materials …
Structural & Effective Compartmentation



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.

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

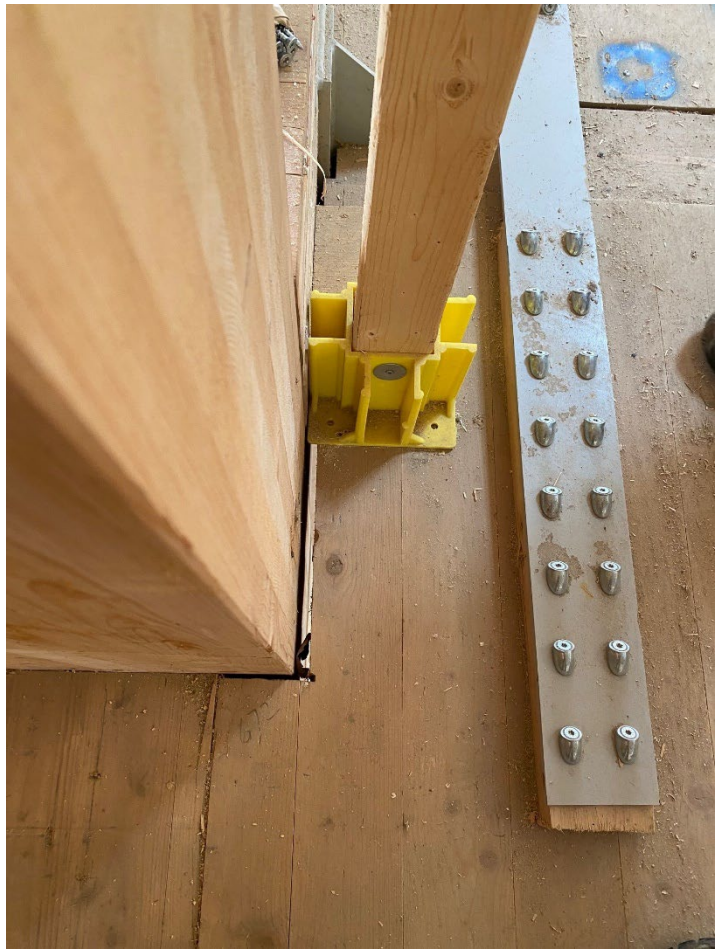

FCIA

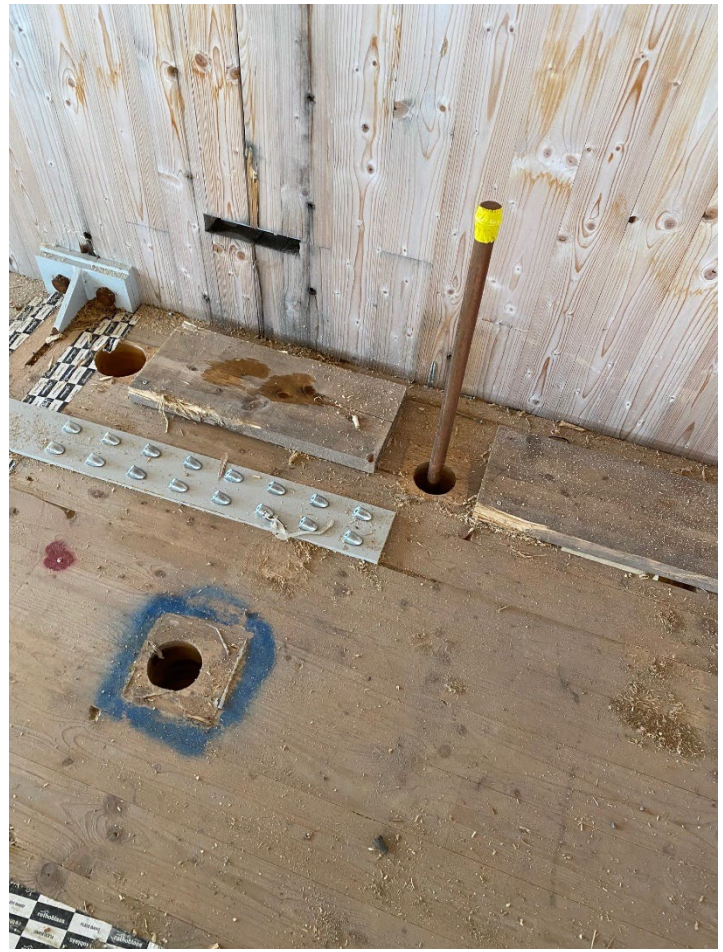

FCIA


FCIA
FCIA
Firestop Contractors International Association

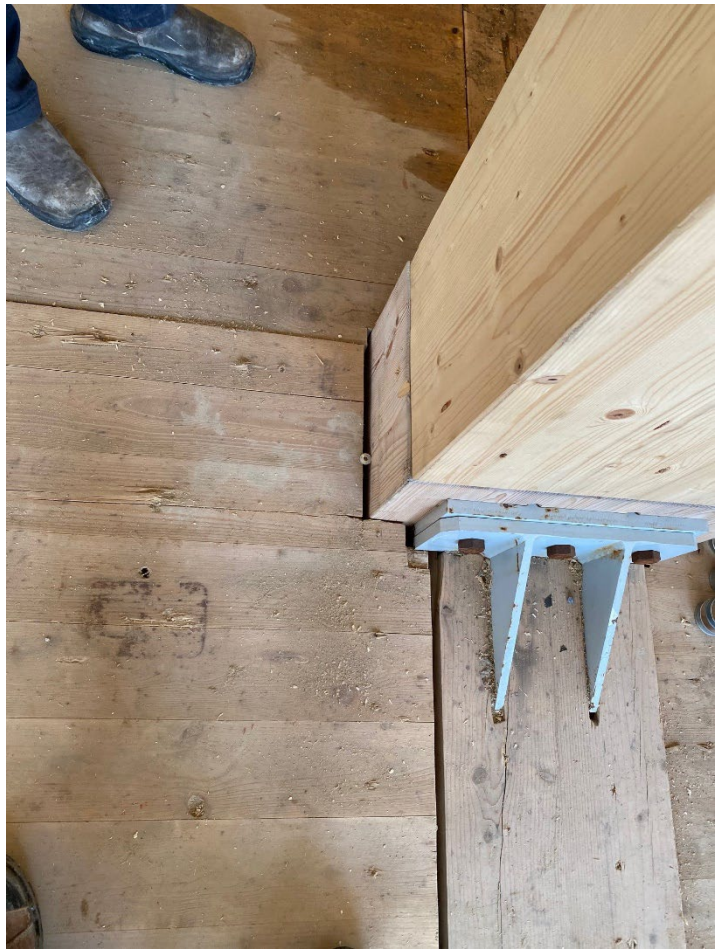
New Developments….

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





New Developments….



Joints and Voids – Head-of-Wall – Mineral Wool & Spray, Sealants, Top Track Strips...

Firestop Solutions Image

Joints and Voids
Head-of-Wall – Mineral Wool and Spray

System No. HW-D-0300

October 16, 2015

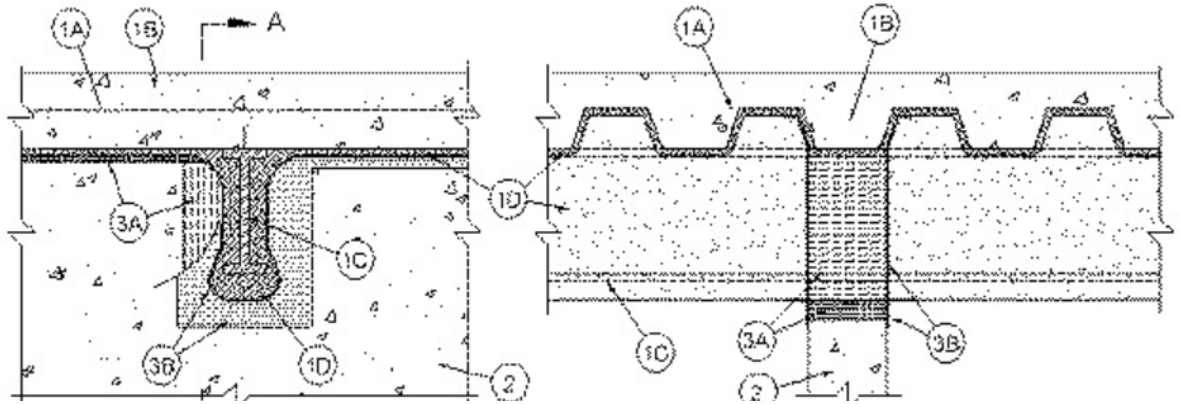
Assembly Ratings — 2 and 3 Hr (See Item 3A)

Nominal Joint Width — 1 and 2 In. (See Item 3)

Class II Movement Capabilities — 25% Compression or Extension

L Rating At Ambient - Less Than 1 CFM/Lin Ft

L Rating At 400 F - Less Than 1 CFM/Lin Ft



UL Solutions Image / Text HW-D0300 - Rectorseal

1A. **Roof Assembly (Not Shown) —** As an alternate to the floor assembly, a fire-rated fluted steel deck roof assembly may be used. The roof assembly shall be constructed of the materials and in the manner described in the individual P700 and P900 Series Roof-Ceiling Design in the UL Fire Resistance Directory. The hourly rating of the roof assembly shall be equal to or greater than the hourly rating of the wall assembly. The roof assembly shall include the following construction details:

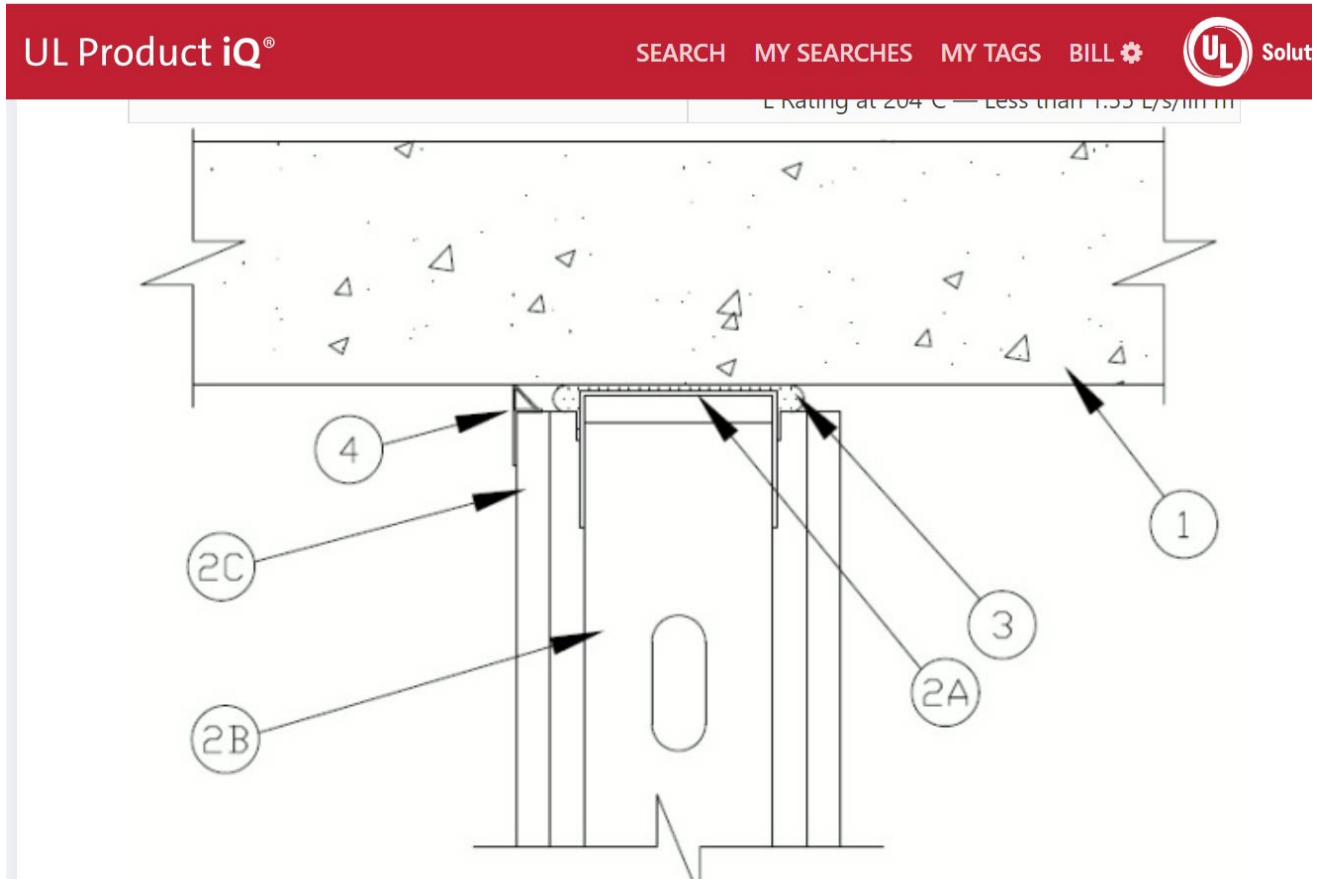
A. **Steel Roof Deck —** Max 2 in. (51 mm) deep galv steel fluted roof deck.

