Design
Installation
Inspection
Maintenance &
Management

FCIA
Firestop Contractors International Association

Welcome, Thanks, From FCIA…..

Bill McHugh & John Sharpe
Firestop Contractors International Association

FREE PDF MOP for Code Officials,
Fire Marshals,
& CSC Specifiers

Info@FCIA.org
www.FCIA.org

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';***

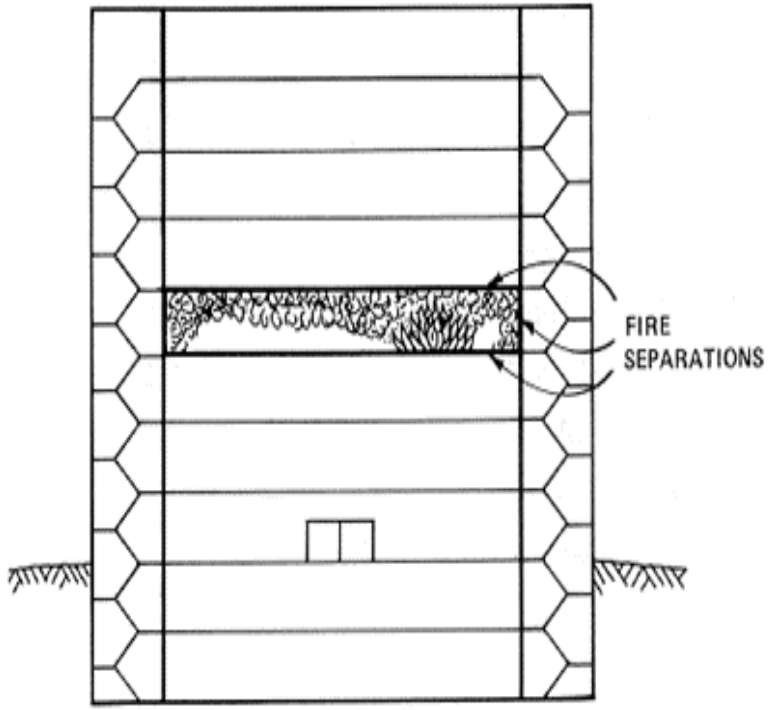
  - **Fireproofing, Compartmentation and Firestopping,**
  - And the active sprinkler system each provide redundancy for maintaining structural integrity in a building fire, should one of the systems fail to perform it's intended function.

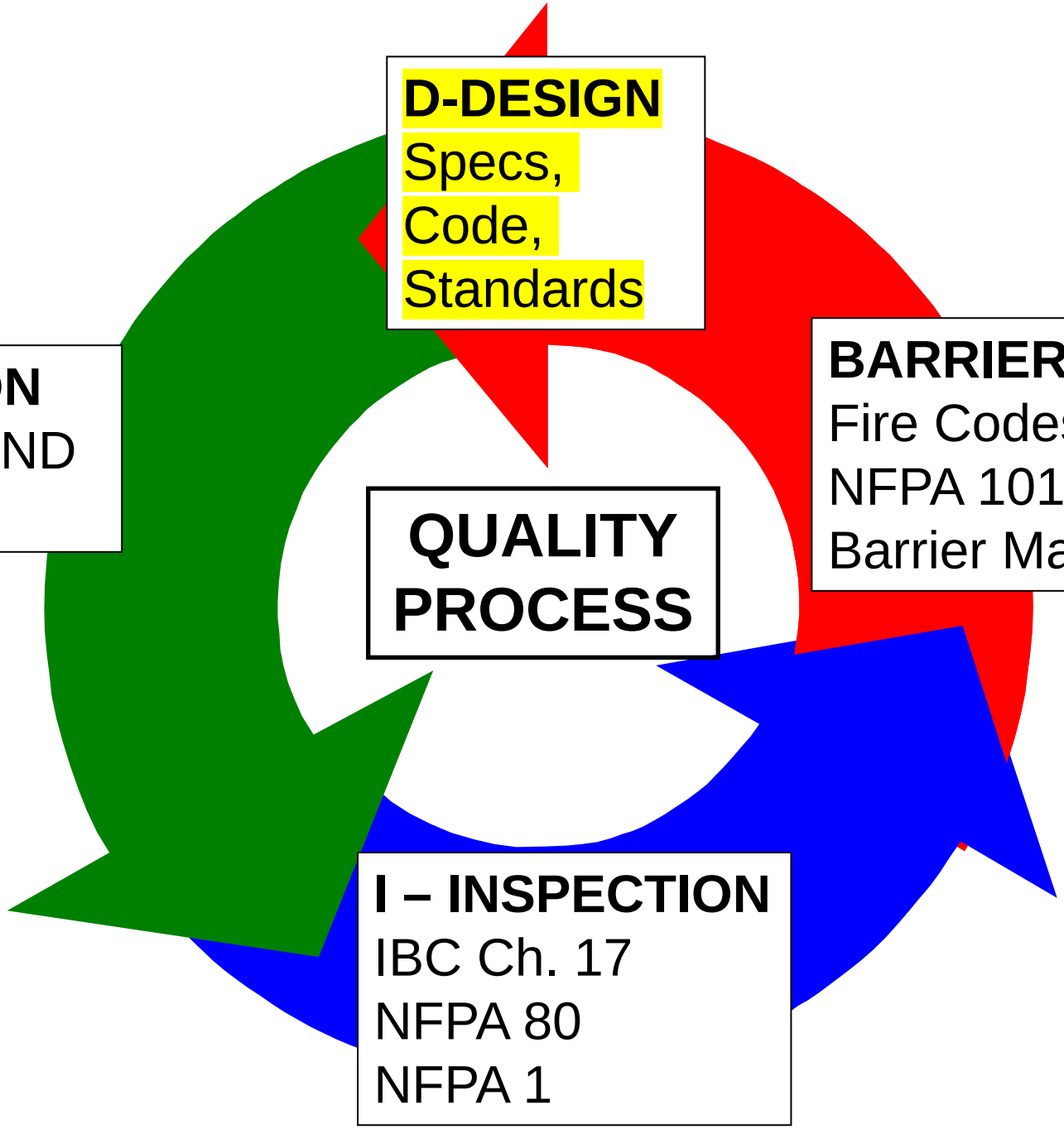
- ***"the ability of the structure and local floor systems to withstand a maximum credible fire scenario, without collapse, recognizing that sprinklers could be compromised, not operational, or non existent.".***

Firestopping & Compartmentation for Safety

- **Egress –*Retroactive Life Safety Measure***
  - Canada's Research Shows….
  - 'Obvious & Intuitive'
    Egress Systems

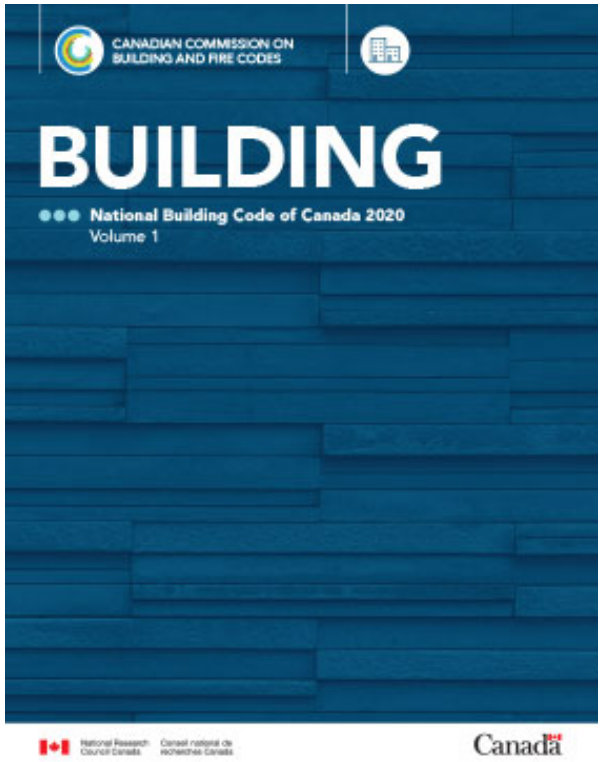
- **Luminescent Markings – 2012 IFC**
  - Buildings 75' and higher…
  - Obvious & Intuitive

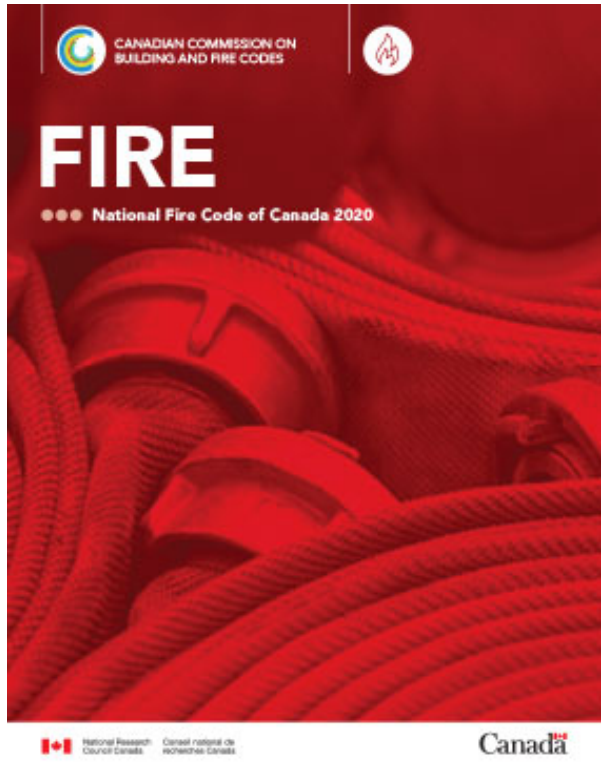



D-DESIGN
Specs,
Code,
Standards
BARRIER MANAGEMENT
Fire Codes
NFPA 101, 1, IFC
Barrier Management
I-INSTALLATION
MS Programs AND
Mfr. Education
QUALITY
PROCESS
I – INSPECTION
IBC Ch. 17
NFPA 80
NFPA 1

Building & Fire Code Requirements

- National Building Code of Canada
- National Fire Code of Canada





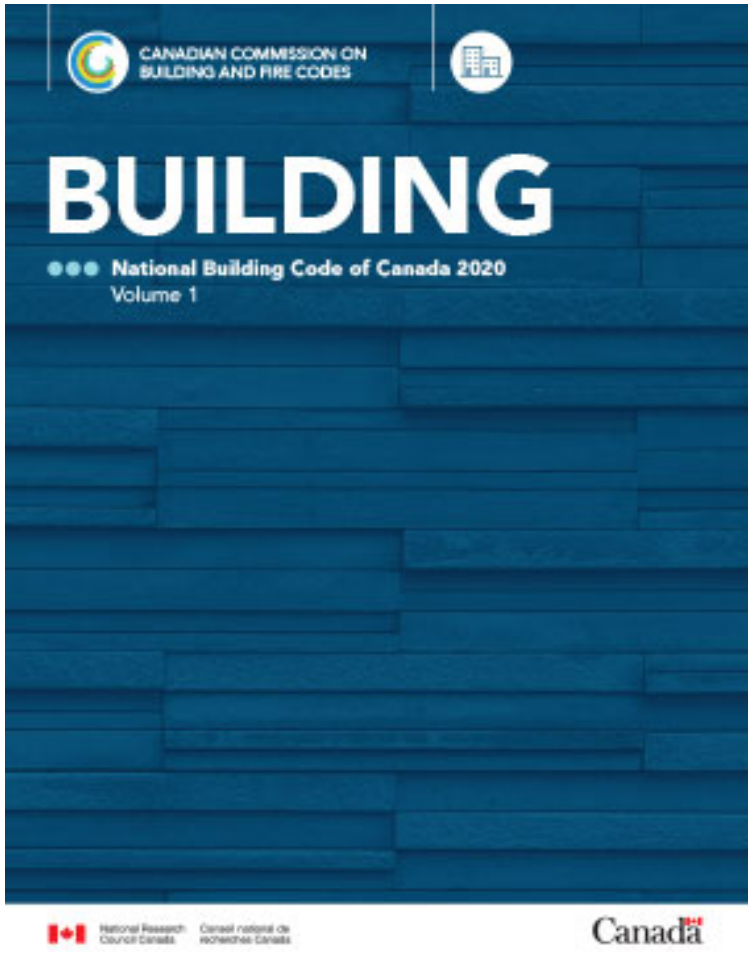
Firestopping & Compartmentation for Safety

National Building Code of Canada (NBC)

The Canadian Commission on Building and Fire Codes (CCBFC):

- Volunteers appointed by NRC
- Regulators, construction industry & public interest
- 2020 Cycle Finished…published November 2010
- 2025 Cycle Starting…

Oversees the code development system



Building & Fire Code Requirements

- **National Building Code of Canada**
- **National Fire Code of Canada**
- NFPA 5000 – 101- Chapter 8
- UAE Fire and Life Safety Code – Chapter 1, Section 21
- International Codes –

- ***Minimum requirements*** - ***Construction*** & ***Maintenance***

- ***Later…others cover Separations…***

Building & Fire Code Requirements

- Fire Compartments
  - ***Exterior Walls***
  - ***Fire Wall (CAN, 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***

“FCIA’s DIIM”

- Fire Resistance & Smoke Resistant Systems
  - Properly ***D-Designed*** and Specified Firestopping
    - FCIA - 07-84-00 – REFERENCE FROM EACH SECTION
    - ***RSW, CCS***

  - ***Tested and Listed Systems*** – Selected by INSTALLER
    - **CAN/ULC-S115, S112, S104, ASTM E2307, E2837, E3037-Movement, E2785 Exposure, UL1479 ONLY Smoke (L), Water (W)**

“FCIA’s DIIM”

- Fire Resistance & Smoke Resistant Systems
  - Professional ***I-Installation*** – FCIA Member, ULC Qualified Contractors, FM 4991 Approved
  - Properly ***I-Inspected*** –
    - ASTM E2174 / E2393
    - by IAS AC 291 Accredited Inspection Agencies,
    - Inspectors who PASS ULC, IFC, FM Firestop Exams

“FCIA’s DIIM”

- Fire Resistance & Smoke Resistant Systems
  - ***M-Maintain Protection*** –
    - Annual Visual Inspection? by FCIA Members –
    - Inspection to maintain integrity?
      - **National Fire Code of Canada**
  - **http://www.constructioncanada.net/firestopping-and-effective-compartmentation/**
  - ***www.FCIA.org/LifeSafetyDigest***

Continuity

Effective Compartmentation Features

Installation – Who?

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

Conclusion –

Without Single Firestop Installation Contractor….