B. **Roof Insulation —** For P900 Series Designs, min 2-1/4 in. (57 mm) thick poured insulating concrete, as measured from the top plane of the roof deck. For P700 Series Designs, as specified in the individual P700 Series Design.

C. **Spray-Applied Fire Resistive Materials* —** Prior to the installation of the Forming Material and Fill, Void or Cavity Material (Items 3A and 3B, respectively), the steel roof deck shall be sprayed with the thickness of material specified in the individual P700 Series Design. For P900 Series Designs, structural steel supports only to be sprayed in accordance with the specifications in the individual P900 Series Design.
ISOLATEK INTERNATIONAL — Type 300
GCP APPLIED TECHNOLOGIES INC — Type MK-6/HY, MK-6/HY ES, MK-6S and RG

The hourly fire rating of the roof assembly shall be equal to or greater than the hourly rating of the wall assembly.

Joints and Voids
Head-of-Wall – Intumescent Strips



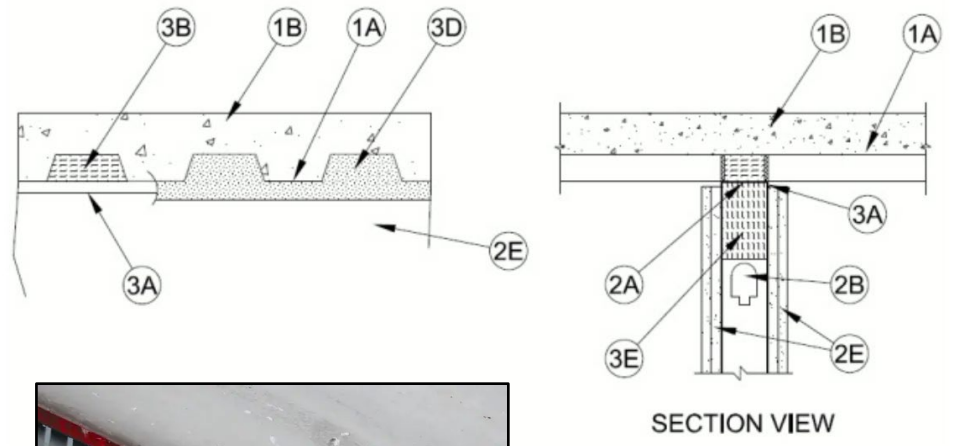
UL Solutions Image

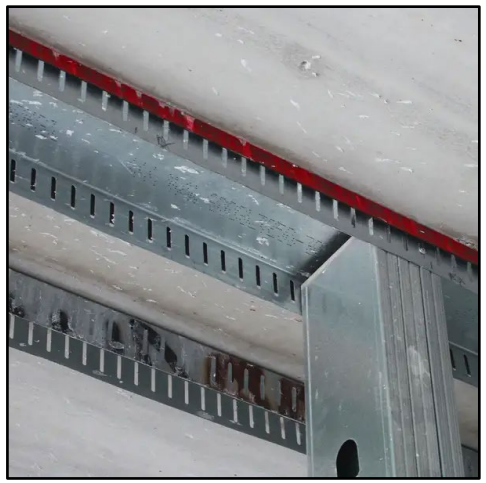
3. **Fill, Void or Cavity Material* — Top Track Seal — When max separation between the bottom of floor and top of wall is 1/2 in. (13 mm), the joint system is designed to accommodate a max 50 percent compression or extension from its installed width. When max separation between the bottom of floor and top of wall is 3/4 in. (19 mm), the joint system is designed to accommodate a max 66% compression only from its installed width.**

Factory supplied foam seal sized for width of and installed over the ceiling runner (Item 2A) prior to attachment to underside of concrete floor in accordance with the installation instructions. Butt joints in CFS-TTS shall be compressed min 1/2 in. (13 mm).

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CFS-TTS 212, CFS-TTS 358, CFS-TTS 600, CFS-TTS R or CFS-TTS-OS

Joints and Voids
Head-of-Wall – Intumescent Strips





STI Firestop Photo – UL Solutions Image/Text HW-D0748

3. **Joint System —** Max separation between bottom plane of the floor or roof and top of gypsum board is 1 in. (25 mm). The joint system is designed to accommodate a max 100 percent compression or extension from its installed width. The joint system consists of the following:

A. **Fill, Void or Cavity Material* —** Factory-supplied intumescent gasket installed and nominally centered over the ceiling runner (Item 2A, 2A1, 2A2, 2A3) prior to attachment to underside of floor or roof assembly. Gypsum wallboard layers to be installed on both sides of the wall maintaining a minimum 1/8 in. (3 mm) overlap over the intumescent gasket at time of installation.
SPECIFIED TECHNOLOGIES INC — Speed Flex Track Top Gasket

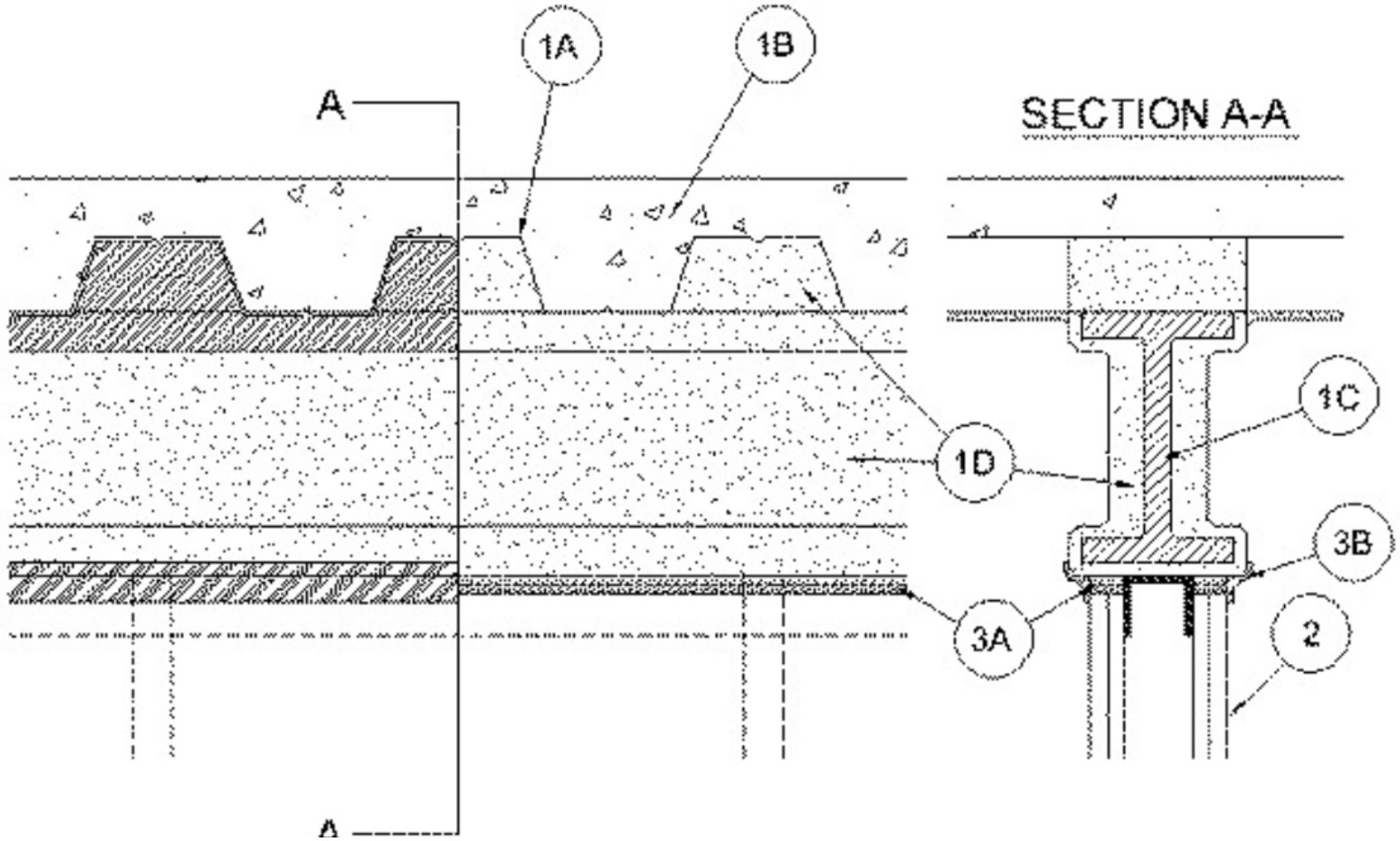
C. **Forming Material* —** As an option to Item 3B, preformed mineral wool plugs, formed to the shape of the fluted floor units, friction fit to completely fill the flutes above ceiling runner. The forming material shall be recessed from each surface of wall ceiling runner to accommodate the required thickness of fill material (Item 3D).
THERMAFIBER INC — TopStop mineral wool deck plugs Type SAF batts

D. **Fill, Void or Cavity Material* — Sealant —** Min 1/4 in. (6 mm) thickness of fill material installed on each side of the wall in the flutes of the steel floor or roof deck and between the top of the fill, void or cavity material (Item 3A) and the bottom of the steel floor or roof deck, flush with each surface of wall framing.
SPECIFIED TECHNOLOGIES INC — SpecSeal ES Sealant

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

Firestop Solutions Image

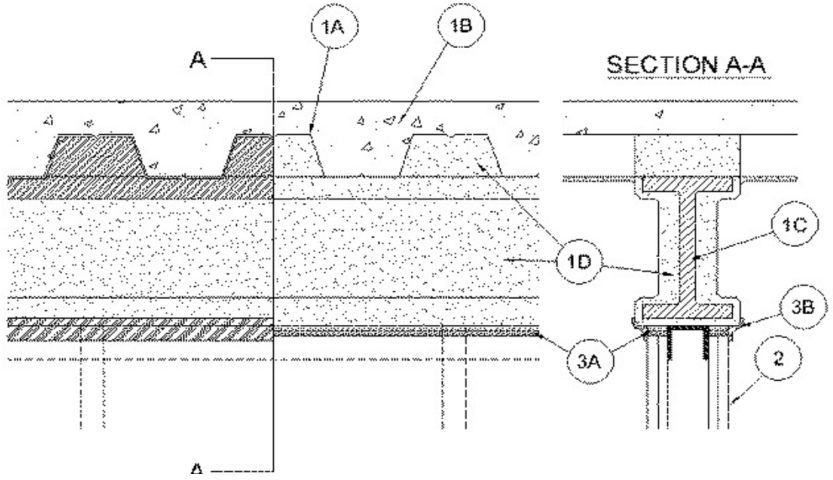
I-Beam to Fluted Deck OVER WALL HW-D-0259



UL Solutions Image

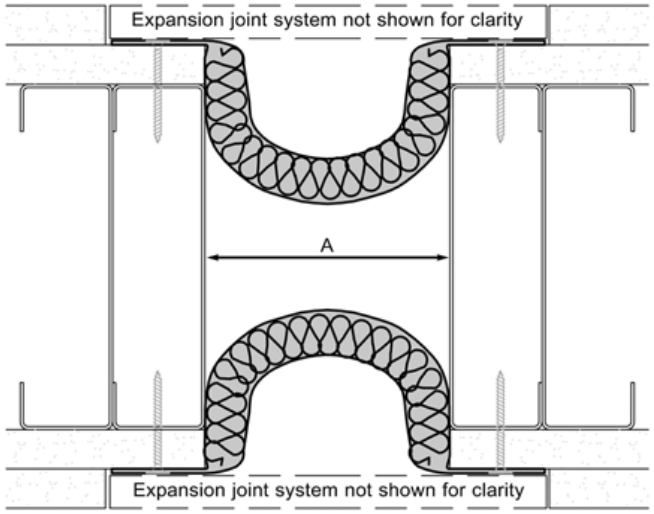
I-Beam to Fluted Deck OVER WALL HW-D-0259

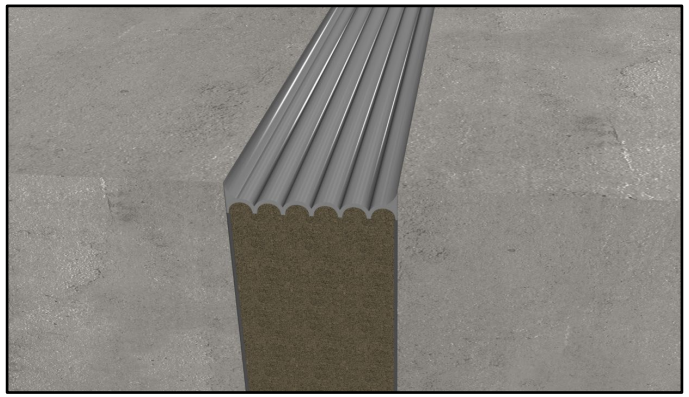
- Beam Size, Shape
- INCREASED Fireproofing Thickness on Web of Beam
  - Acceptance Criteria – 250°F Ave / 325°F Individual Point on non-fire side
- Rest of beam protected based on beam design
- More later…

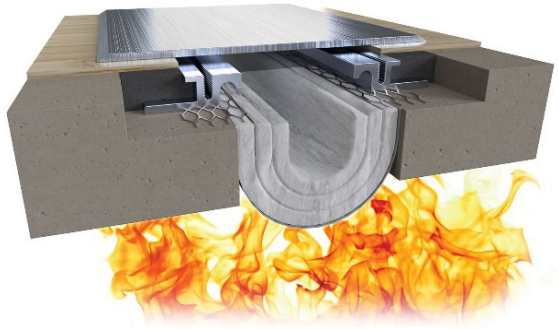


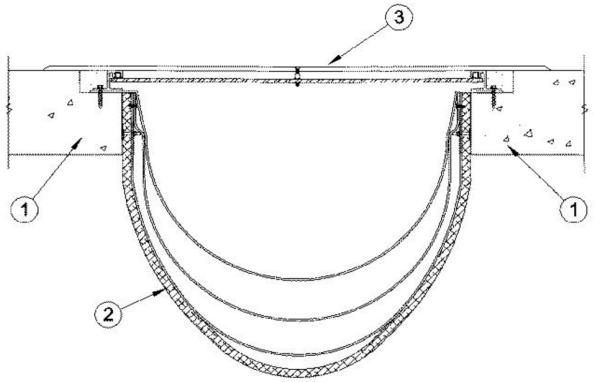
UL Solutions Image

Fire Rated Expansion Joints
FF-D-4001, -1201, -1204…more









Balco, Construction Specialties, Inpro, MM Systems, UL Solutions

Fire Rated Expansion Joints
FF-D-4001, 1201, 1204…more

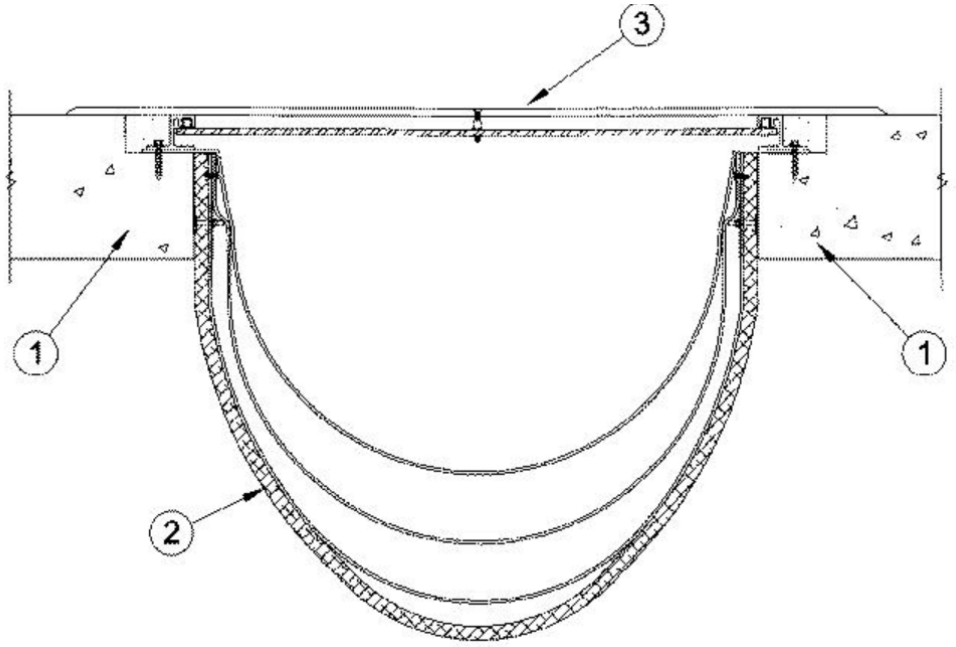
System No. FF-D-4001

September 20, 2000

Assembly Rating — 2 Hr

Nominal Joint Width — 25 to 36 in.

Class II and III Movement Capabilities — 50% Compression or Extension



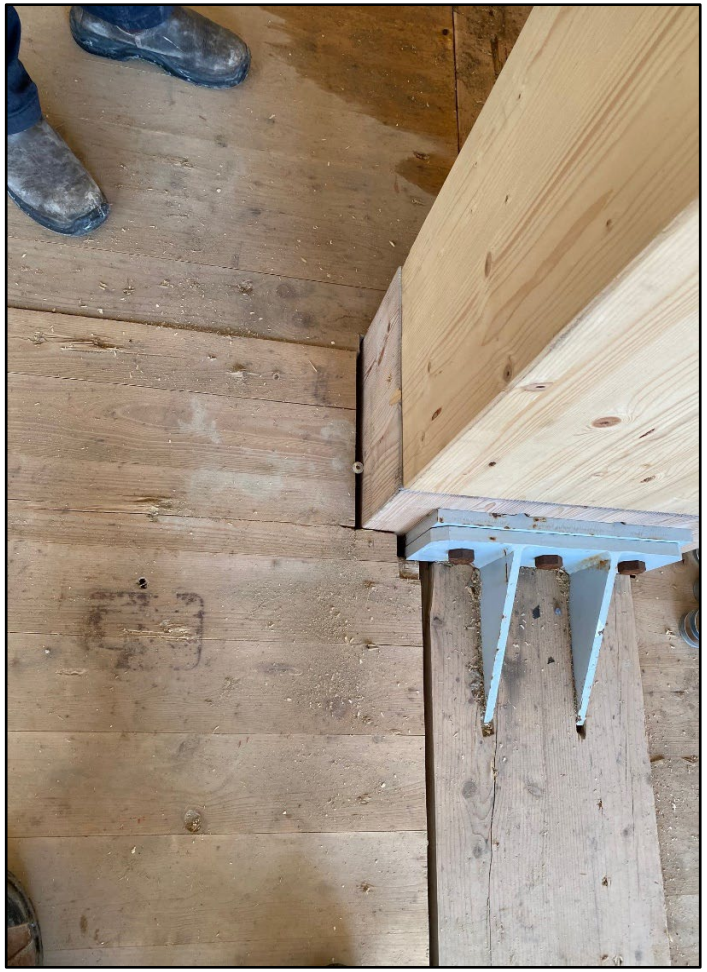
1. **Floor Assembly —** Reinforced lightweight or normal weight (100-150 pcf) structural concrete having a min thickness of 4-1/2 in. at stepped-edges receiving joint cover (Item 3).

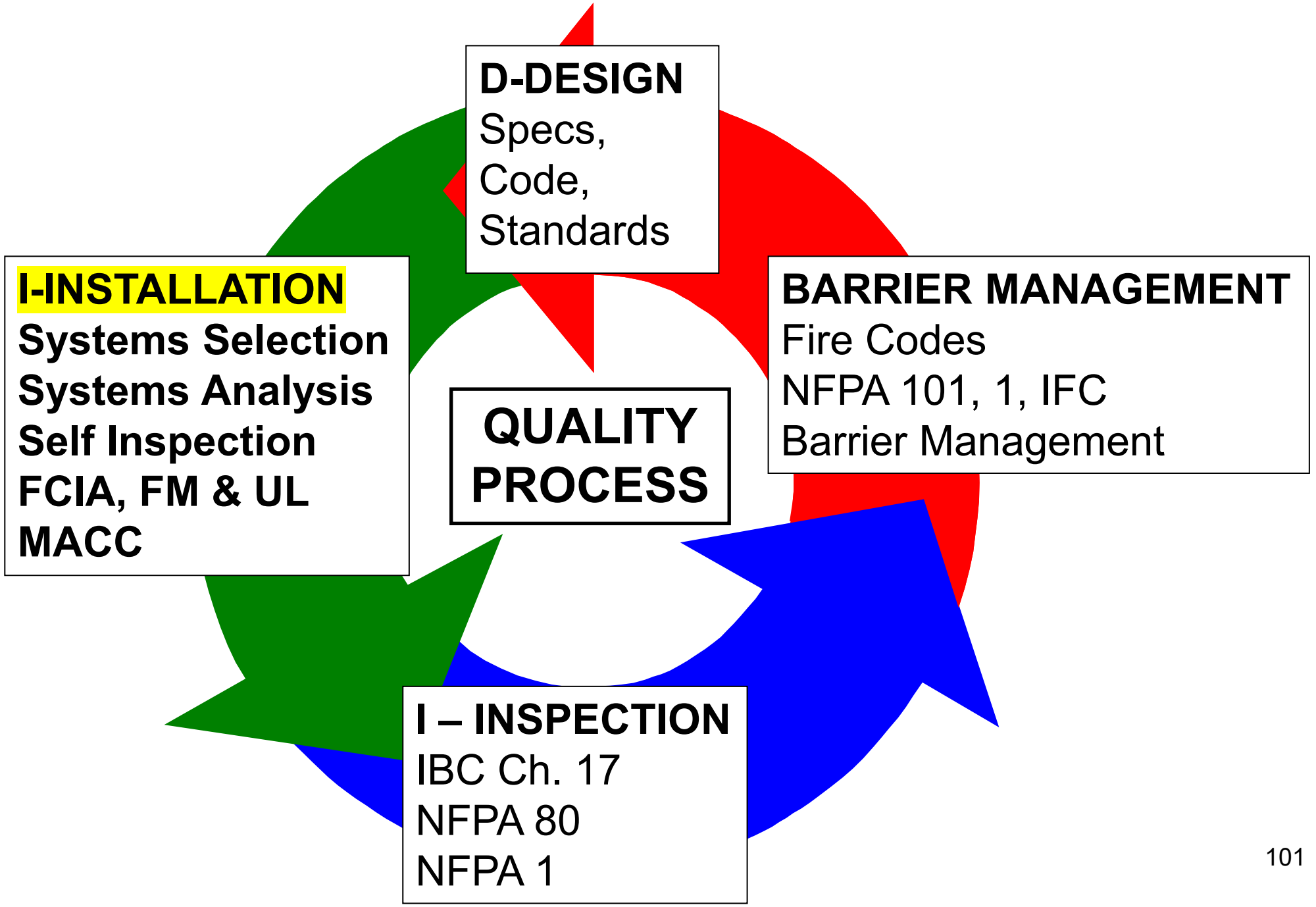
2. **Mechanical Joint Assembly* — Nom width of joint is 25 to 36 in.** Flexible multilayer mat material with galv steel mounting angles on longitudinal edges. The mechanical joint assembly shall be installed in accordance with the installation instructions accompanying the units.

CONSTRUCTION SPECIALTIES INC — FB97-25F-++ through FB97-36F-++ (++=max width of joint opening)

3. **Joint Cover —** Min 0.030 in. thick joint cover formed of aluminum, bronze, stainless steel or galv steel. Joint covers anchored to floor slabs on each side of joint opening, continuous over entire length of joint, in accordance with the manufacturer's installation instructions.
As an alternate, where the linear joint opening is enclosed within a chase wall and is non load bearing, a cover consisting of a creased sheet of min 2 mil stainless steel foil secured with 1 in. wide continuous galv steel washer strips along each side of the joint opening may be used.