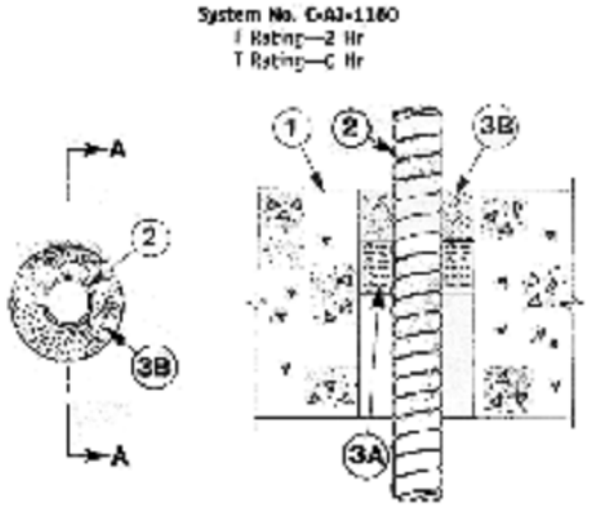
Fire & life safety risks

Adler Photo

3 Firestop Installation Methods

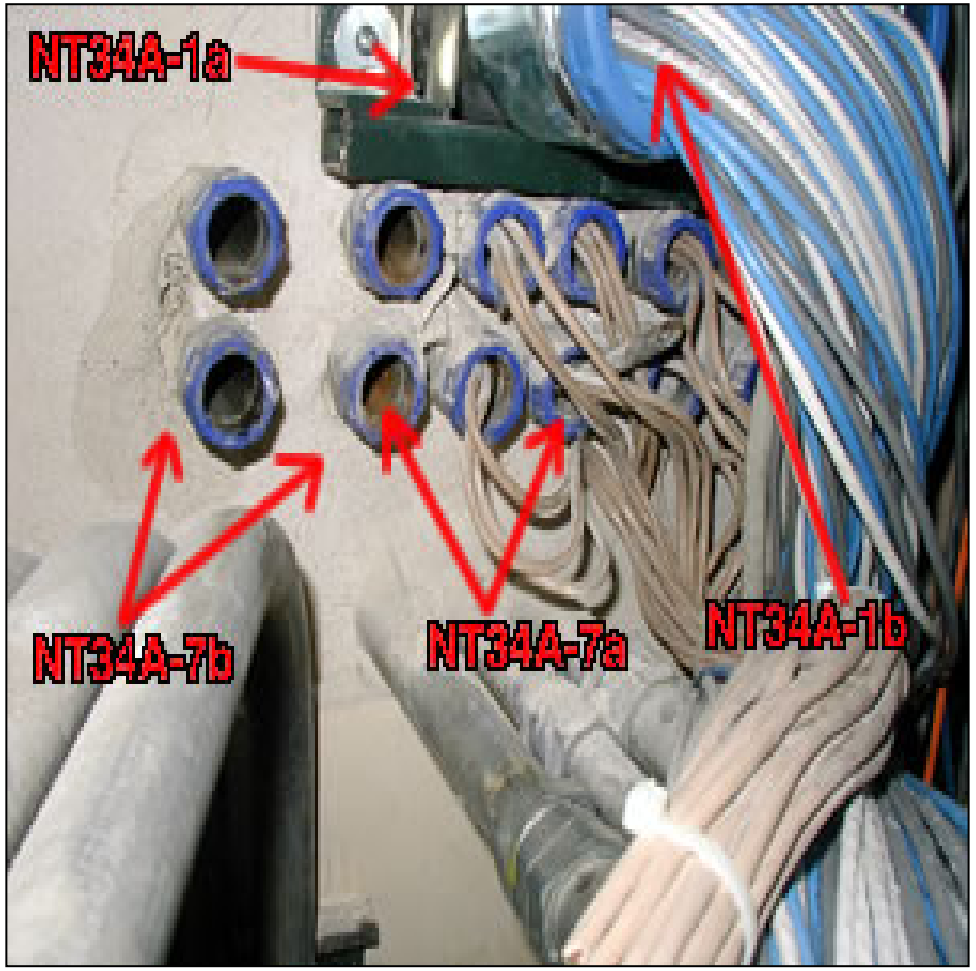
- **Each Trade**
  - “He/She who pokes hole, fills hole”
- **Multiple Contracts**
  - Firestop Contractors, Trades
- **Single Source Firestop Contractor**
  - ***FCIA Member in Good Standing***
  - ***FM 4991, UL, ULC Qualified***

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 1/2 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
- Fire Wrap & Penetrations
  - Kitchen
  - Stair Pressurization
  - Fume Exhaust
- Rolling & Swinging Doors

Requirements for Protecting Breaches

- Each type of **breach** has a unique fire test using a ULC standard and a smoke leakage test standard associated with it which compliments CAN/ULC-S101

Requirements for Protecting Breaches

- **Penetrations**
  - Fire / Hose Stream Test Standards
    - CAN/ULC-S115 (UL 1479)
    - PLASTIC PIPES – ASTM E814 DOES NOT = ULC S115
    - 50pa, vs. 2.5pa Pressure = Means DIFFICULTY PASSING
  - Smoke Leakage Standard
    - ONLY in CAN/ULC-S115
    - Any Lab can perform fire test, but ULC S-115 is the standard.

Requirements for Protecting Breaches

- **Joints**
  - Fire / Hose Stream Test Standards
    - CAN/ULC-S115 (Construction Joints),
      - ASTM E2307 (Perimeter Fire Containment),
      - ASTM E2837 (Cont. HW Joints)
      - UL2079
  - Smoke Leakage Standard
    - CAN/ULC-S115

Requirements for Protecting Breaches

- **Opening Protectives**
  - Fire / Hose Stream Test Standards
    - CAN/ULC-S104 (Fire Doors),
    - CAN/ULC-S113 (20 min Wood Fire Doors),
    - CAN/ULC-S105 (Fire Door Frames),
    - CAN/ULC-S106 (Fire Windows, FPR Glazing, Glass Blocks),
    - CAN/ULC-S101 (FRR Glazing)
  - Smoke Leakage Standard
    - UL 1784

Requirements for Protecting Breaches

- **Duct and Air Transfer Openings**
  - Fire / Hose Stream Test Standards
    - CAN/ULC-S112 (Fire and Combination Dampers),
    - CAN/ULC-S112.2 (Ceiling Firestop Flap Assemblies)
  - Smoke Leakage Standard
    - ULC-S112.1 (Smoke and Combination Dampers)

Firestopping for Continuity

Products become SYSTEMS Based on Testing

- **‘Field Erected Construction…Tested to…’**
  - Standards – CAN/ULC-S115, ASTM E2307, ASTM E2837
  - F Rating – Flame
  - FT Rating – Temperature
  - FH Rating – Hose
  - FTH Rating – Flame, Temperature & Hose Stream
  - L Rating – Smoke
  - W Rating – Water
  - M Rating – Movement

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

- F
- FT
- (FTH)

Affinity Firestop Photo

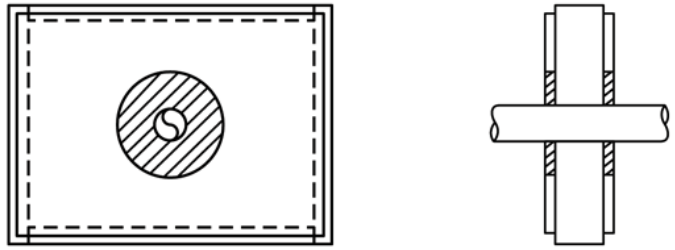
L Rating (Optional) ULC-S115

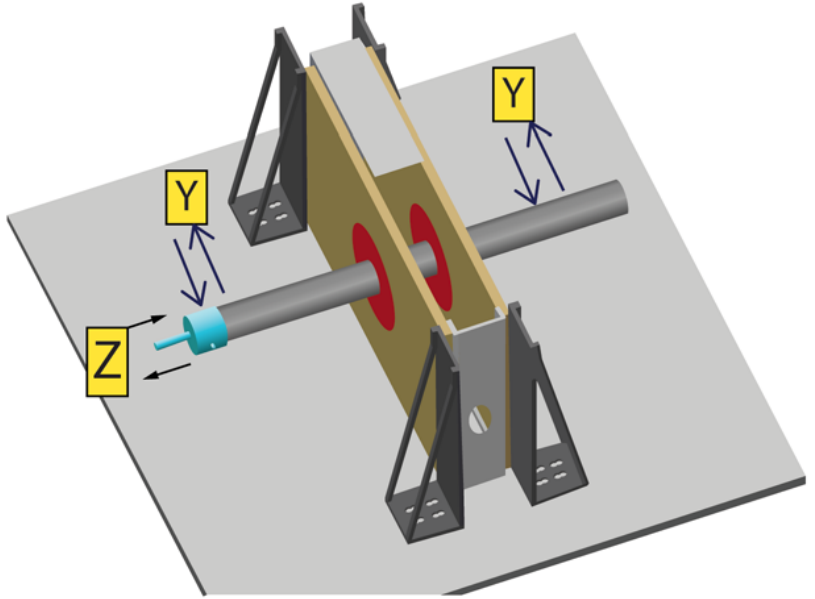
- Air Leakage Rate at Ambient Temperature
- Air Leakage Rate at 400ºF (204ºC)

W Rating (Optional) ULC-S115

- 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 Image)

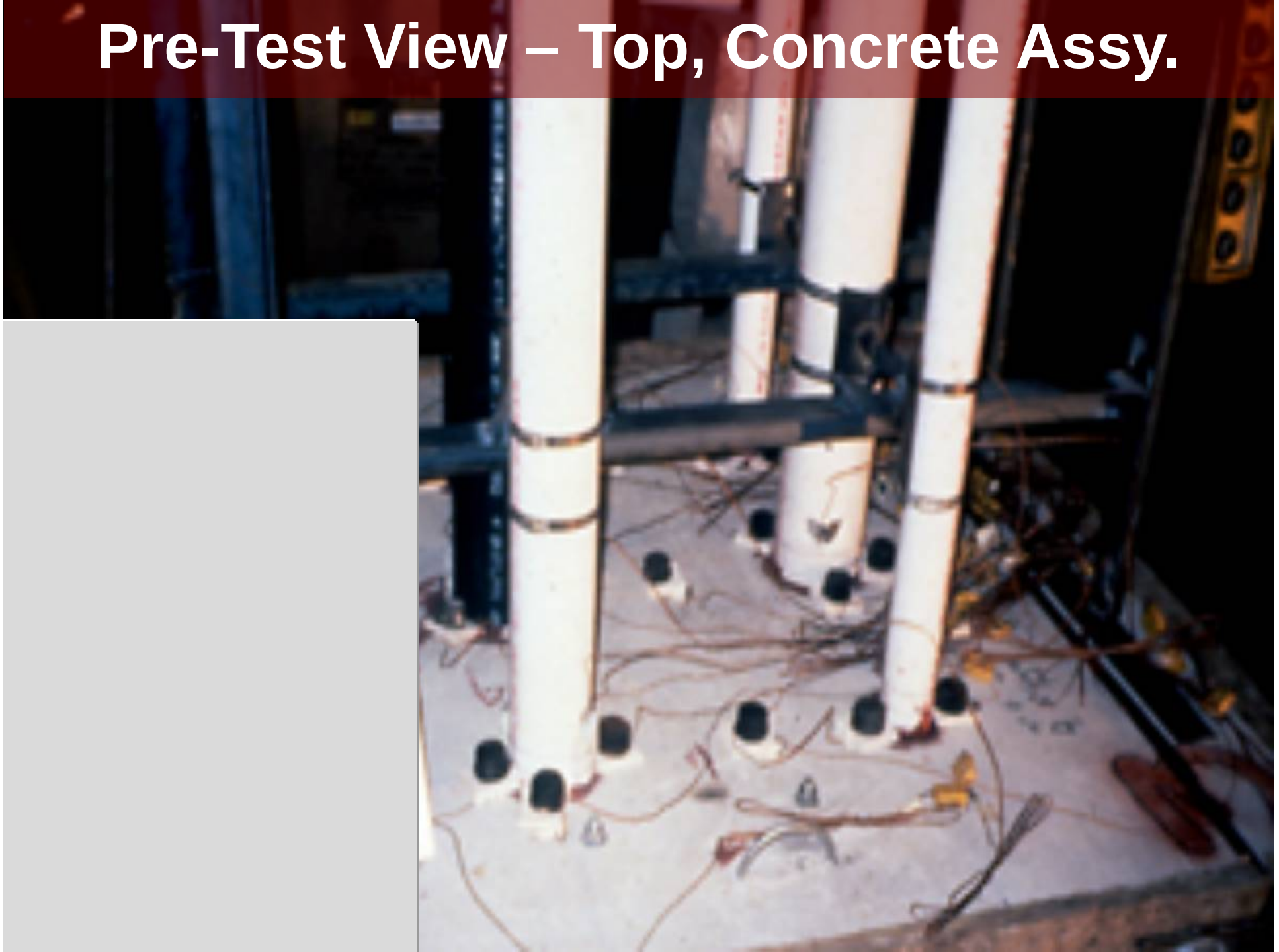




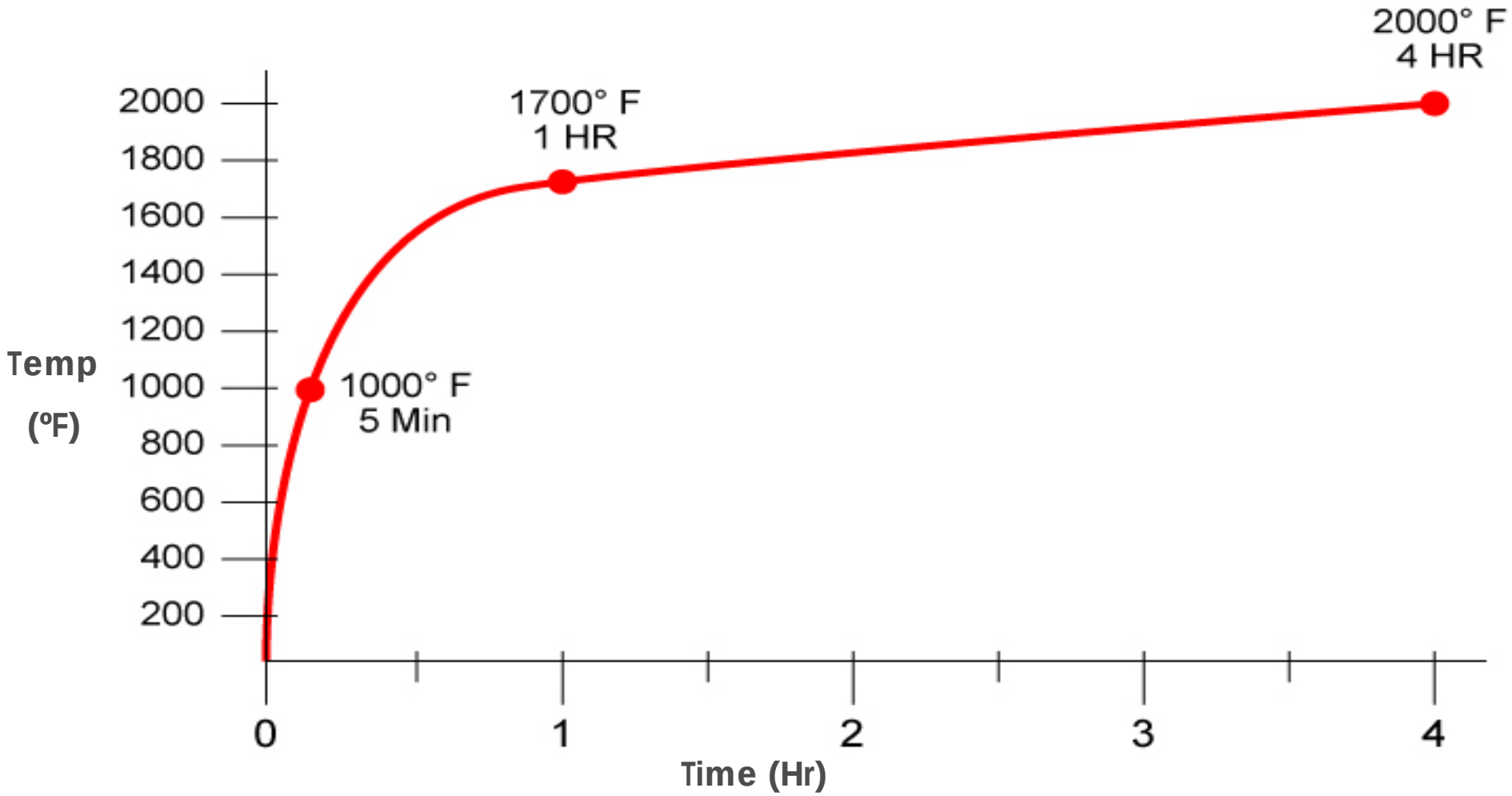
M Rating (Optional) ASTM E3037

- 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

Pre-Test View – Top, Concrete Assy.