New Developments….




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?

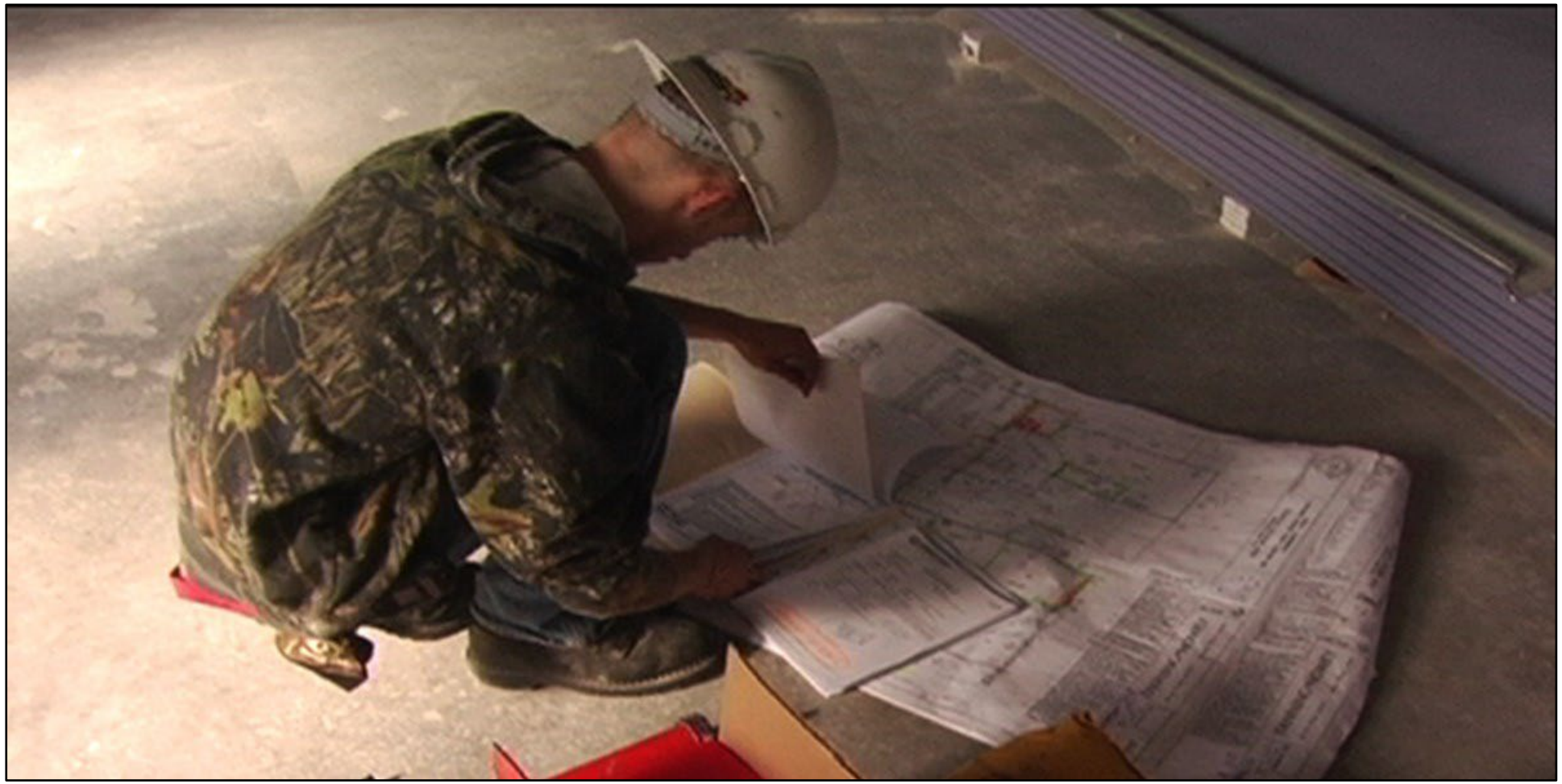
- Wall or Floor Construction Type, Rating
- Wall or Floor Thickness
- Penetrating Item, Coverings
- Size, Type, Thickness
- Annular Space, Joint, Breach Sizes
- Packing/Damming/Backing Materials
- Fill Material(s)

STI Graphic

= Rated Firestop System

Manufacturers Instructions, Tested and Listed Designs

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

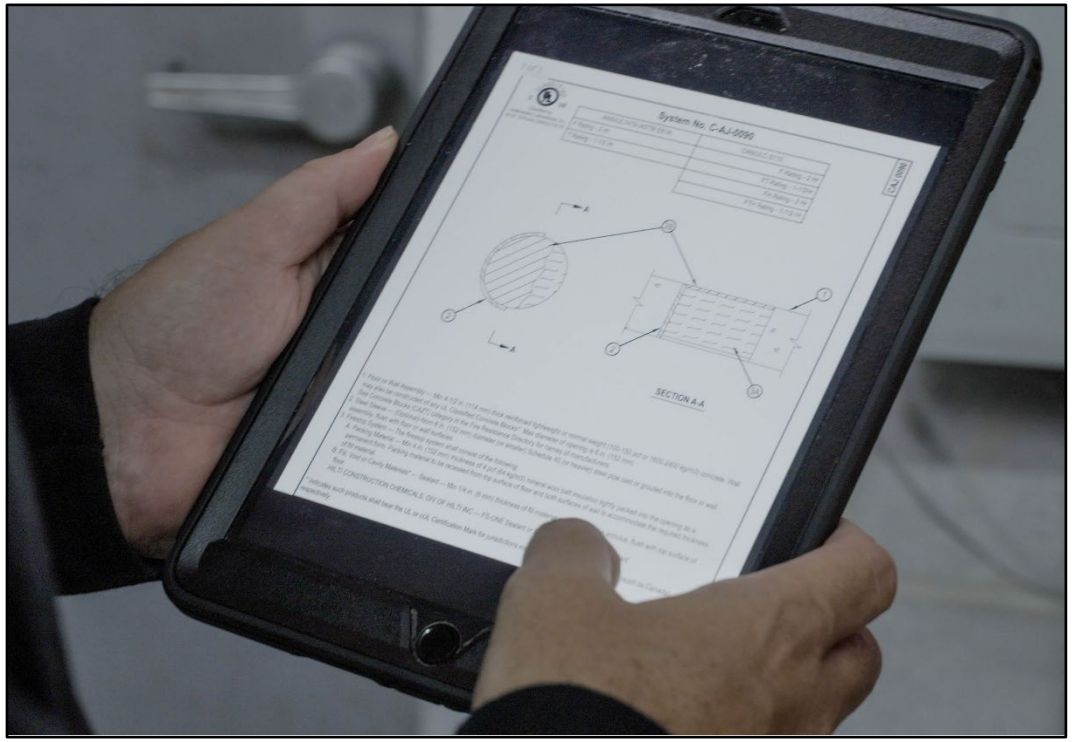
How do Contractors Select/Analyze Systems & Inspection Agencies Analyze?

- 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

Systems & Materials….



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 Contractors***

Spec Contractor Qualifications

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

FM Approvals®
Member of the FM Global Group

UL Underwriters Laboratories Inc.®
Qualified Firestop Contractor Program

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

FM 4991 & UL/ULC QFC Requirements

- **FM, UL/ULC Firestop Exam @ 80% min.**
- **Management System (MS) Written**
- **MS Procedures implemented**
- **MS Audit @.....**
  - **Contractor Office** – Records & Documents
  - **Jobsite** – Observation, possible destructive

FM Approvals®
Member of the FM Global Group

Underwriters Laboratories Inc.®
Qualified Firestop Contractor Program

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

FM 4991 & UL/ULC QFC

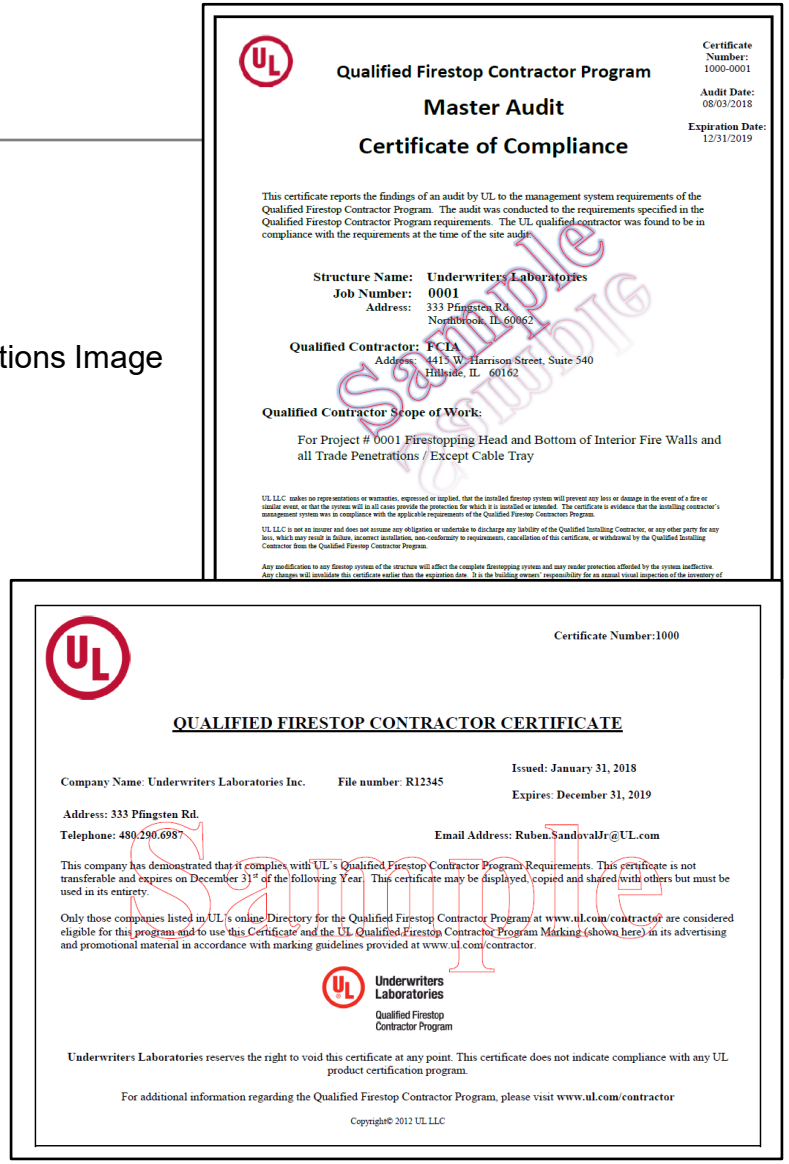
- UL QUALIFIED or FM 4991 APPROVED
- DRI – Appointed by Contractor, CEU's
- Listed @
  - www.FCIA.org
  - www.UL.com
  - www.ApprovalGuide.com

Master Audit Certificate of Compliance Program

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

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

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



Qualified Firestop Contractor Program

Master Audit

Certificate of Compliance

Certificate Number: 1000-0001

Audit Date: 08/03/2018

Expiration Date: 12/31/2019

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

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

Qualified Contractor: 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

UL LLC makes no representations or warranties, expressed or implied, that the installed firestop system will prevent any loss or damage in the event of a fire or similar event, or that the system will in all cases provide the protection for which it is installed or intended. The certificate is evidence that the installing contractor's management system was in compliance with the applicable requirements of the Qualified Firestop Contractors Program.

UL LLC is not an insurer and does not assume any obligation or undertake to discharge any liability of the Qualified Installing Contractor, or any other party for any loss, which may result in failure, incorrect installation, non-conformity to requirements, cancellation of this certificate, or withdrawal by the Qualified Installing Contractor from the Qualified Firestop Contractor Program.