Time-Temperature Curve

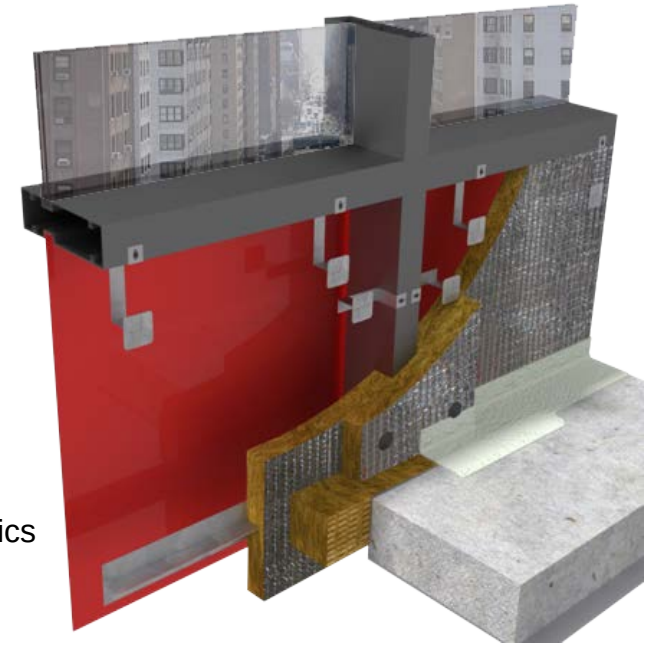


Building & Fire
Worldwide Code Requirements

- *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**

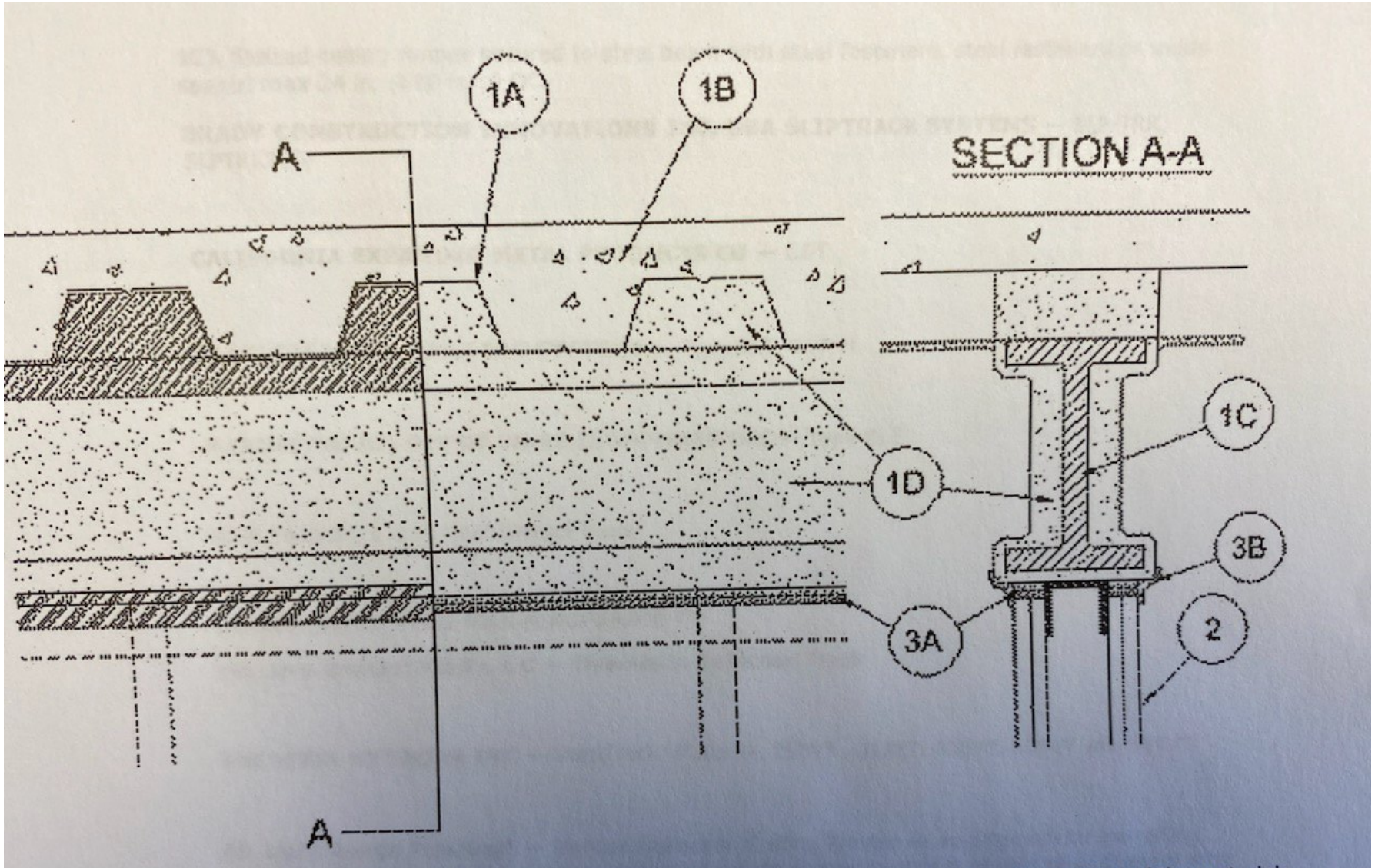


OCF/Thermafiber Graphics

Joints and Voids
I-Beam to Fluted Deck

Firestop Solutions Photo

Joints and Voids
I-Beam to Fluted Deck



Beam through GWB

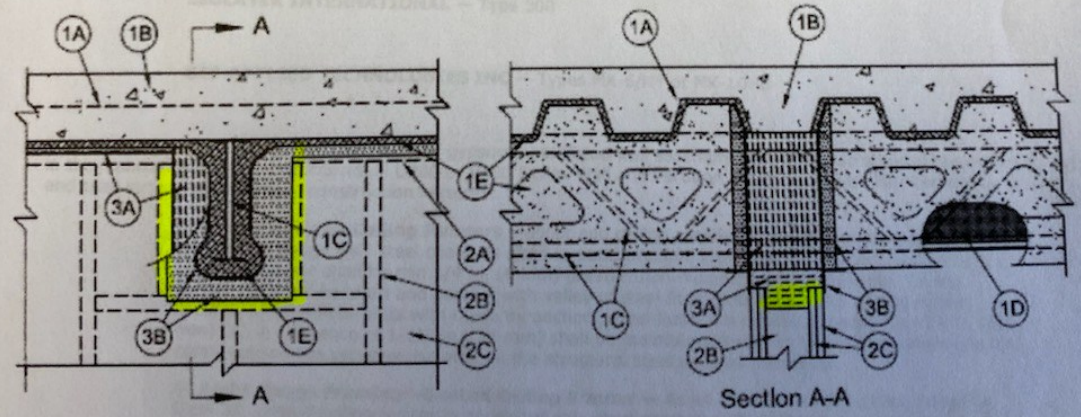
See General Information for Joint Systems

See General Information for Joint Systems Certified for Canada

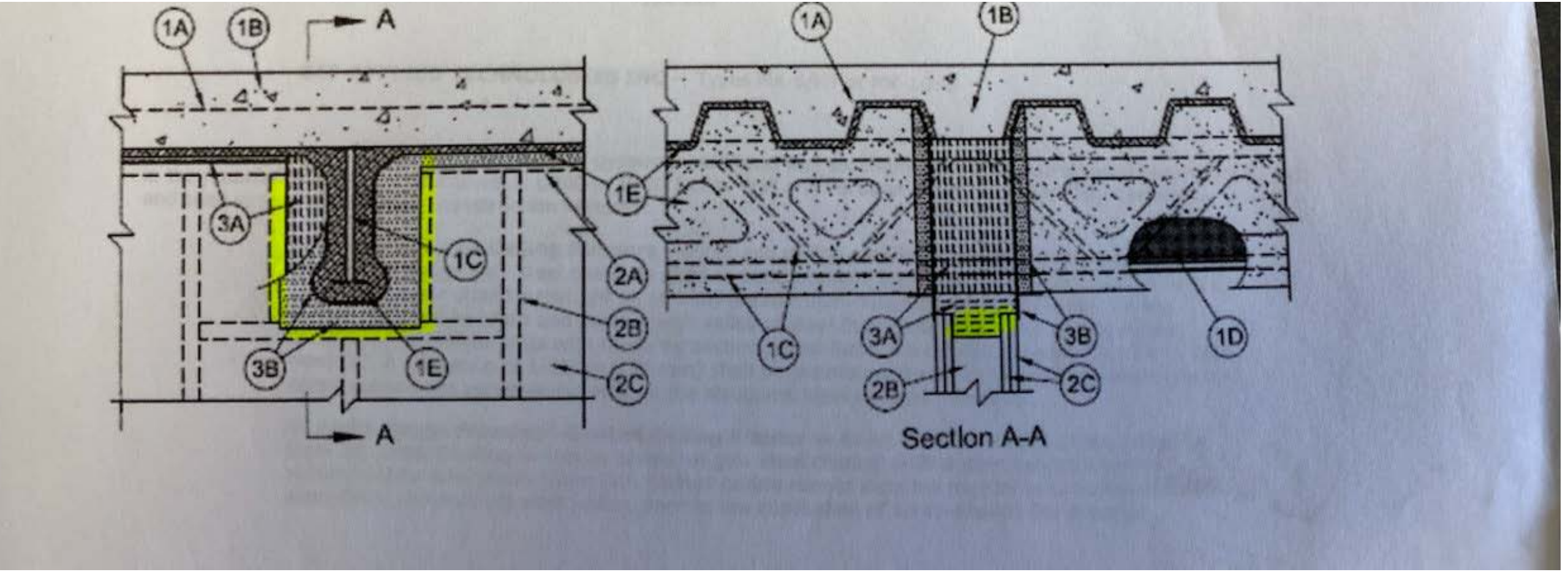
System No. HW-D-0218

September 01, 2016

ANSI/UL2079	CAN/ULC S115
Assembly Ratings — 1 and 2 Hr (See Item 2)	F Ratings — 1 and 2 Hr (See Item 2)
Nominal Joint Width - 1-1/2 In.	FT Ratings — 1 and 2 Hr (See Item 2)
Class II Movement Capabilities — 25% Compression or Extension	FH Ratings — 1 and 2 Hr (See Item 2)
L Rating At Ambient — Less Than 1 CFM/lin ft	FTH Ratings — 1 and 2 Hr (See Item 2)
L Rating At 400 F — Less Than 1 CFM/lin ft	Nominal Joint Width - 1-1/2 In.
	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



Beam through GWB



Sleeved Pipes

How Many Penetrating Items?

How close to Door Frames?

How Close to Head of Wall?

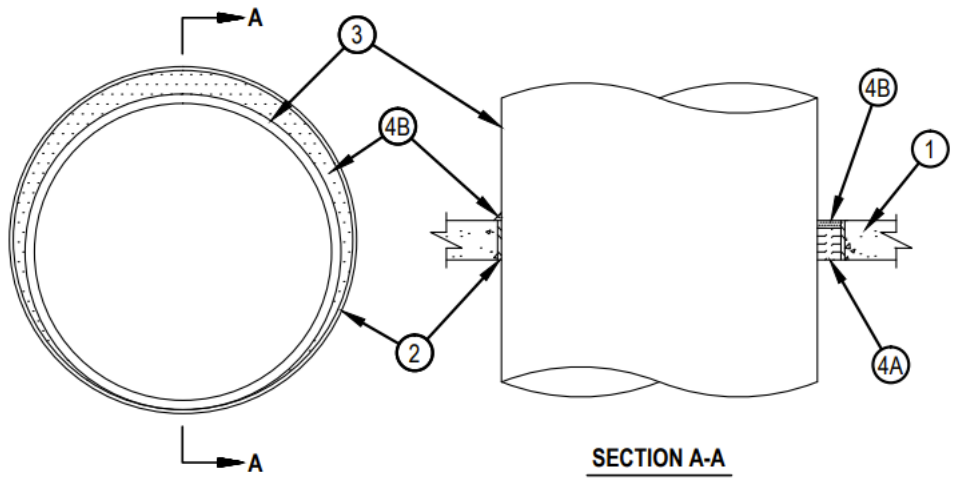
WALL LISTINGS

CAJ 1155

Classified by
Underwriters Laboratories, Inc.
to UL 1479 and CAN/ULC-S115

System No. C-AJ-1155

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 and 3 Hr (See Item 3)	F Rating — 2 and 3 Hr (See Item 3)
T Rating —0 Hr	FT Rating — 0 Hr
L Rating At Ambient — Less Than 1 CFM/sq ft	FH Rating — 2 and 3 Hr (See Item 3)
L Rating At 400 F — 4 CFM/sq ft	FTH Rating — 0 Hr
W Rating — Class 1 (See Item 4)	L Rating At Ambient — Less Than 1 CFM/sq ft
	L Rating At 400 F — 4 CFM/sq ft



SECTION A-A

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…

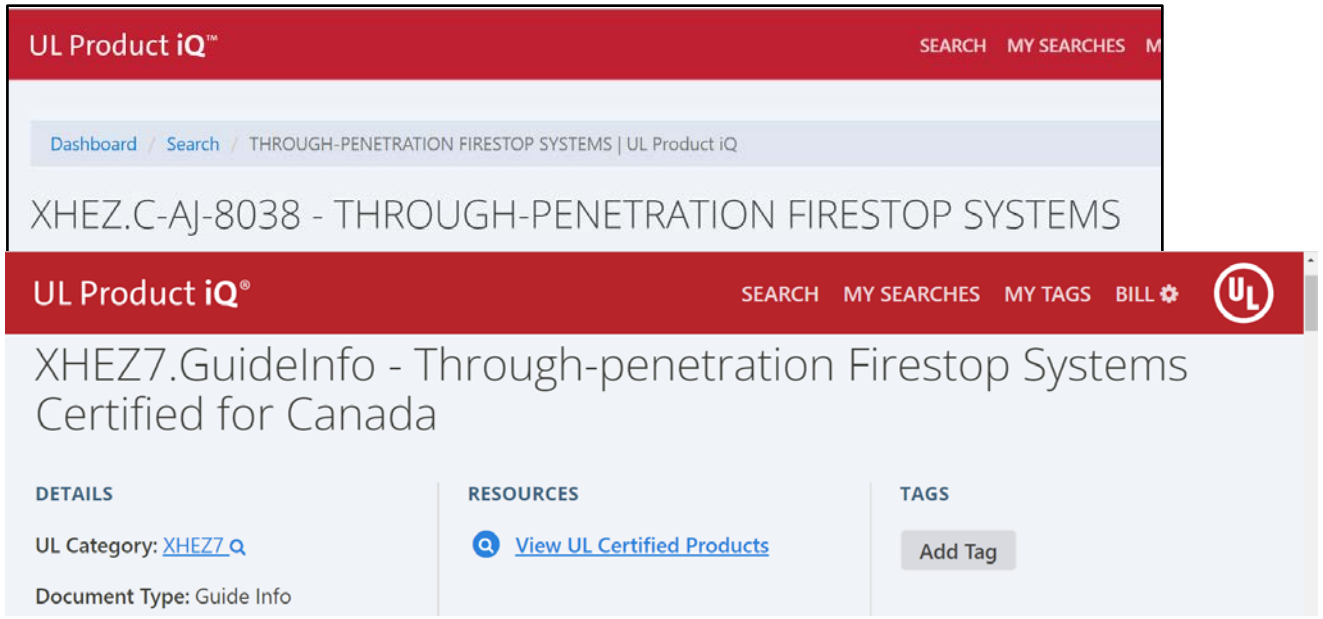
Consult the Damper Manufacturer & the Authority Having Jurisdiction

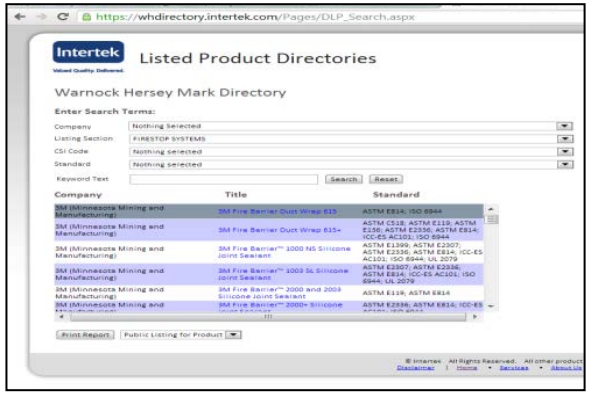
Greenheck Photo

Fire Separation Continuity Products become SYSTEMS

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

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 – EJ**
    - ***Engineering Judgment* –**
      - ***"EJ"***
    - ***Equivalent Fire Resistance Rated Assembly***
      - ***"EFRRA"***

J. Sharp – ProFirestop Photo

C. Zussman – Pepper Photo

Engineering Judgments/EFRRA

- **EJ Process….**
  - ***Reviewed by Designer,***
  - ***Possibly Fire Consultant***
  - ***P.Eng. Stamp?***
  - ***AHJ after Architect Approval***
  - ***Signoff by EOR, FS Manufacturer??***

- ***IFC Protocol….***

J. Sharp – ProFirestop Photo

C. Zussman – Pepper Photo

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

Engineering Judgments/EFRRA

International Firestop Council – Manufacturers Protocol
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….’