Any modification to any firestop system of the structure will affect the complete firestopping system and may render protection afforded by the system ineffective. Any changes will invalidate this certificate earlier than the expiration date. It is the building owners' responsibility for an annual visual inspection of the inventory of

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

Sample

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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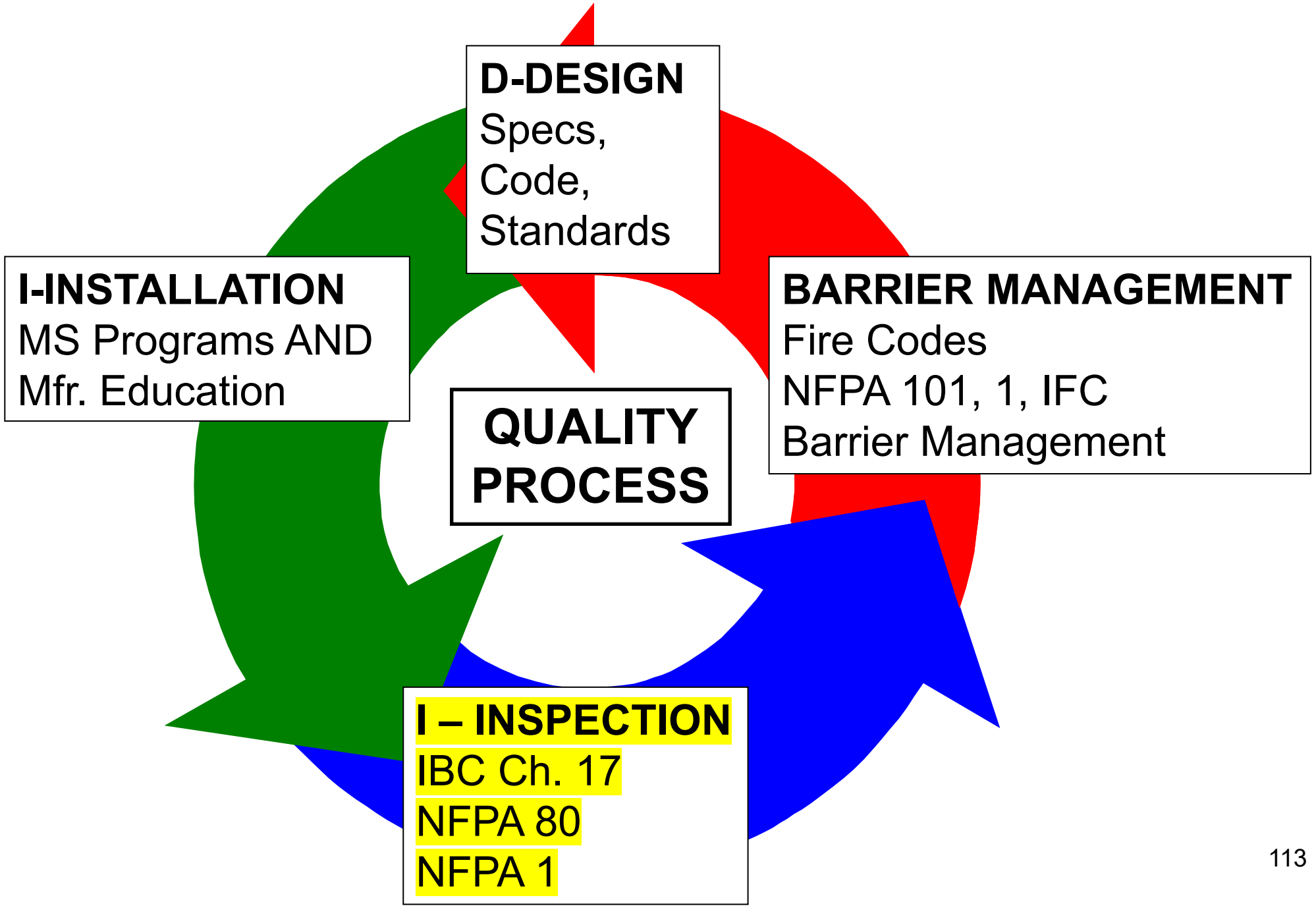
UL Solutions Image


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 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**
  - **Risk Category Types III, IV, Chapter 16, Table 1604.5**
  - **IBC 2021 Residential ≥ 250 Occupants**
- Abu Dhabi International Building Code

FCIA & KOFFEL
2002-2023

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, AHJ…other than GC
    - ***Drawings, LISTINGS & Manufacturers Instructions***
    - Destructive (2%) or Observation (10%)
    - Final Report

I – Inspection – VERIFY VS. LISTINGS….

I – Inspection – Procedures

- Firestop Sealants / Firestop Sprays
- Multiple Locations
- Forming Materials
  - Density
  - Compression
  - Fiber Orientation
  - Depth
  - Tightly Packed

Affinity Image

I – Inspection – Procedures

- Multiple Locations
- Sealants
  - Identify
  - Depth
  - Measure at ‘Bond Line’
  - <2” – 2 locations 4 points
  - SHRINKAGE?

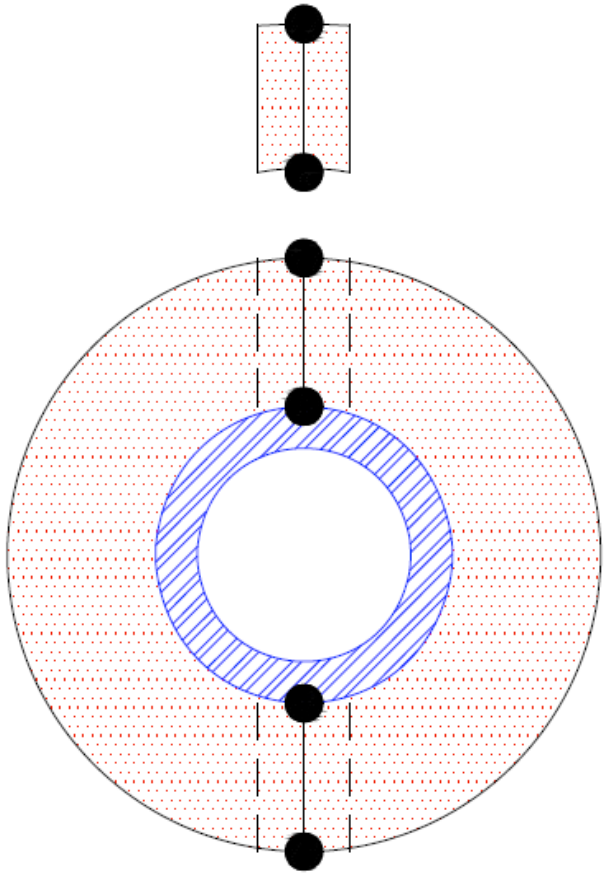


Figure 4

IFC Image

I – Inspection – Procedures

- Multiple Locations
- Sealants
  - Identify
  - Depth
  - Measure at ‘Bond Line’
  - <6” >2” – 3 Locations, 6 points
  - SHRINKAGE?

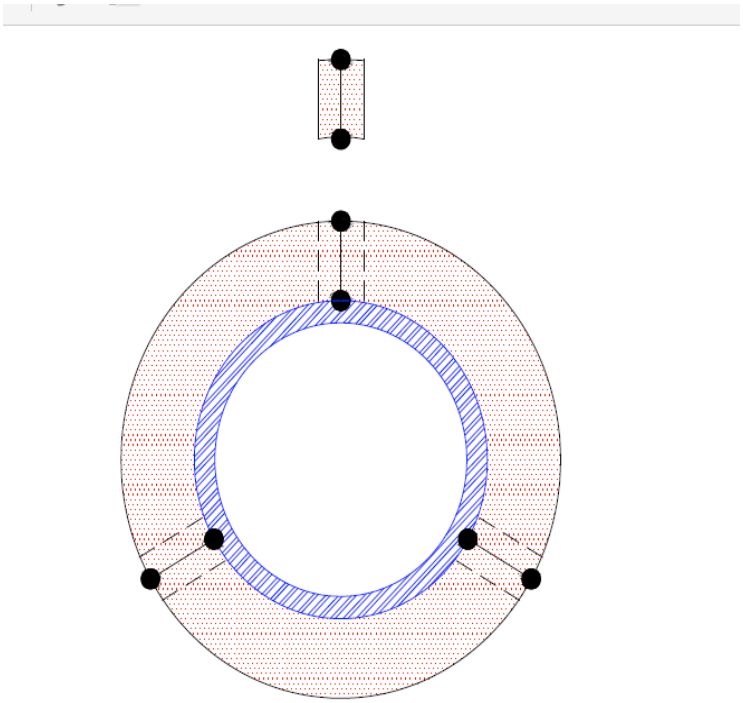


Figure 3

IFC Image

I – Inspection – Procedures

- Multiple Locations
- Sealants
  - Identify
  - Depth
  - Measure at ‘Bond Line’
  - >6” – 4 Locations, 8 points
  - SHRINKAGE?

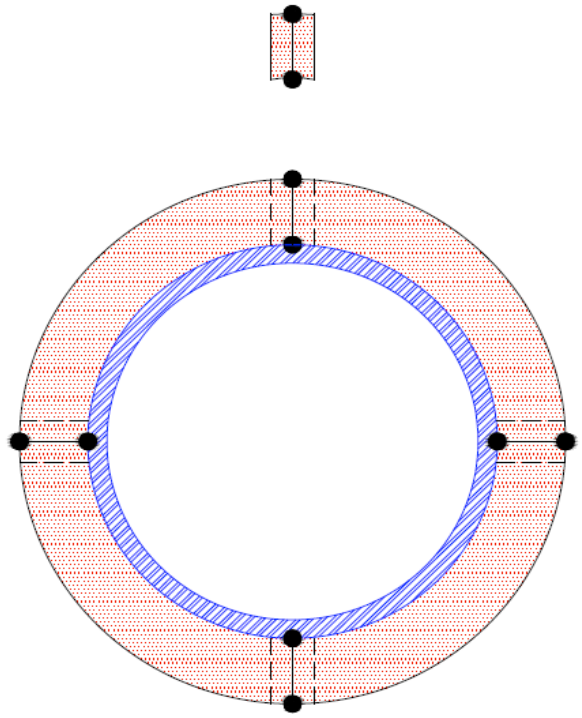
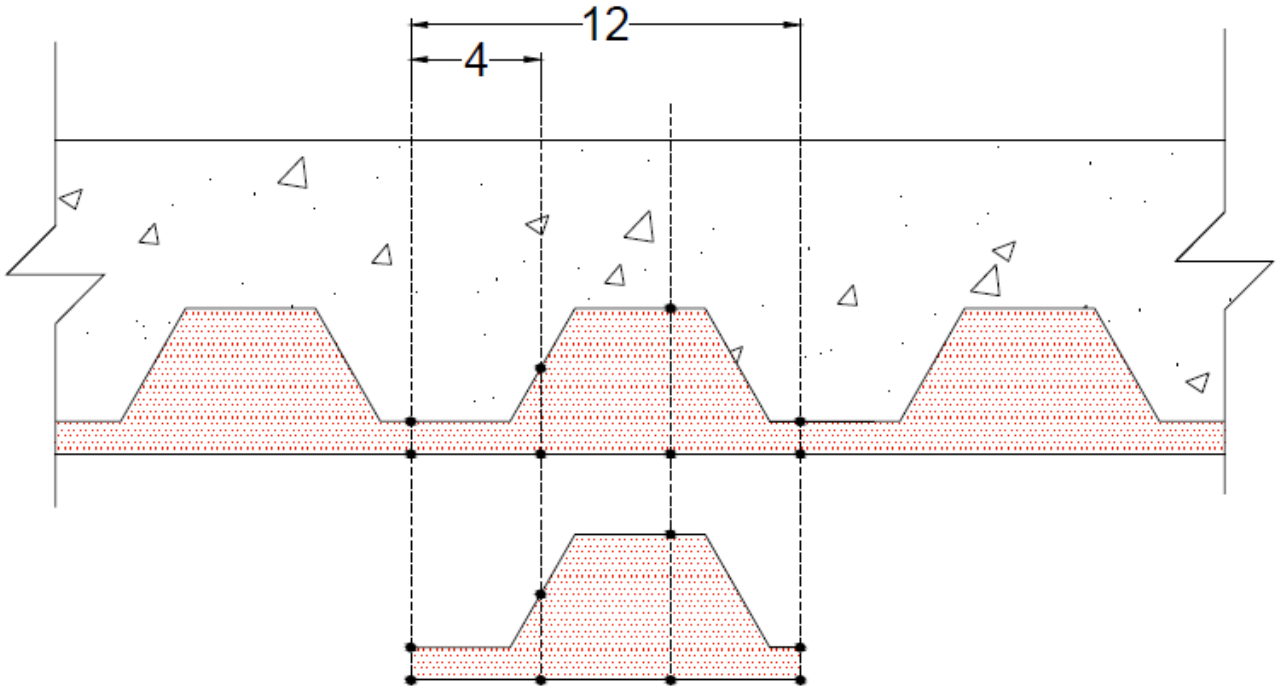