FCIA RECOMMENDS CONTRACTOR REQUEST MANUFACTURER STATEMENT FOR ALL EJ”s…

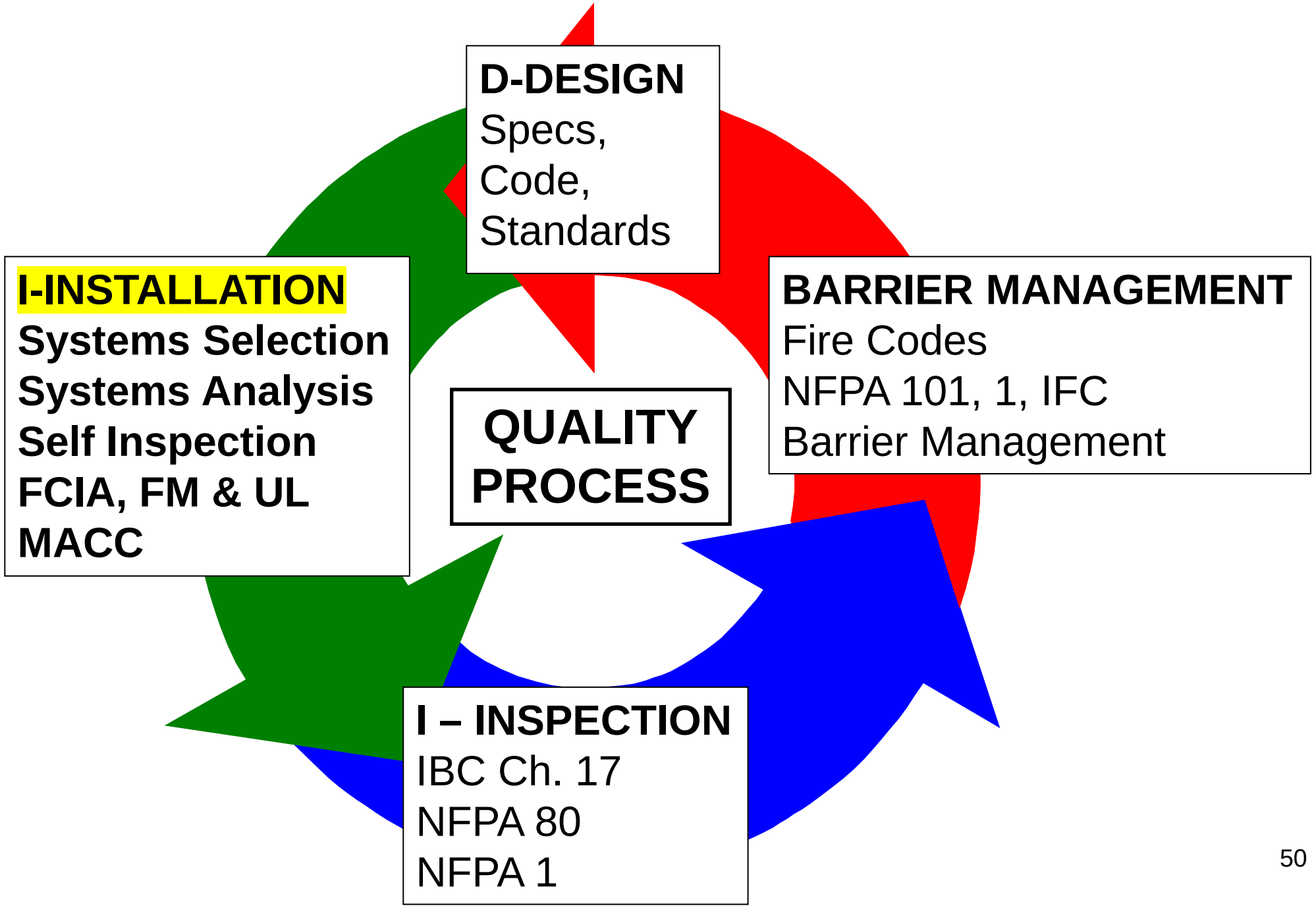
Engineering Judgments/EFRRA

FCIA RECOMMENDS CONTRACTOR REQUEST MANUFACTURER STATEMENT FOR ALL EJ"s….

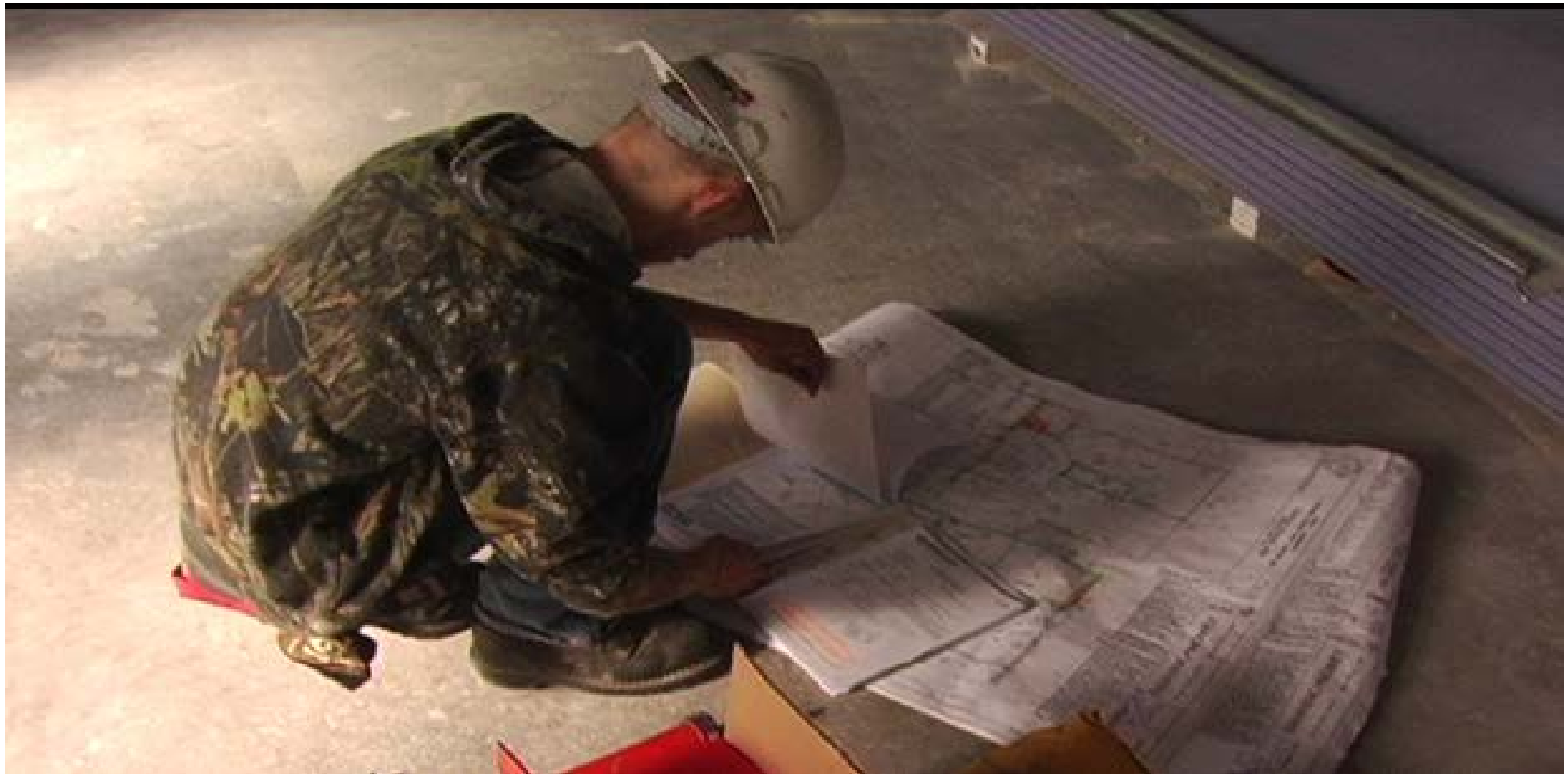
"Manufacturer attests this EJ will pass applicable firestop fire test with hose stream if subjected…"

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


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

Understand Building Requirements



Firestop Products Become SYSTEMS – Sealant, Tape, Spray & MW Mineral Wool

- Backing/Damming/Packing AND
- Sealants
  - Silicone, Acryic/Latex, Intumescent
- Wrap Strips & Collars
  - “Thick, Thin, Wide, Less Wide”
- Putties
- Pre Fabricated MCT Devices
- Fire Pillows
- Firestop 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, Joint, Breach Sizes
- Packing/Damming/Backing Materials
- Fill Material(s)

= Rated Firestop System

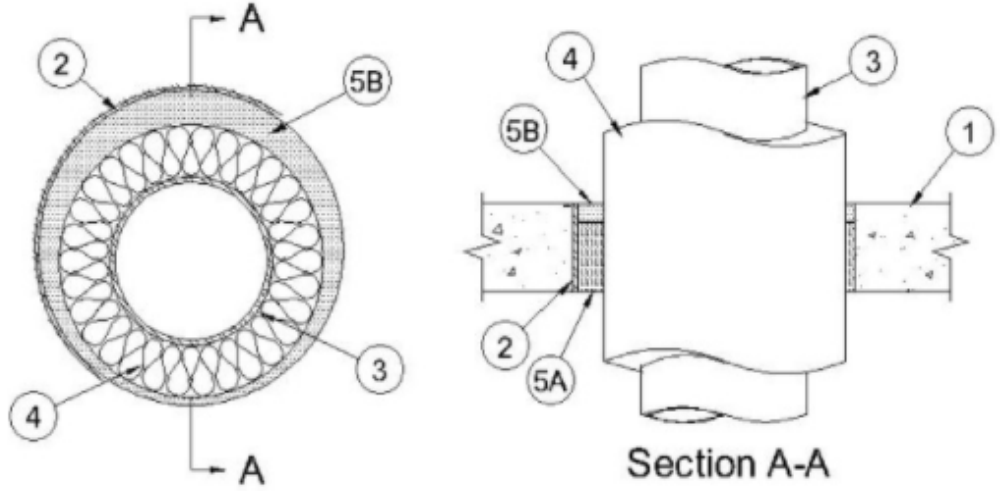
Manufacturers Instructions, Tested and Listed Designs

STI Graphic

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.

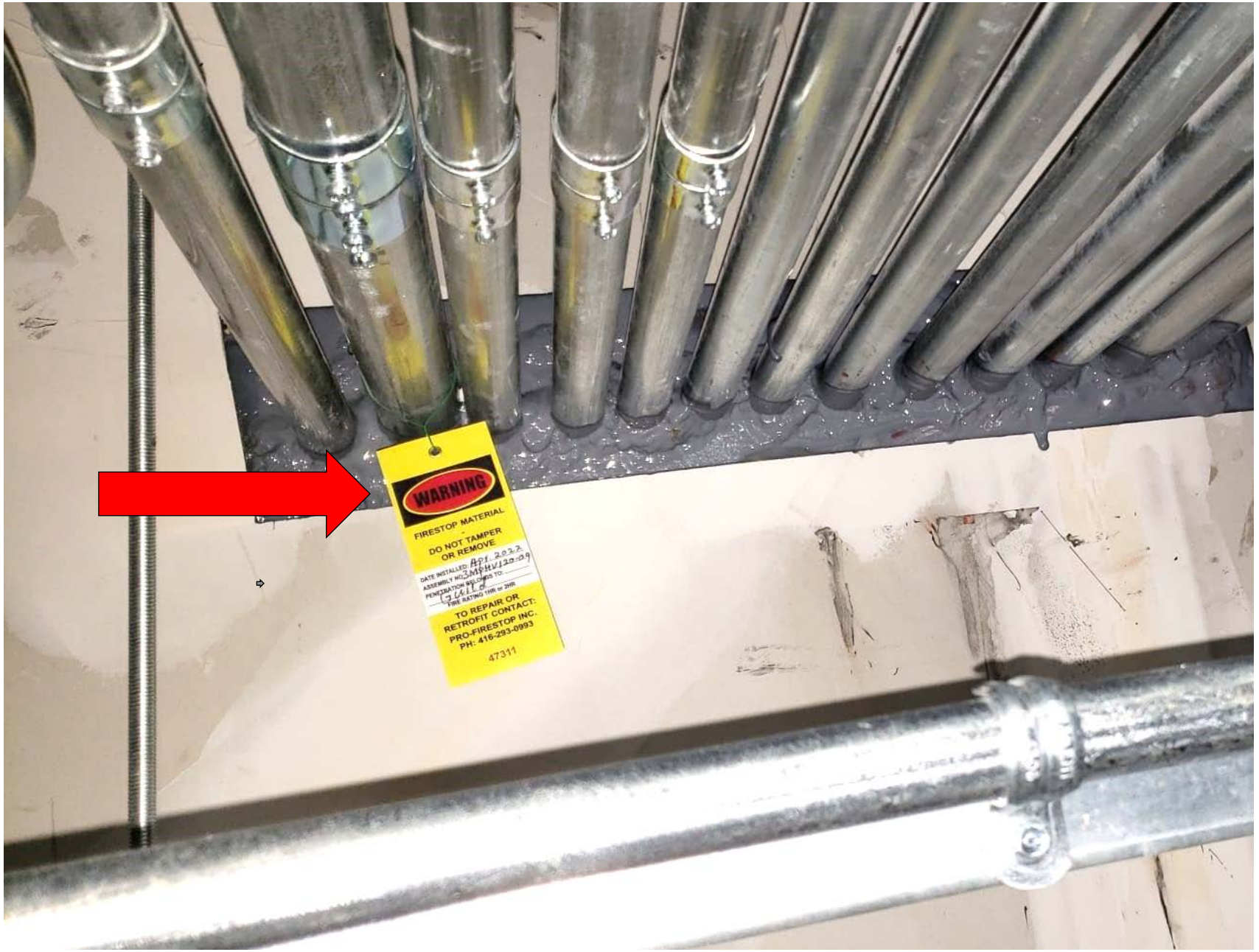
Systems & Materials….

FCIA Recommended Professional Practice Identification Systems

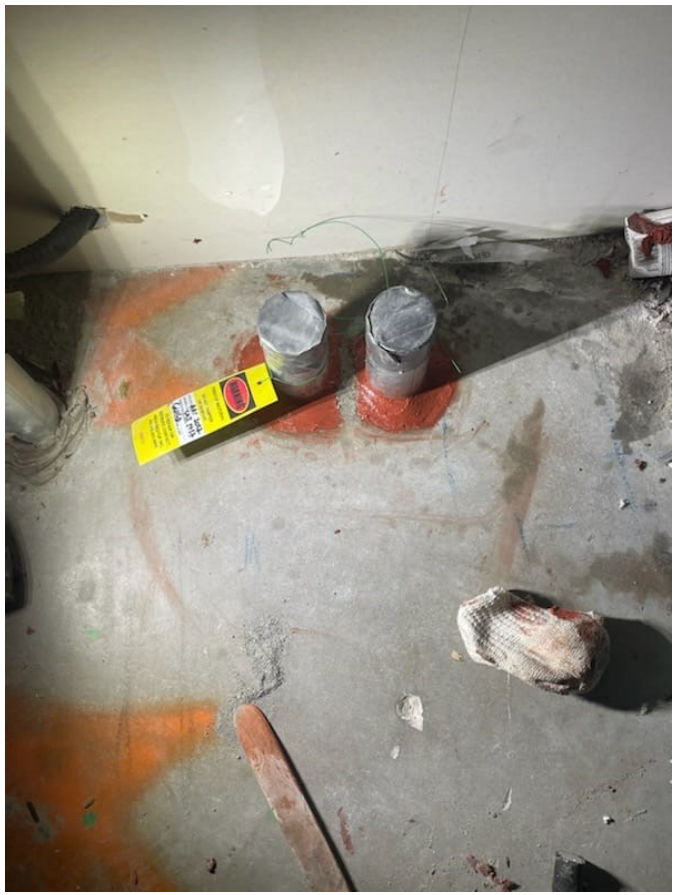
“Labelling”

-On-

Wall/Horizontal Assy. Penetrating Item Hanging




WARNING
FIRESTOP MATERIAL
DO NOT TAMPER OR REMOVE
To repair or retrofit contact:
PRO-FIRESTOP INC. 416-292-0853




WARNING

FCIA @ NBCC, IBC, NFPA…
Building & Fire Code Development Process

- **National Building Code – Canada**
- NFPA 5000 – 101- Chapter 8
- International Codes –
  - New and Existing Buildings International Building Code – Chapter 7
  - International Fire Code – Chapter 7

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

FCIA's 2020-2025 Proposals – National Building Code of Canada

- **Add "Breach" Term to the Code…APPROVED**
- **Change "Fire Stop to "Firestop"…APPROVED**
- **45 minute Fire-Resistance - ROOFS**
- **Firestop Installation Standards**
  - ULC Qualified Firestop Contractors or FM 4991 Approved
  - **DISAPPROVED 2020 …**
- **Firestop Inspection -**
  - ASTM E2174 and ASTM E2393 Standards for On-Site Firestop Inspection
  - **DISAPPROVED 2020 – "No Objective??"**
- **Maintain Protection – Annual Visual Inspection - DISAPPROVED**

Contractor Qualifications

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

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

Why Contractor Qualifications?

- **Documentation = Inventory**
- **Firestop Contractors RESPECT SYSTEMS**
  - **Fire-Resistance SYSTEMS Selection & Analysis**
  - **SYSTEMS & As Builts – Maintain Protection**
  - F, T, L, W, M Rated Systems (H)
- Tolerances - Annular Space Sizes, Angles
- Gap Sizes - Undercuts - Framing
- Anchors - Spacing – Hardware

What are Parts of FM 4991 & UL/ULC QFC

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

Management System – ULC, FM

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

Management System – ULC, FM

- **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

Issued: January 31, 2018

Company Name: Underwriters Laboratories Inc. File number: R12345

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

Copyright© 2012 UL LLC

Sample

Is Passive Fire Protection Maintained?

- Fire Separations / Barriers? **WHAT?**
  - Fire-Resistance Rated Walls/Floors
  - Penetrations & Joints
  - Fire Doors
  - Fire/Smoke Dampers
  - Fire-Rated Glazing
- In-House Staff?
- Fire Separation/Barrier Contractor?

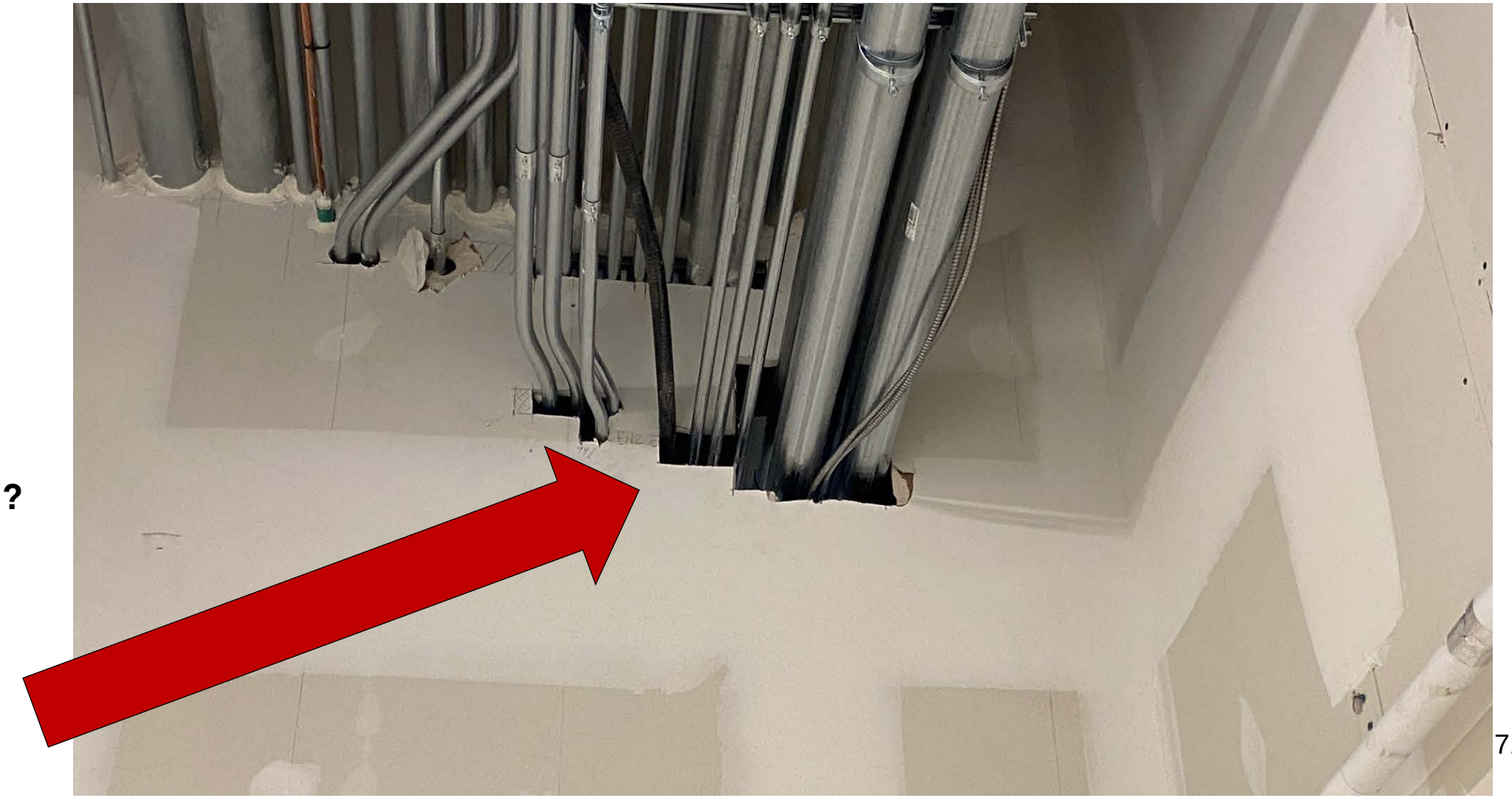
Facility Maintenance Budget Line Items…

- Fire-Sprinklers, Pumps, etc…**YES**
- Fire-Detection & Alarms…**YES**
- Fire Separations / Barriers? **WHAT?**

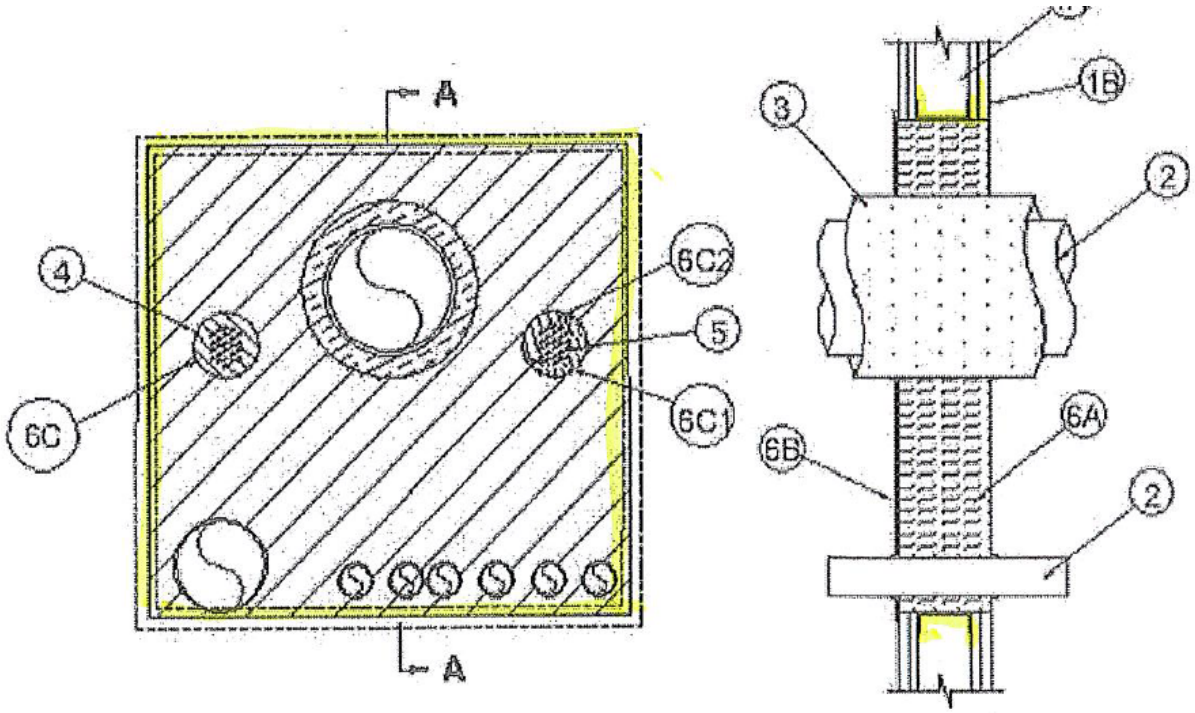
Firestopping & Compartmentation
Do we have a Problem??

FOAM STILL???

Firestopping & Compartmentation
Do we have a Problem??



Firestopping & Compartmentation
Do we have a Problem??



Section A-A

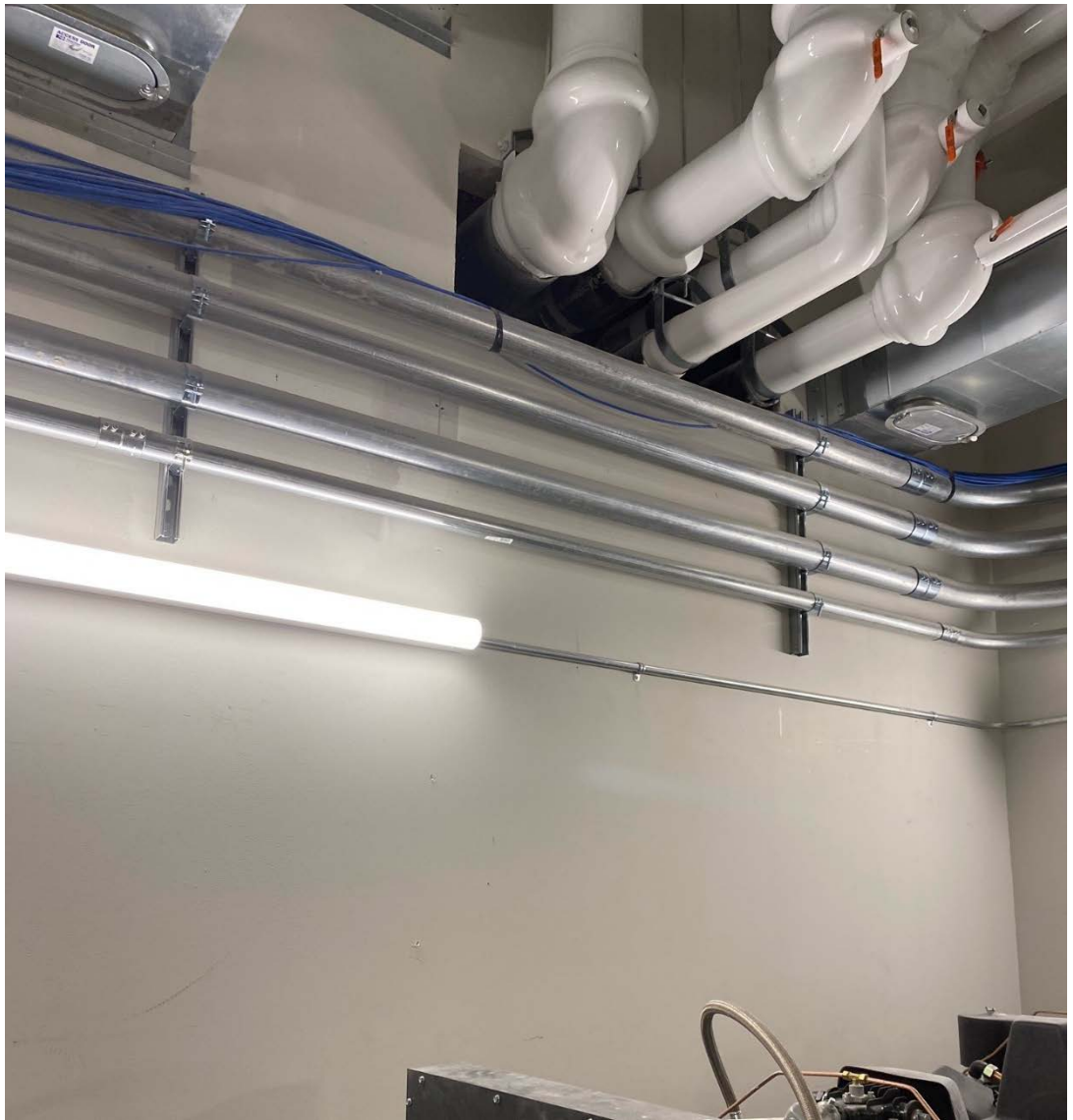
1. **Wall Assembly** — The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction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

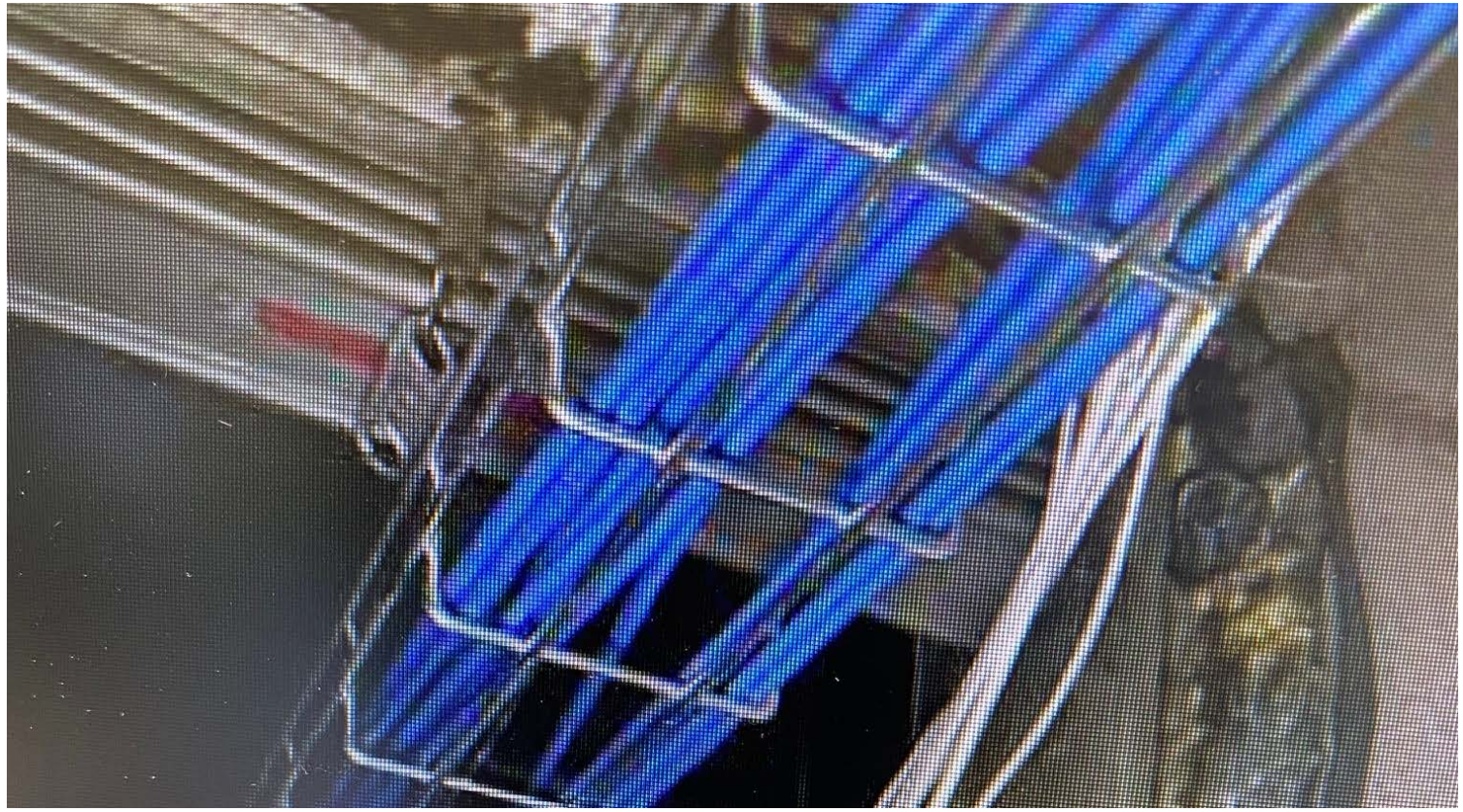
:. Additional framing members shall be located to completely frame the opening.

Firestopping & Compartmentation
Do we have a Problem??