Figure 2

IFC Image

I – Inspection – Procedures

- **Multiple Locations – JOINTS – HW, FF, FW, WW, Perimeter**
- **Sealants/Sprays**
  - **Identify**
  - **Depth**
  - **Measure at ‘Bond Line’**
  - **1/500 LF @ 8 Locations**
  - **SHRINKAGE?**



IFC Image

I – Inspection – Procedures

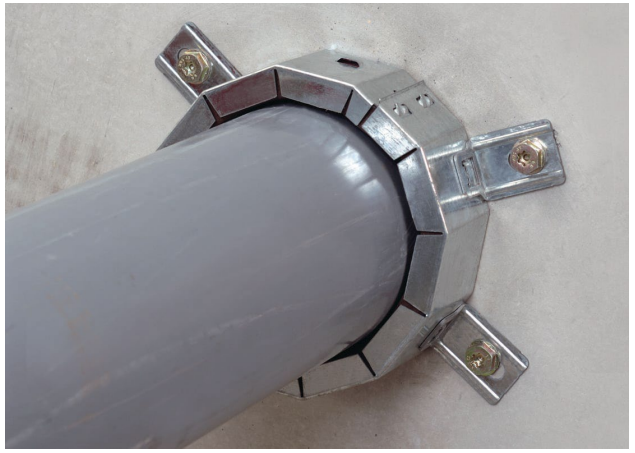
- **Wrap Strips – Devices**
  - **Elastomer Count/Size**
- **Composite Sheet**
- **Kits**
  - **Fasteners**
  - **Attachments**
  - **Bands**
- **Bags**
- **Bricks**
- **Foam**

STI Image

Hilti Image

I – Inspection – Procedures

- **Wrap Strips – Devices**
  - **Elastomer Count/Size**
- **Composite Sheet**
- **Kits**
  - **Fasteners**
  - **Attachments**
  - **Bands**
- **Bags**
- **Bricks**
- **Foam**



Hilti Image

STI Image

I – Inspection – Procedures

- **Bags**
- **Bricks**
- **Foam**

3M, KBS, HIlti Image

I – Inspection – Procedures

- **MCT**
- **Open Path**

STI Image

Hilti Image

I – Inspection – Procedures

- **Firestop Mortar**

Hilti Image

I – Inspection – Procedures

- **Firestop Composite Sheet**

STI Image

I – Inspection – Procedures

- **Firestop Spray**

Hilti, STI Images

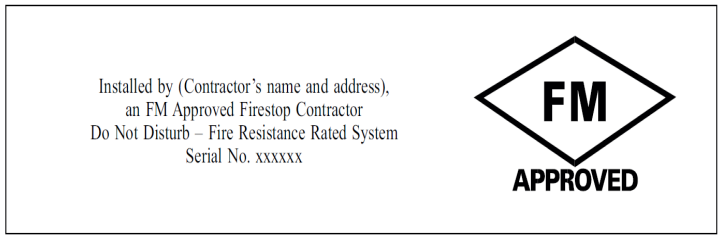
I – Inspection – Procedures

- **Firestop Tapes**

3M Image

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 / Deviation Notification**

- **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

- **COMMUNICATION AGREEMENT**

Execution – Special Inspections

- What's Acceptable?
- Firestopping in accordance with
  - Manufacturers Instructions
    - PDS
    - SDS
    - MII
    - Sell Sheets
  - Listings

LISTINGS….

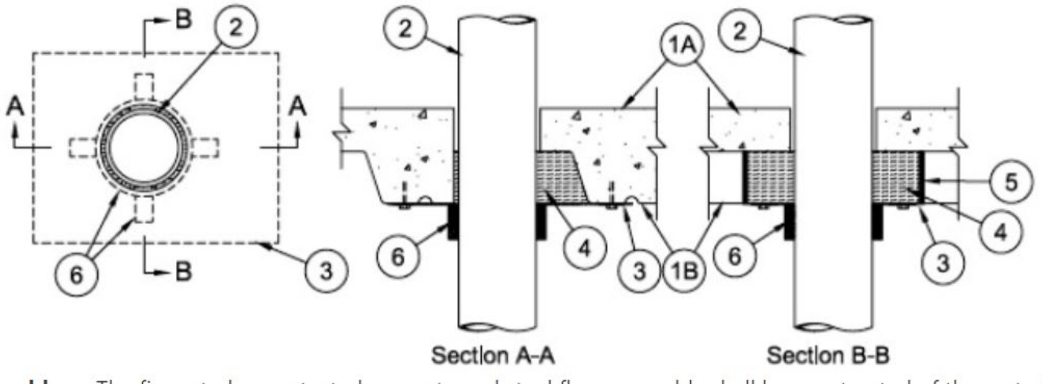
General Information for Through-penetration Firestop Systems

System No. F-A-2025

January 15, 2015

F Rating — 2 Hr

T Rating — 2 Hr



Fire Resistance Rated Assembly Markings – WALLS

- Required by IBC's Chapter 7

  Provide identification for all vertical fire resistance rated and smoke resistant assemblies.

  Adhesive tamper evident stickers, stencil painted with lettering at least 3" (75) mm in height with a minimum 3/8" (10) mm stroke in contrasting color.

  Marking to incorporate the assembly's fire-resistance rating and the type of assembly that the wall is. Examples are below from the IBC and NFPA:

Firestop Identification system - LABELS

- **“Firestop System #XX – Do Not Remove or Tamper”**
  - Tested and listed system number.
  - Date of Installation.
  - Installing Contractor Company name, contact information.
  - Installing Individual Identifier

  OR
  - Bar Code
- Location Identifier in the Cloud

Adler Firestop Photo

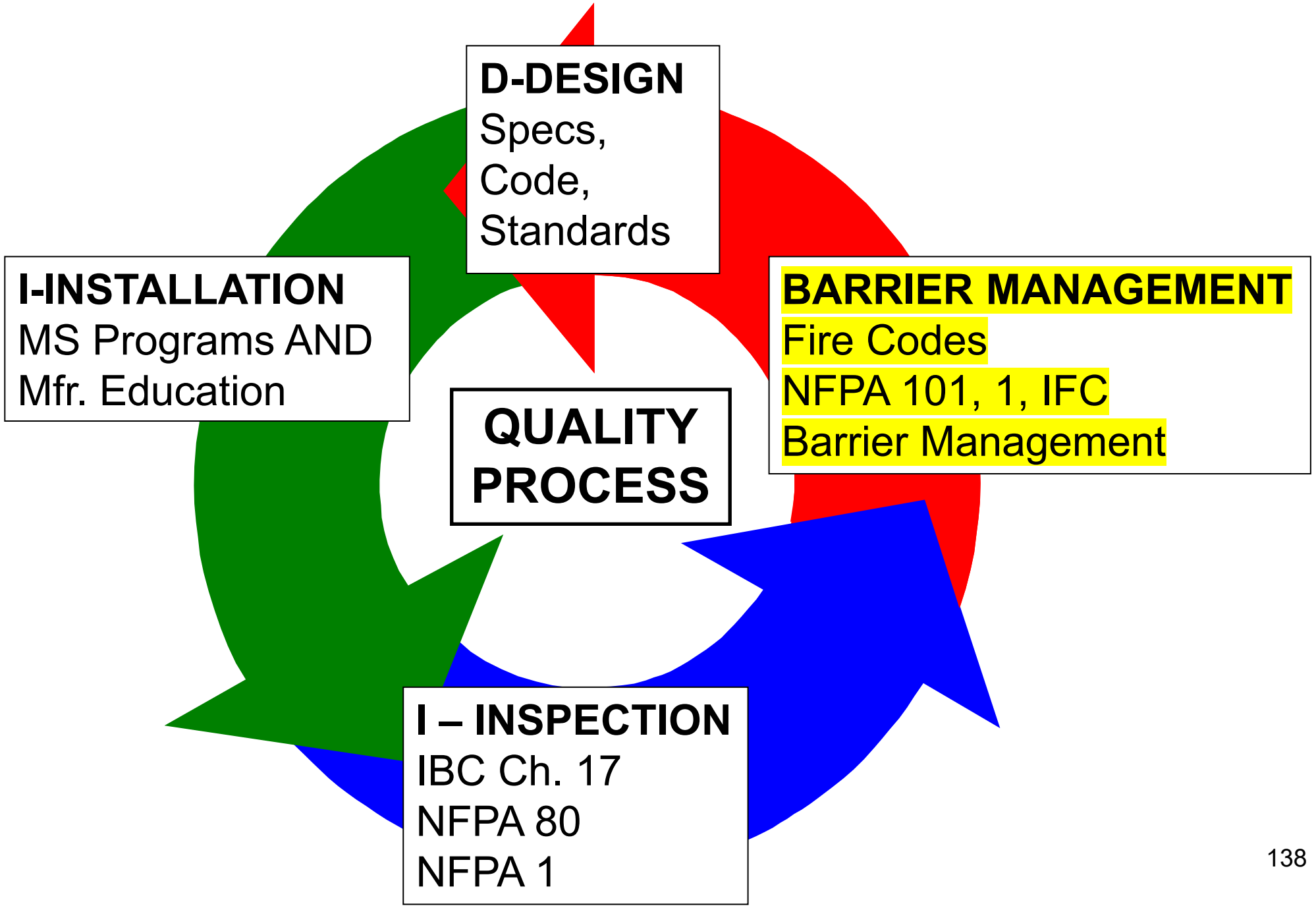
Firestop Identification system - LABELS

Firestop Identification Systems

The firestop system identification device shall be located …

- Within 6” of the firestop system edge
- Each side of the wall,
- Accessible side of horizontal assemblies,
- In or out of view.

Firestop identification systems should be installed as each firestop system is completed.


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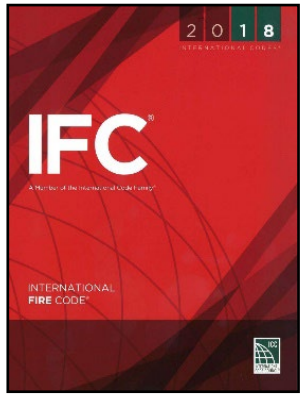
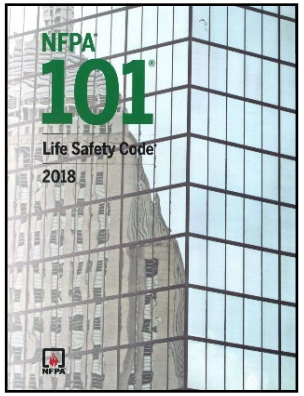
MS Programs AND
Mfr. Education
BARRIER MANAGEMENT
Fire Codes
NFPA 101, 1, IFC
Barrier Management
QUALITY
PROCESS
I – INSPECTION
IBC Ch. 17
NFPA 80
NFPA 1

Fire Codes Require Maintenance

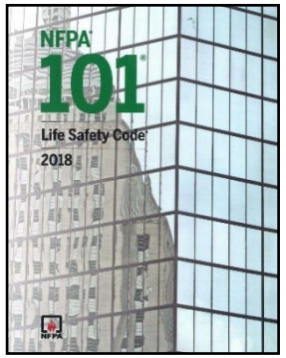
- NFPA 101
- NFPA 1
- International Fire Code
- UAE
- India
- Saudi Arabia
- Etc….
  - Minimum Requirements Stated
  - Frequency





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 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

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

- **701.6 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.**
- **Records of inspections and repairs shall be maintained.**

FCIA Added Emphasis

2021 International Fire Code Maintenance

- **SECTION 703-707**

  - **704 – Joints & Voids – Protected w/Firestop Systems (Pens, Joints, Perimeter)**
  - **705 – Door and Window Openings – Protected with Fire Doors**
  - **706 - Duct and Air Transfer Openings – Protected with Fire Dampers**
  - **707 – Concealed Spaces – Fireblocking, Draftstopping**
  - **708 – Spray Fire Resistive Materials and Intumescent Fire-Resistive Materials**

FCIA Added Emphasis

2021 International Fire Code Maintenance

SECTION 703 GENERAL

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.

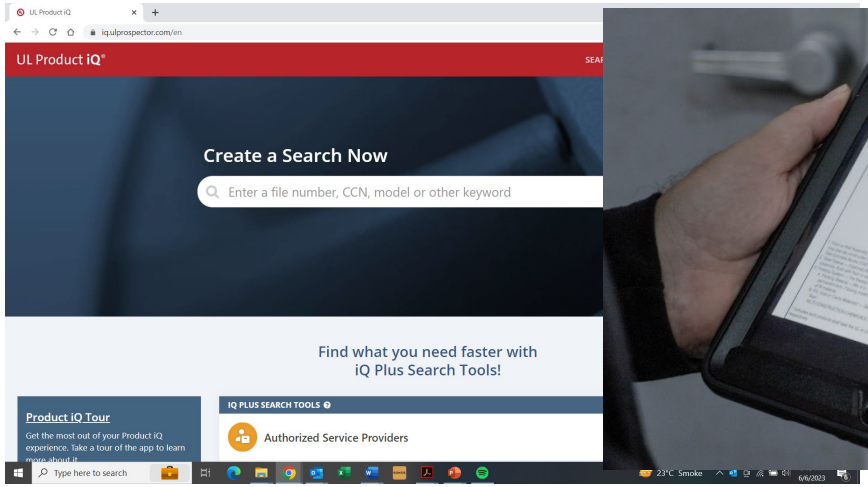
FCIA Added Emphasis

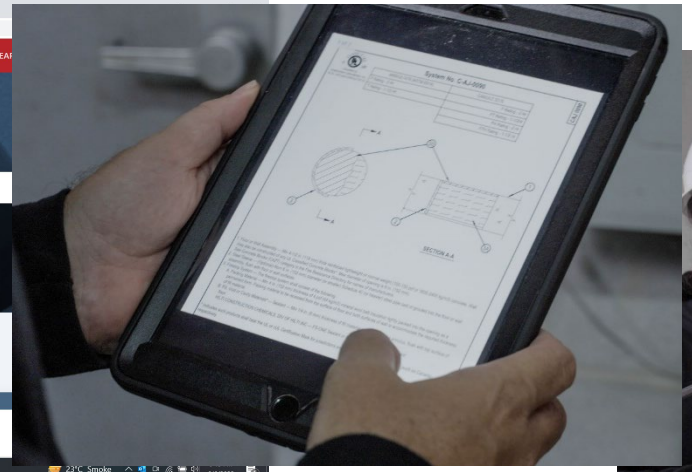
What's an *Inventory?*

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

Consider Requesting for RESULTS…

Please protect the breaches in fire-resistance with a firestop system (and structural fire protection) installed in accordance with a listing and manufacturers instructions…





I-Inspection – SURVEY

- **Visual Building Survey/Inspection….**
  - **Does the Firestop/Fire-Resistive Joint look like the assembly in the LISTING?**
    - 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**

Education about Systems AND Products

J. Black, GDA Photo

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, Listing***

Affinity Firestop Image

Gypsum Based Walls

- Gypsum Mineral
- Types of Gypsum Panel Cores and Their Applications
- Test Standard and Method
- Common UL Designs and Acceptable Variations
- Repairs of Gypsum Wallboard

Wall Testing Furnace

GA Photo

Hose Stream Test

GA Photo

Repairs

- Simply covering a hole or damaged area **<u>is not a repair</u>**
- Repair procedure must take into consideration:
  - Size of the affected area
  - Hourly rating of assembly
  - Framing: type, size and spacing
  - Gypsum: type, number of layers and orientation
  - Accessibility: Can the repair be made from both sides?
  - Other: fastening method, location of repair, etc.
- NFPA 1:
  - 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.**
- ***<u>Must contact manufacturer to verify listed repair method</u>***

Repairs

- GA-225 – Repair of Fire-Rated Gypsum Panel Product Systems

Figure 1: Damaged Gypsum Panel

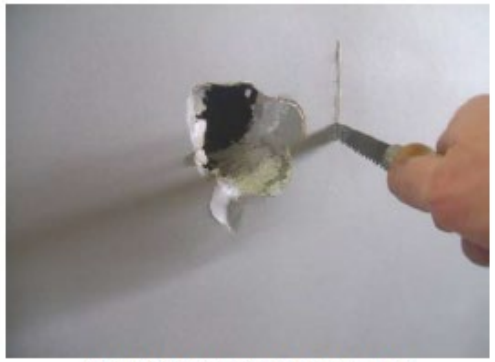


Figure 2: Square Off Damaged Area

Figure 3: Frame Opening

Figure 4: Apply Gypsum Panel Patch

Figure 5: Tape and Finish Patched Area

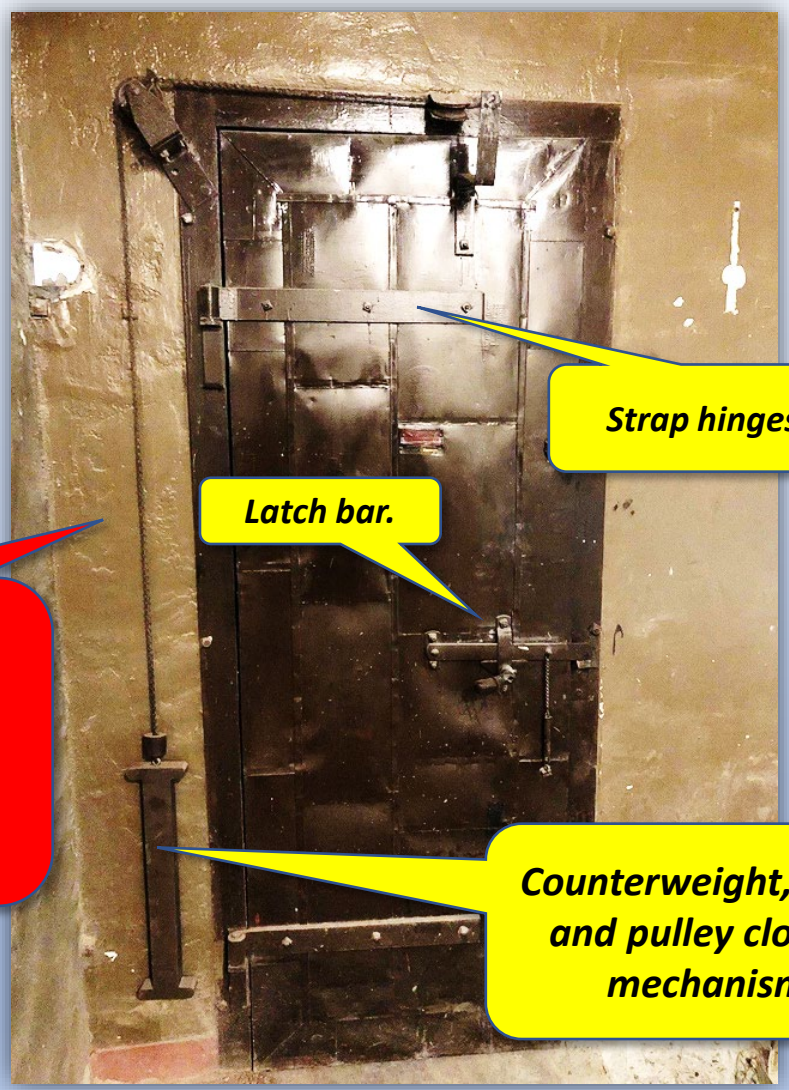
Figure 6: Redecorate Repaired Area

Swinging Door with Builders Hardware (Chapter 6)

Full mortise hinges and surface-mounted door closer (other side)

Fire exit hardware.

Swinging Door with Fire Door Hardware (Chapter 7)

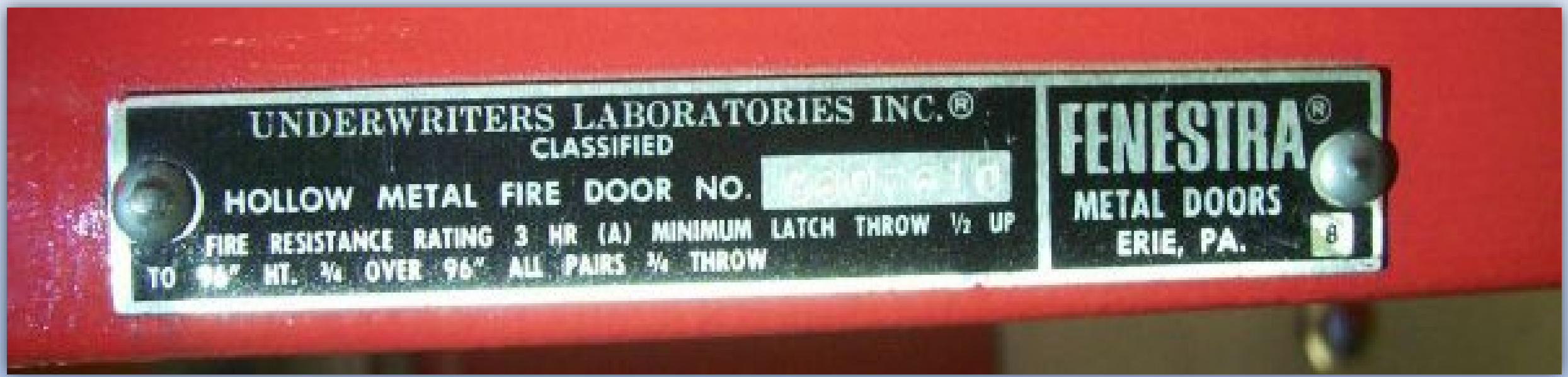


Strap hinges.

Latch bar.

Counterweight, rope, and pulley closing mechanism

Fire Door Labels



AMERICAN STEEL PROD. CORP.
FARMINGDALE, N.Y.
1-1/2 HOUR RATED FIRE DOOR
BY ASTM E 152
LATCH THROW 1/2 IN.
SERIAL NO. 05494

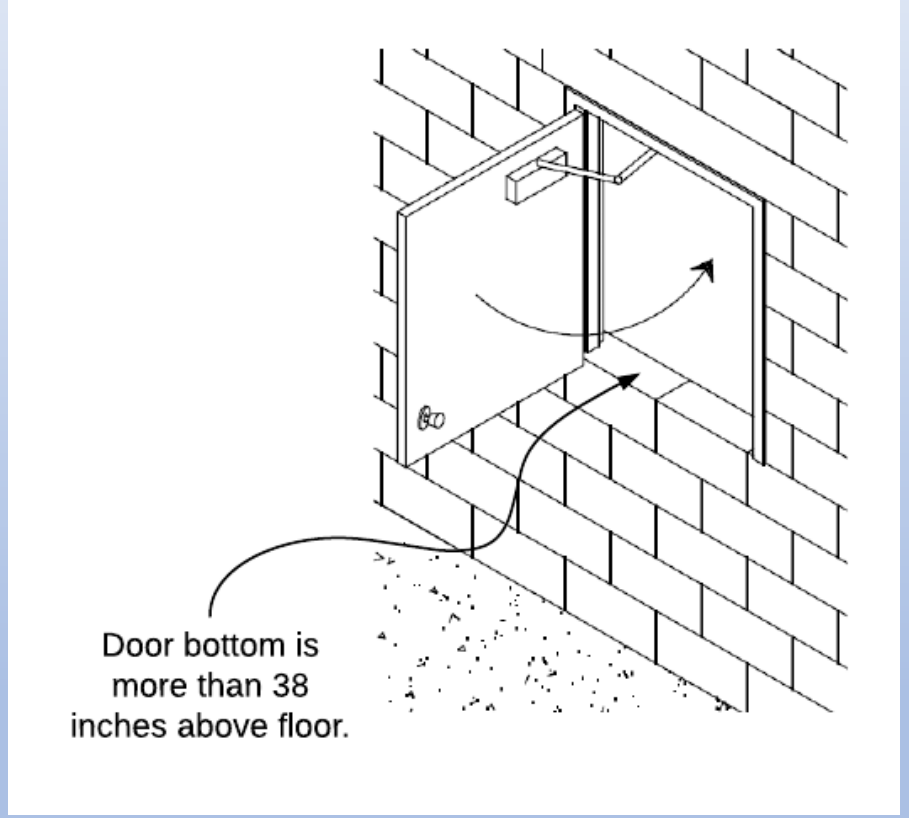
FACTORY MUTUAL

FM

APPROVED

Chapter 4: General Requirements

- Clearance dimensions UNDER swinging fire doors.
  - 3/4-inch (19 mm) maximum, unless hardware requires LESS clearance
  - 3/8-inch (9 mm) maximum when the bottom of the door is more than 38 inches above the floor.