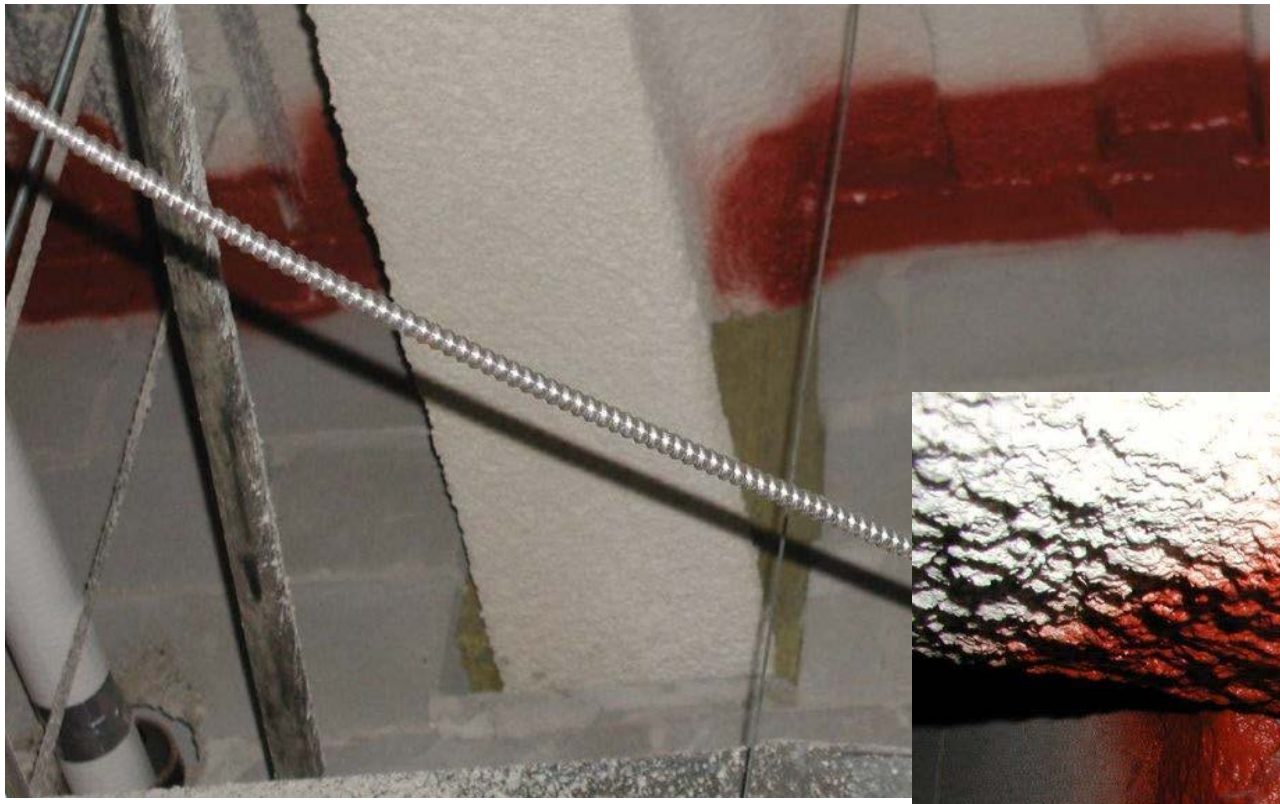


Firestopping & Compartmentation
Do we have a Problem??

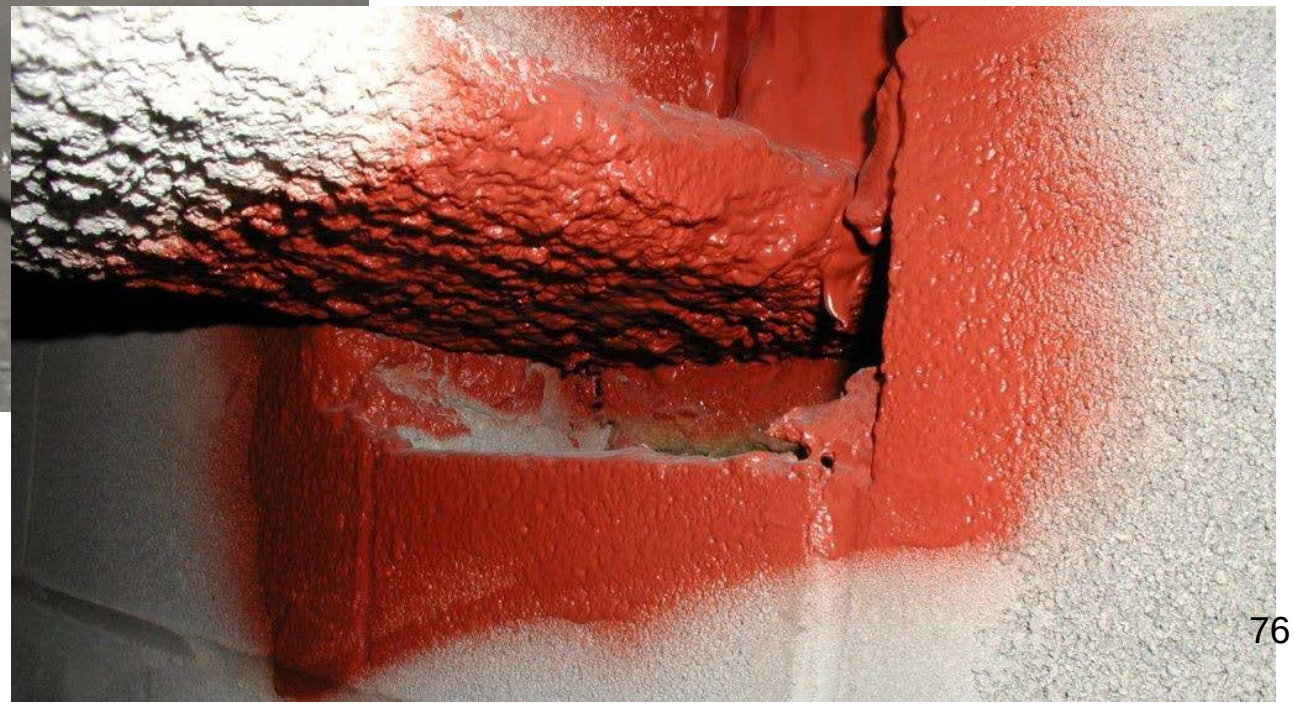
Cable Tray through a FIRE DAMPER?



Firestopping & Compartmentation
Do we have a Problem??



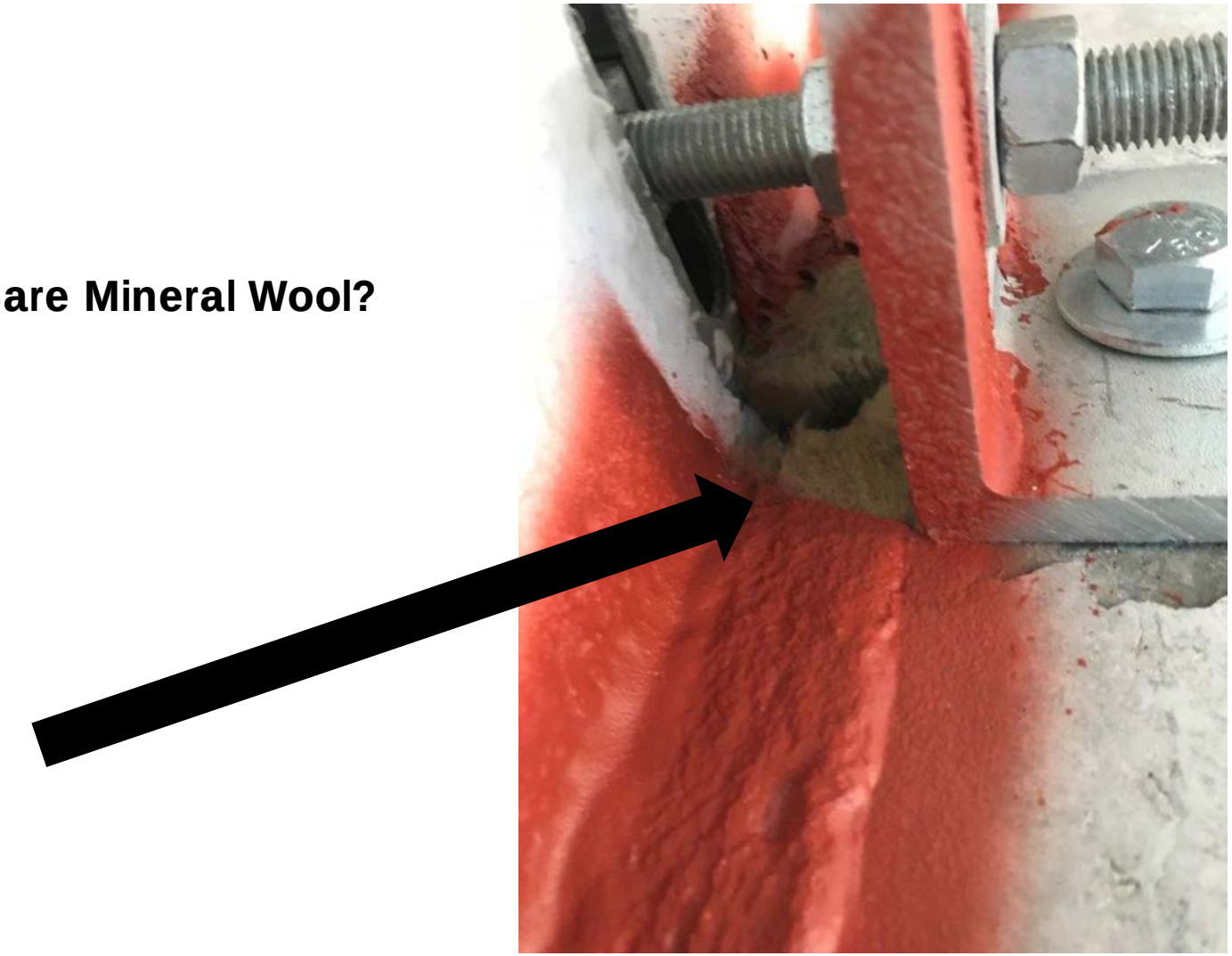
Beam Pocket SYSTEMS? NOT HERE



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?

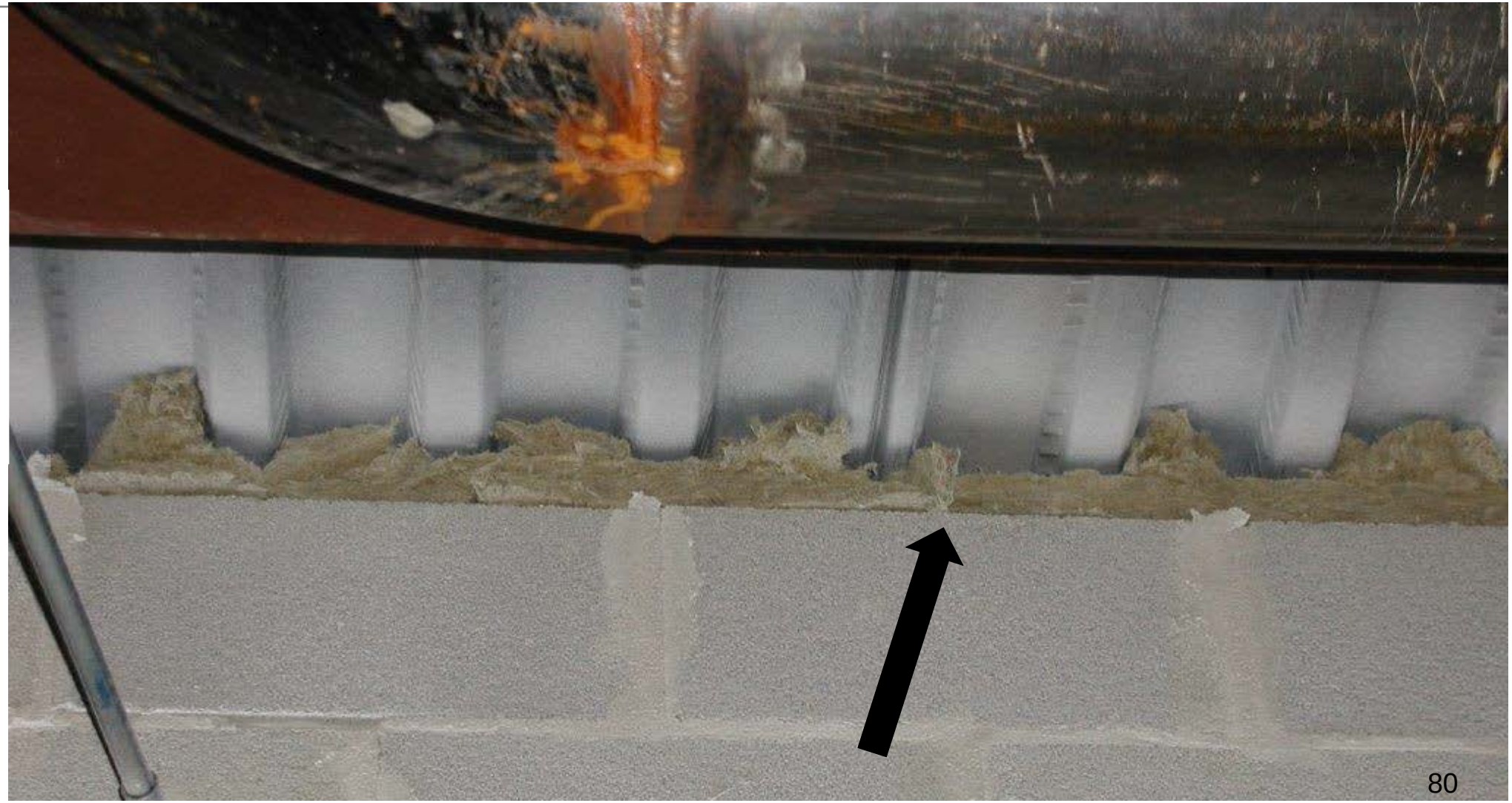
SYSTEM??

Firestopping & Compartmentation
Do we have a Problem??

Mineral Wool with NOTHING?

Continuity?

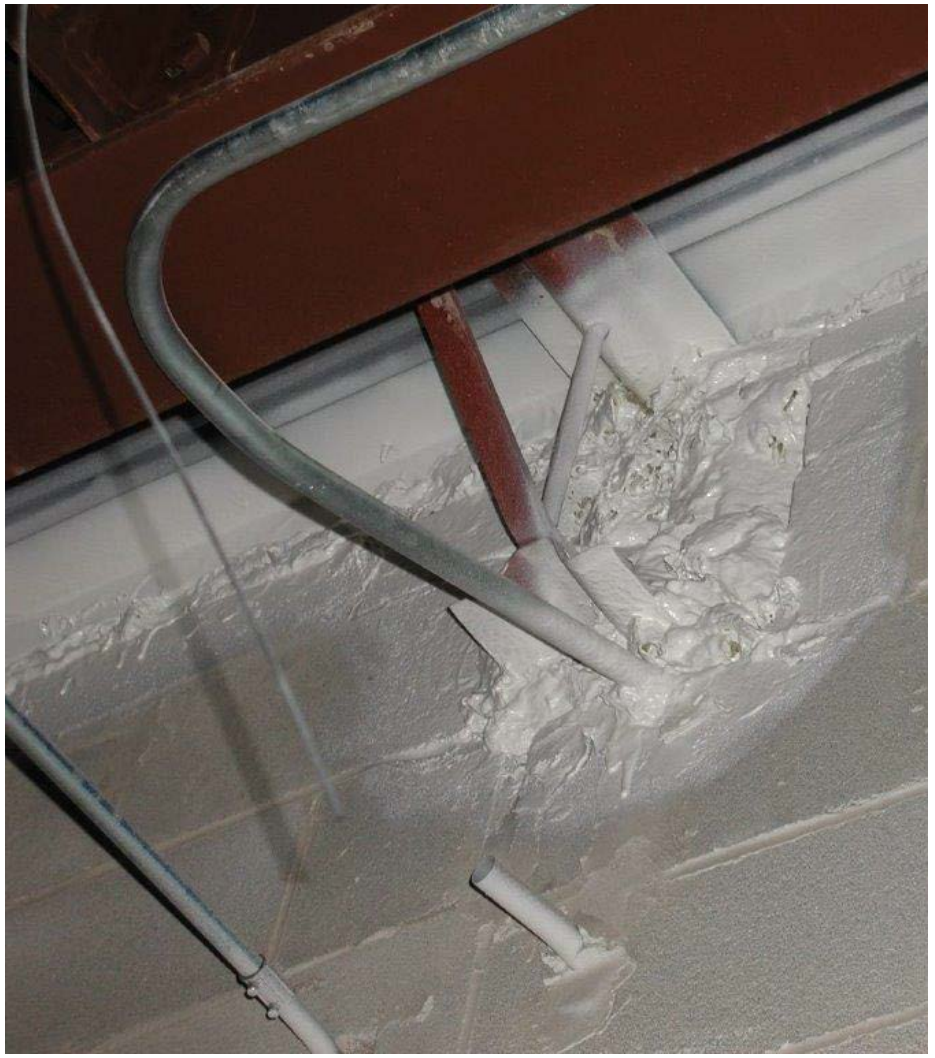
SYSTEM?



Firestopping & Compartmentation
Do we have a Problem??

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

SYSTEM STATES
COMPRESSION



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

CANADA?

Firestopping & Compartmentation
Do we have a Problem??

Firestopping & Compartmentation
Do we have a Problem??

Transitions

Metal Pipe
Plastic Pipe

UNSAFE

NBC 2020?

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

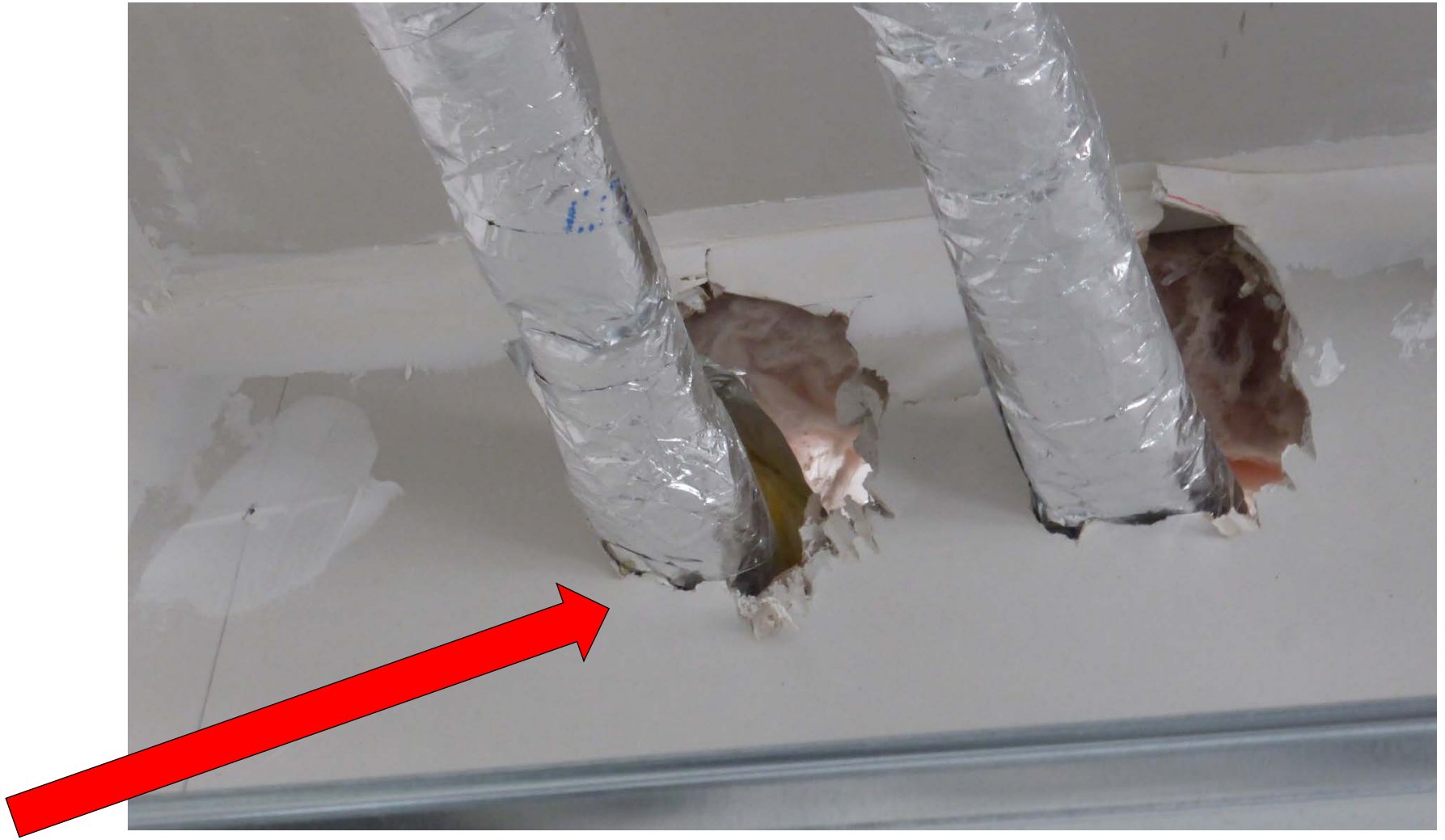
System LIMITS ANNULAR SPACE

Sleeve? Collar? Caulk Only?

FOLLOW LISTING

Firestopping & Compartmentation
Do we have a Problem??

Annular Space Control?



Firestopping & Compartmentation
Do we have a Problem??

What's this?

Plastic PEX Copper Supply Pipe

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)

&

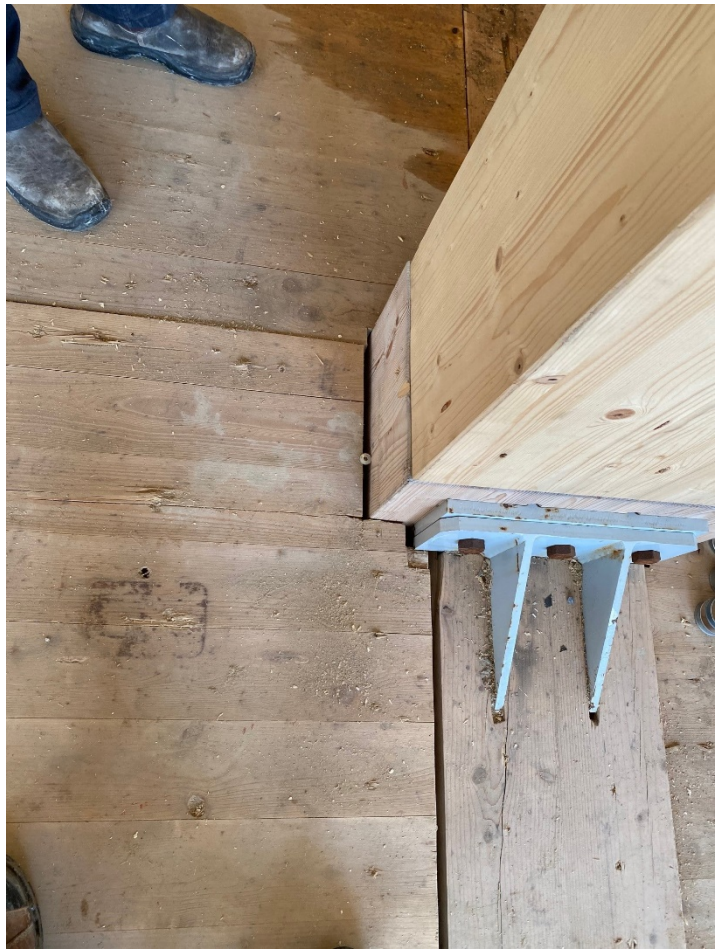
Firestopping

ALL EJ's now

New Developments….

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

New Developments….



Firestop & Inspection

- **Contractor Self Inspection/Survey**
  - Verify Management System validity
- **Manufacturer Inspection?**
  - Does not exist … Survey, maybe
- **3rd Party Inspection/Commissioning**
  - **ASTM E2174 & ASTM E2393**
  - Independent 3rd Party
  - Destructive, Non Destructive
  - Specified Frequency

Firestop & Inspection

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





Firestop & Inspection

What SYSTEM is THIS?

Firestop & Inspection

Mineral Wool and??

Firestop & Inspection

What SYSTEM?

I – Inspection –

- In Master Specifications…Commercial Buildings

- Not Required in NBC
  - NBC Code Proposal – 2020 … and 2025
  - MUNICIPALITY CAN REQUIRE??
  - Sprinklers Require, why not FIRESTOPPING?

- Required, International Building Code – Chapter 17

Firestop Systems Inspection
ASTM E2174 - ASTM E2393

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

    = Authorizing Authority

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

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

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 Certs.**

INTERNATIONAL ACCREDITATION SERVICE®

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


Affinity Firestop Photo


GARDER HORS DE PORTÉE DE
KEEP OUT OF REACH OF CHILDR
Affinity Firestop Photo


Affinity Firestop Photo

Firestop Inspection Process
ASTM E2174 - ASTM E2393

- Pre-Construction Meeting
  - Conflict Resolution
  - Communication Time
  - 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 Documents
  - Specifications and Drawings
  - Manufacturer Product Data Sheets and Installation Instructions
  - Listed Systems and EJ's/EFRRA's

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

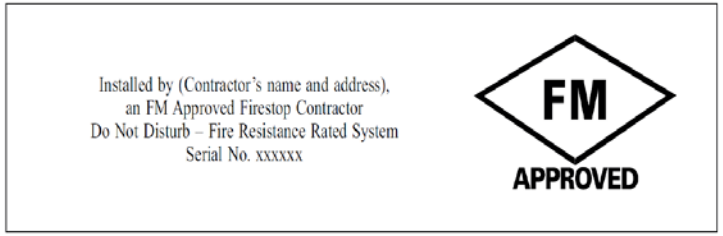
Firestop Inspection Process
ASTM E2174 – ASTM E2393

- 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

- Inspectors shall
  - **Not supervise or direct FS Contractors**
  - 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

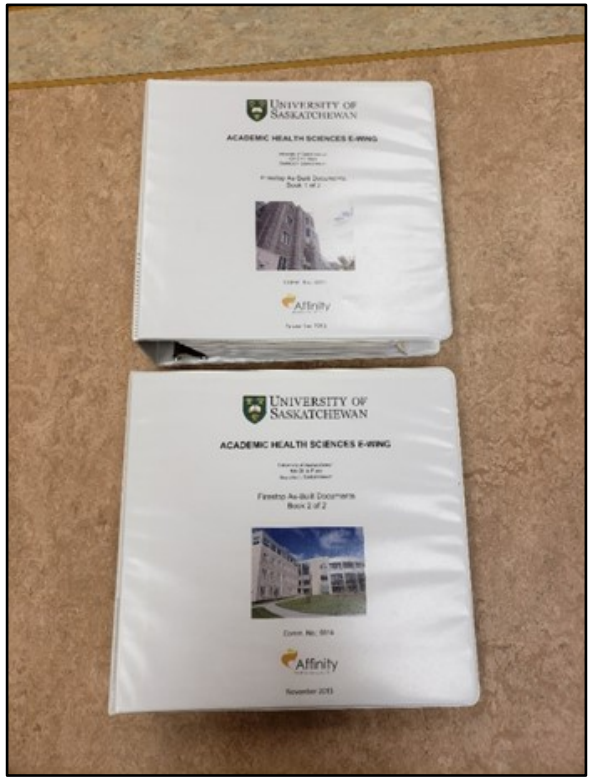
Firestop Repairs

- Repairs
  - Instruction requirements by manufacturer
  - Listed systems
  - Patch/infilling
    - Adhesion
    - Movement
    - F, FT, FH, FTH, L, W Ratings
    - ***As recommended by MFR***

Affinity Firestop Photo

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 Special Inspection
ASTM E2174 - ASTM E2393

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

Great Installation / Inspection starts @ SPEC…

New & Existing Buildings - Maintain Protection

- NEW Buildings – 07-84-00 Specs
  - www. FCIA .org & FCIA MOP
- Part I – Products…but
  - Systems
  - Product Properties
  - Manufacturers
- “Single Manufacturer to the greatest extent possible” – EJ/EFRRA’s
- SEE 07-84-00 For Firestopping From Div. 21, 22, 23, 25, 27, 28, etc.

Specs – Key Parts Relating to Installation

- **Part II– Contractor/Installer Qualifications**
  - **FCIA Member in Good Standing, AND**
  - **FM 4991, Standard for the Approval of Firestop Contractors, OR**
  - **ULC Qualified Firestop Contractor Program**
  - **AND**
  - **Manufacturer Accredited, Approved, Trained**

Specs – Key Parts Relating to Inspection

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

Specs – Key Parts Relating to Execution

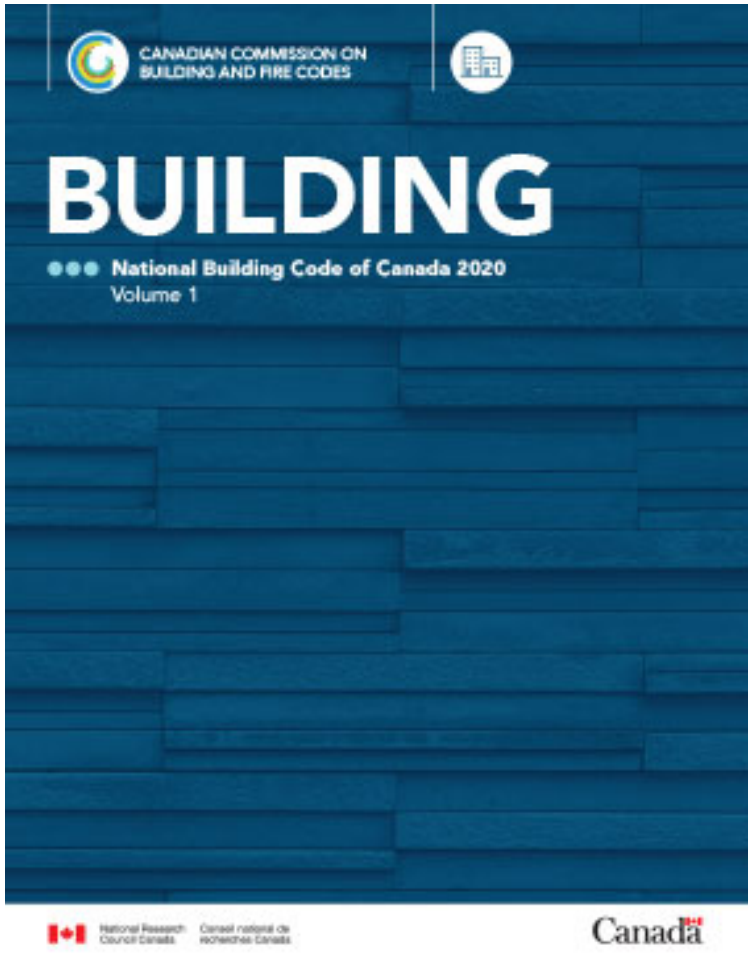
- **NEW Buildings – 07-84-00 Specs**
- **Part III – Execution**
  - **Special Inspection**
    - **ASTM E2174 – Penetrations**
    - **ASTM E2393 – Joints**

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

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

Firestopping & Compartmentation for Safety

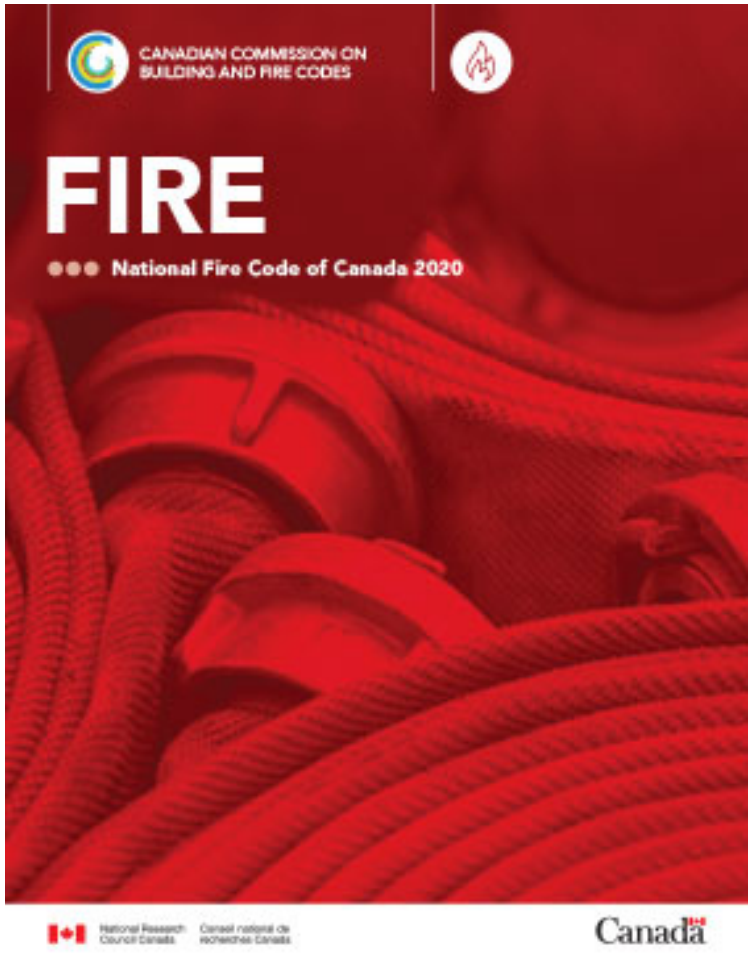
- **Canada's Codes…**
- NBCC 2015/2020
  - •Adopt Entirely!!
- NBCC 2020
  - •Adopt With Amendments??
  - •Publish Provincial Code based on National Code??
- NBCC 2025….