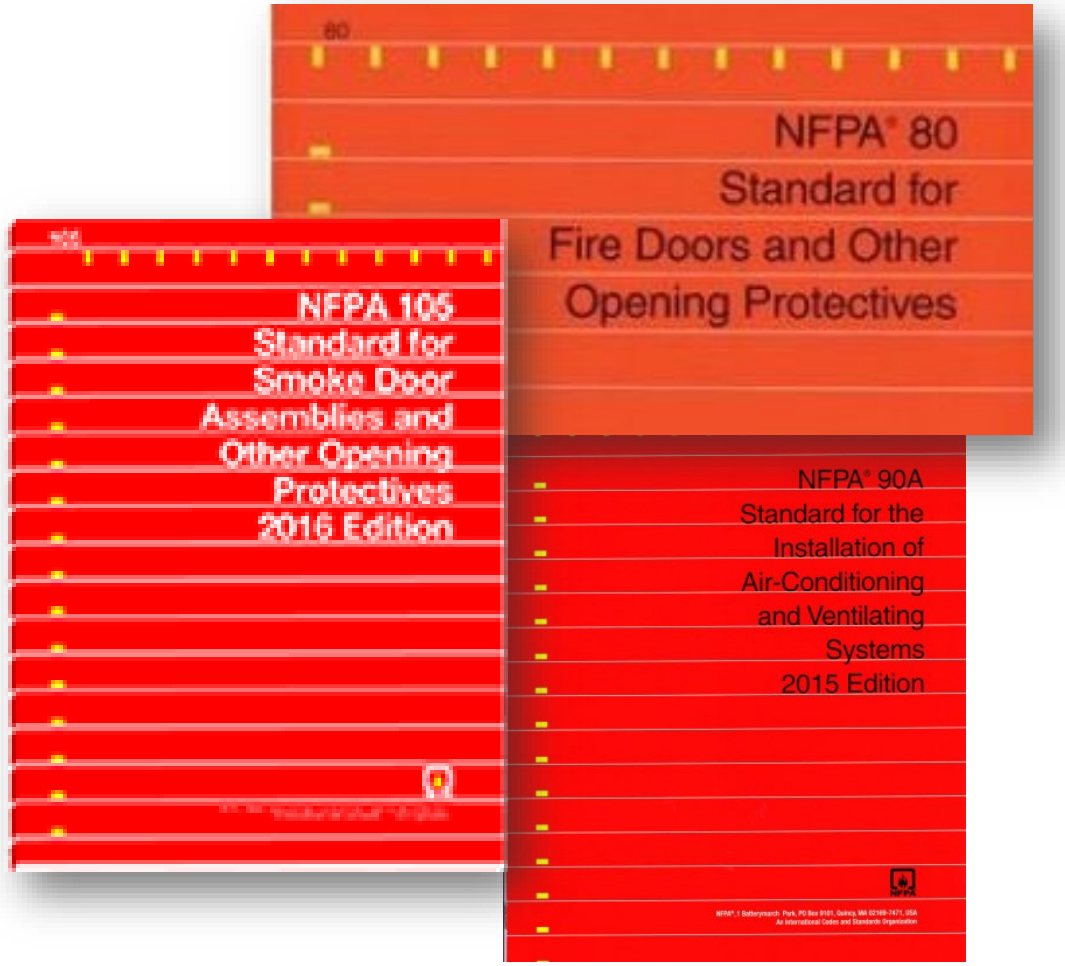
Required Elements of an “Approved” Life-Safety Damper Installation

1. Rated Barrier
2. Listed Product
3. Installation Requirements

Standards - NFPA

National Fire Protection Association

- Installation, Testing and Maintenance
  - NFPA 80
    - Standard for Fire Doors
  - NFPA 105
    - Standard for Smoke Doors
  - NFPA 90A and 90B
    - Standard for Installation of Air-conditioning and Ventilating Systems
  - NFPA 92
    - Standard for Smoke-Control Systems

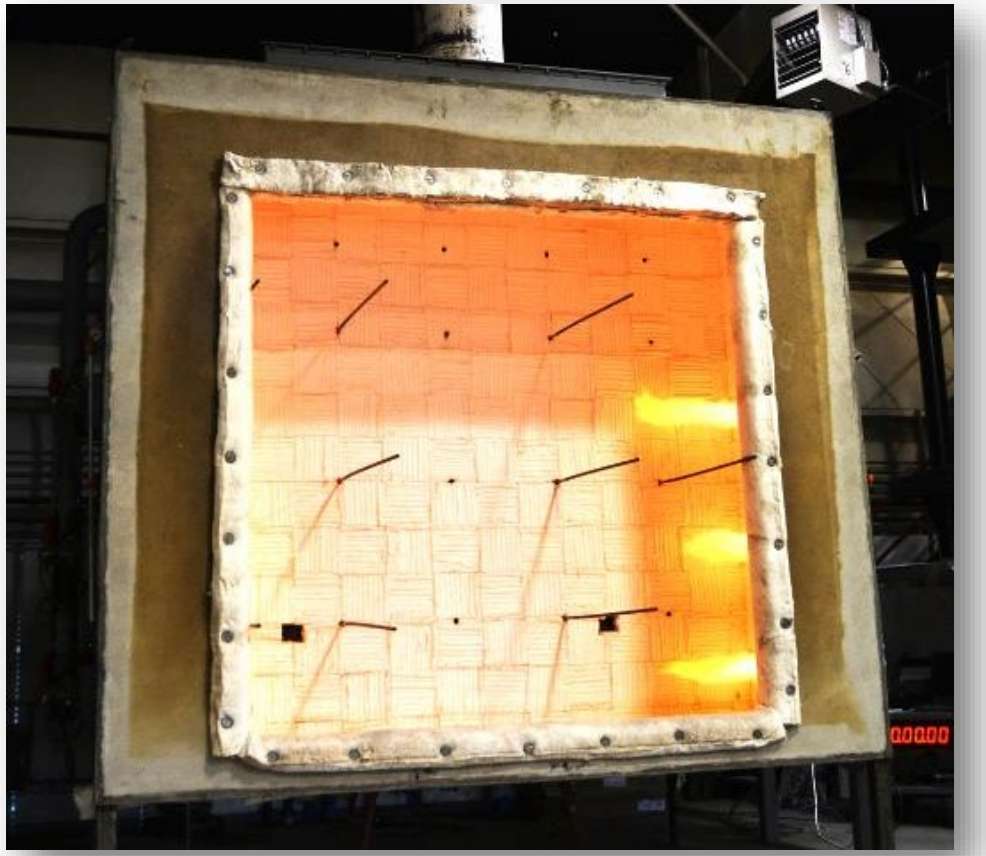


Standards - UL

Underwriters Laboratories

- Testing, Evaluation and Certification
  - **UL 555** - standard for Fire dampers
  - **UL 555S** - standard for Smoke dampers
  - **UL 555C** - standard for Ceiling Radiation dampers

- UL's "Follow-Up Service" ensures that dampers are built as they were tested



Periodic Testing

IFC / NFPA 80 & 105

– Frequency

- “Each damper shall be tested and inspected 1 year after installation.”
- “The test and inspection frequency shall then be every 4 years, except in buildings containing a hospital, where the frequency shall be every 6 years.”

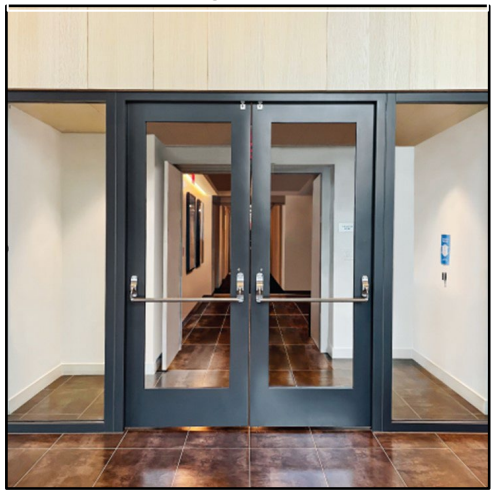
Uses of Fire-rated Glazing

- As a fire-resistance-rated wall assembly
- Vision panels in fire rated door assemblies
- Transom and sidelight panels used adjacent to fire doors
- Fire window assemblies

Fire-resistance-rated Wall

Vision Panel in Door

Sidelight Panels



Interior Fire Windows

SAFTIFIRST Images

Marking Requirements for Fire-Rated Glazing

- 2006 and later codes requires marking on glazing to provide an easy method to confirm code compliance both at time of installation and during annual inspections

TGP Image

NFPA 80 Requirements – Care and Maintenance Cont.

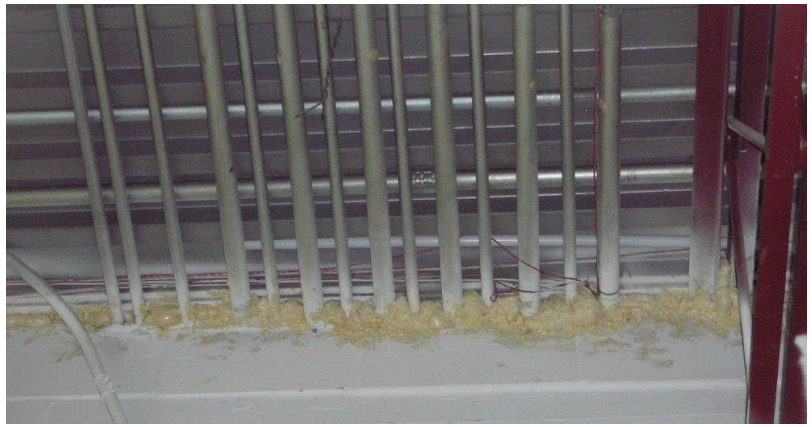
- **5.2.1 Inspection**
  - **5.2.1*** Periodic inspections and testing shall be performed not less than annually.
  - **5.2.2.3** Results of inspection, testing and maintenance shall be documented.

NFPA 80 Requirements – Care and Maintenance Cont.

- **5.5 Maintenance**
  - **5.2.15.1*** Damaged glazing material shall be replaced with labeled glazing.
  - **5.2.15.1.1** Replacement glazing materials shall be installed in accordance with their individual listing.

Request produces Results …

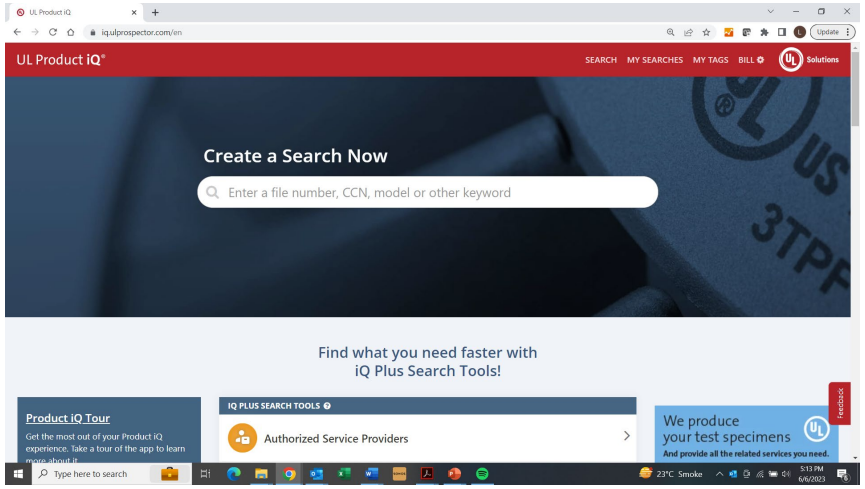
Please fill, plug the holes = Foam, Mud, Stuff



Consider Requesting …

Please protect the fire-resistance breaches with a firestop system installed in accordance with a listing and manufacturers instructions…(Structural Fireproofing Too)

= A System…



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Questions?

FCIA Firestop DIIM 1990-2024

Presented by:

Bill McHugh, FCIA Exec. Director

Rich Walke, CTI, Consultant to FCIA

FREE STUFF - INFO@FCIA.org

Contact Me - Bill@FCIA.org

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