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.



Barrier Continuity SYSTEMS

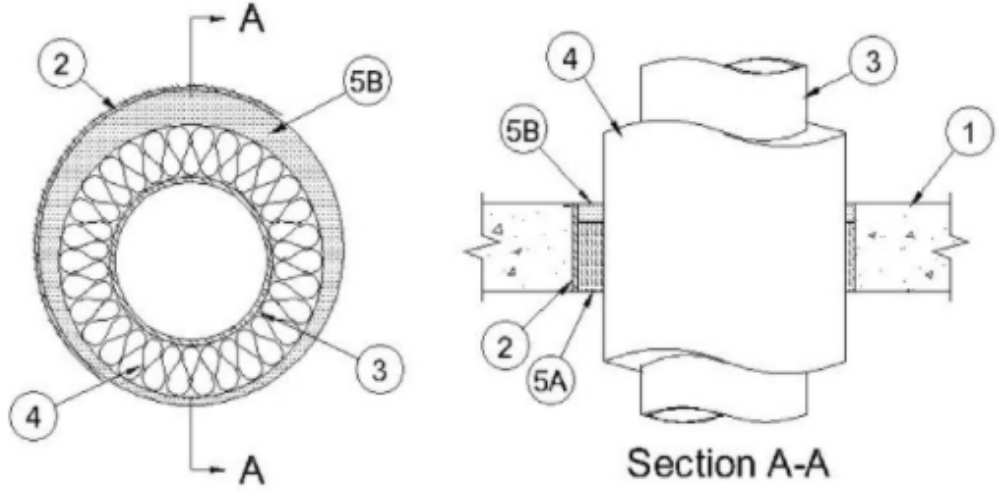
- **Products Become Systems – Test Standards**
  - **Fire & Smoke Barriers – Fire Separations**
    - **CAN/ULC-S101,** ASTM E119, UL 263
  - **Firestopping – CAN/ULC-S115,** ASTM E814 / UL 1479, UL 2079, E1966, E2307, E2837, E3037, **…**test methods…"
  - **Swinging/Rolling Fire Doors – CAN/ULC-S104, S105 Frames, S113 for 20-minute wood doors**, UL 10B/C….NFPA 252
  - **Fire Rated Glazing – CAN/ULC-S106, S101,** UL 9, ASTM E119, UL 263
  - **Fire/Smoke Dampers – CAN/ULC-S112, S112.1,** UL 555, UL 555S
- **SYSTEM Testing = Suitability Statement**

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.

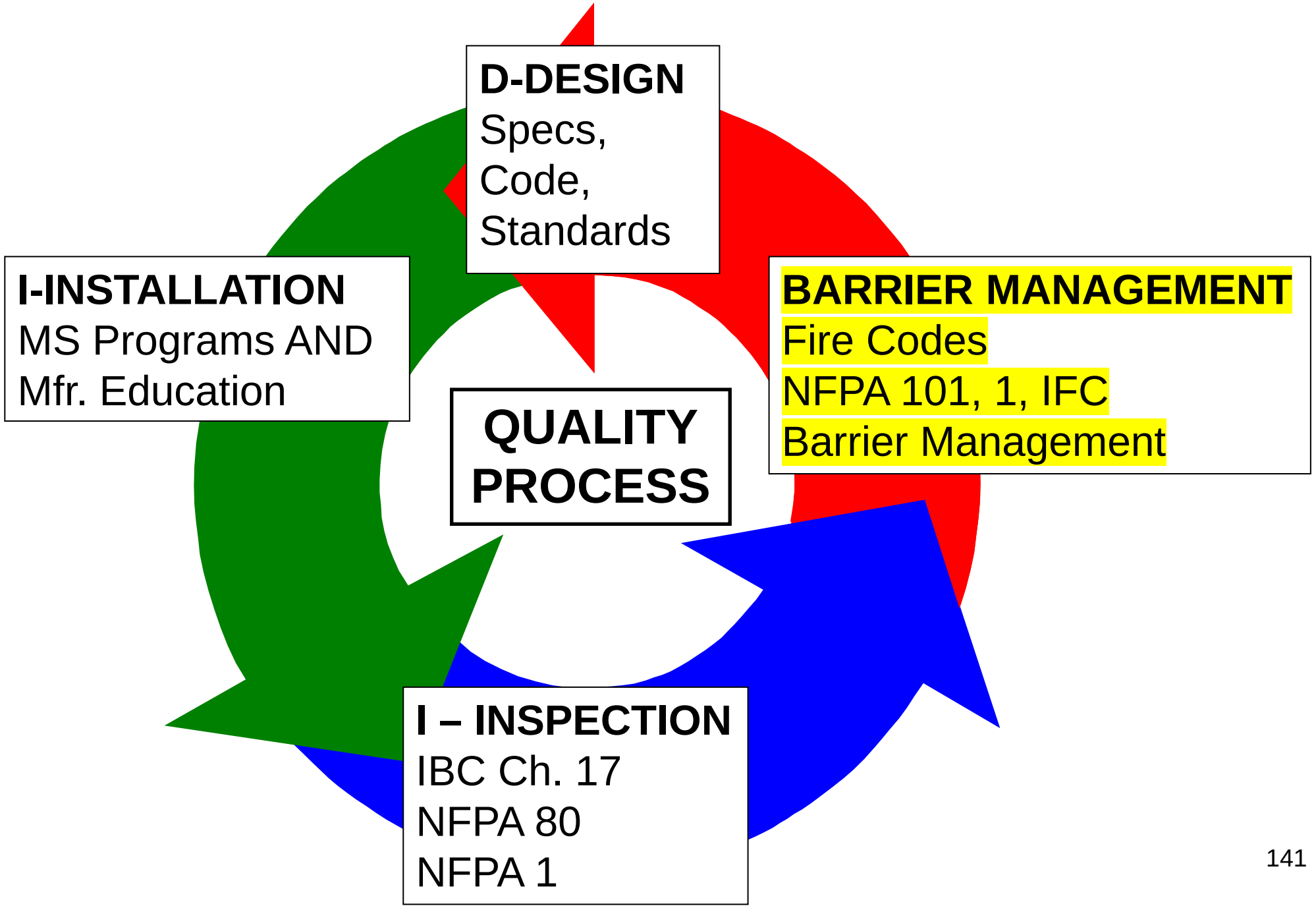
   D. **Copper Pipe** — Nom 2 in. (51 mm) diam (or smaller) Regular (or heavier) copper pipe.

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.


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

Building & Fire Code Requirements

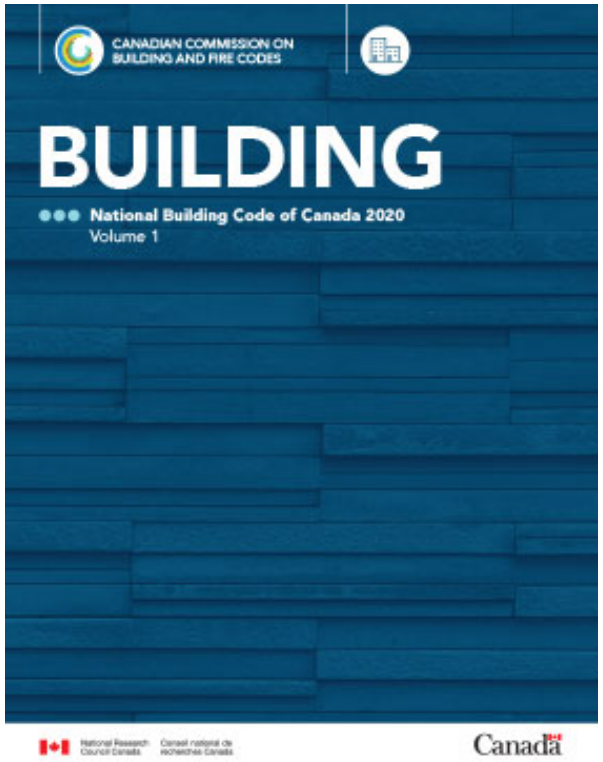
- **National Building Code of Canada**
- **National Fire Code of Canada**
- NFPA 5000 – 101- Chapter 8
- UAE Fire and Life Safety Code – Chapter 1, Section 21
- International Codes –

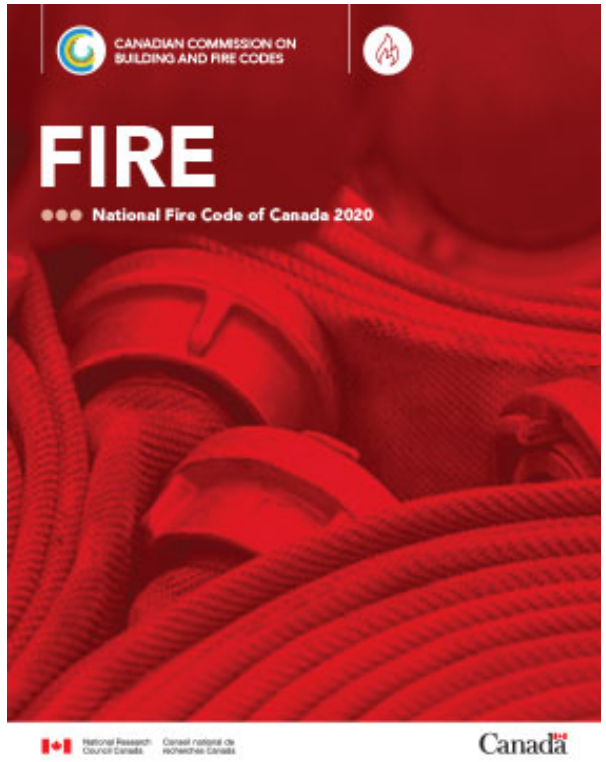
- ***Minimum requirements*** - ***Construction*** & ***Maintenance***

- ***Later…others cover Separations…***

Building & Fire Code Requirements

- National Building Code of Canada
- National Fire Code of Canada





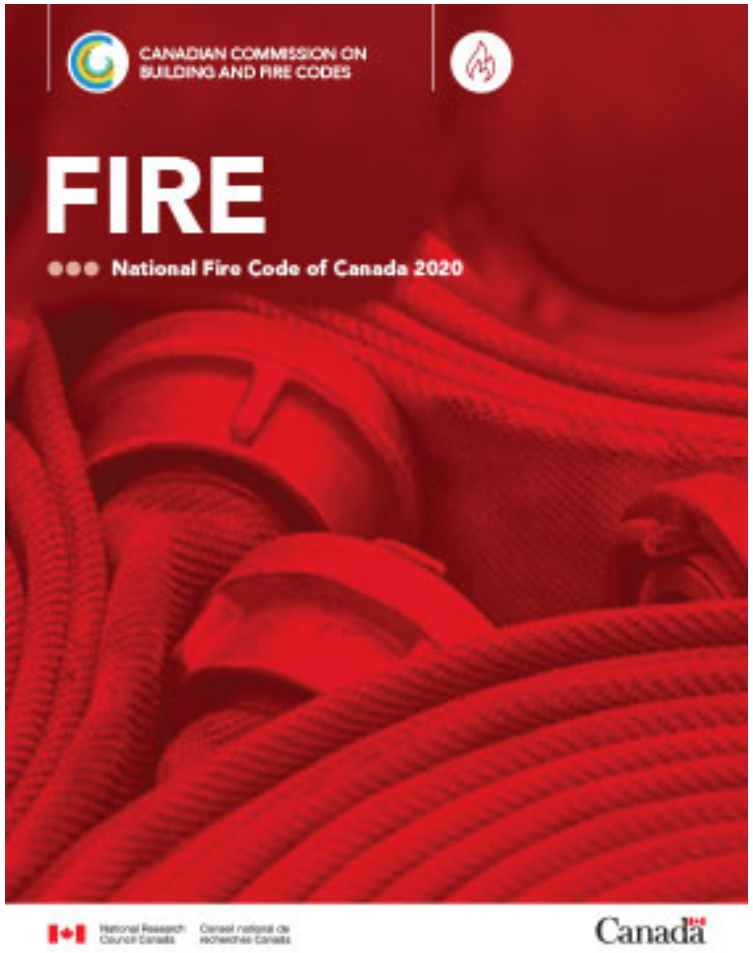
National Fire Code of Canada

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…

More Later…



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…

More Later…

National Fire Code of Canada

Division A, Compliance, Objectives and Functional Statements

A-1.1.1.1.(1) Application of this Code.

- Buildings and facilities, whether occupied or vacant.
- Some NBC requirements apply to new buildings and retroactive application to existing situations as prescribed by this Code could result in some difficulty in achieving compliance.
- It is the intent of the NFC that an ***equivalent level of safety be achieved*** rather than necessarily achieving strict conformance to the NBC. (AHJ Approval)
- Owner or the owner's authorized agent is responsible for carrying out provisions of the Code

(see Article 2.2.1.1. of Division C).

National Fire Code of Canada

Division A, Compliance, Objectives and Functional Statements

- A-1.2.1.1.(1)(b) Code Compliance via Alternative Solutions. Where a design differs from the acceptable solutions in Division B, then it should be treated as an “alternative solution.”
- A proponent of an alternative solution must demonstrate that the alternative solution **addresses the same issues as the applicable acceptable solutions** in Division B and their attributed objectives and functional statements.

National Fire Code of Canada

Division A, Compliance, Objectives and Functional Statements

2.2.1. Objectives -- 2.2.1.1. Objectives

1) The objectives of this Code are as follows (see Note A-2.2.1.1.(1)):
OS Safety

An objective of this Code is to **limit the probability** that, as a result of specific circumstances related to the *building* or facility, **a person in or adjacent to the *building* or facility will be exposed to an unacceptable risk of injury.**

National Fire Code of Canada

Division A, Compliance, Objectives and Functional Statements

OS1 Fire Safety

An objective of this Code is to limit the probability that, as a result of

(a) activities related to the construction, use or demolition of the *building* or facility,

(b) the condition of specific elements of the *building* or facility,

(c) the design or construction of specific elements of the facility related to certain hazards, or

(d) inadequate built-in protection measures for the current or intended use of the *building*, a person in or adjacent to the *building* or facility will be exposed to an unacceptable risk of injury due to fire. The risks of injury due to fire addressed in this Code are those caused by—

National Fire Code of Canada

Division A, Compliance, Objectives and Functional Statements

- OS1.1 – **fire or explosion** occurring
- OS1.2 – fire or explosion **impacting areas beyond its point of origin**
- OS1.3 – **collapse of physical elements** due to a fire or explosion
- OS1.4 – **fire safety systems** failing to function as expected
- OS1.5 – persons being delayed in or impeded from moving to a safe place during a fire emergency

National Fire Code of Canada

Division A, Compliance, Objectives and Functional Statements

- **OP Fire Protection of Buildings and Facilities**
- An objective of this Code is **to limit the probability that**, as a result of specific circumstances related to the *building* or facility, the ***building*** **or facility will be exposed to an unacceptable risk of damage due to fire**.

National Fire Code of Canada

Division A, Compliance, Objectives and Functional Statements

- **OP1 Fire Protection of the Building or Facility**
- An objective of this Code is to **limit the probability that, as a result of**

  (a) activities related to the construction, use or demolition of the *building* or facility,

  (b) the condition of specific elements of the *building* or facility,

  (c) the design or construction of specific elements of the facility related to certain hazards, or

  (d) **inadequate built-in protection measures for the current or intended use of the *building*,** the *building* or facility will be exposed to **an unacceptable risk of damage** due to fire. The risks of damage due to fire addressed in this Code are those caused by—

National Fire Code of Canada

Division A, Compliance, Objectives and Functional Statements

- **OP1 Fire Protection of the Building or Facility**

  OP1.1 – fire or explosion occurring

  OP1.2 – **fire or explosion impacting** areas **beyond its point of origin**

  OP1.3 – **collapse of physical elements** due to a fire or explosion

  OP1.4 – **fire safety systems failing** to function as expected

  Fire Safety Systems NOT DEFINED.

National Fire Code of Canada

Division A, Compliance, Objectives and Functional Statements

3.2.1.1. Functional Statements

1) The objectives of this Code are achieved by measures, such as those described in the acceptable solutions in Division B, that are intended to allow the *building* or facility or its elements to perform the following functions (see Note A-3.2.1.1.(1)):

F01 To minimize the risk of accidental ignition.
F02 To **limit the severity and effects of fire** or explosions.
F03 To **retard the effects of fire on areas beyond its point of origin**.
F04 To **retard failure or collapse** due to the effects of fire.
F05 To retard the effects of fire on emergency egress facilities.
F06 To retard the effects of fire on facilities for notification, suppression and emergency response.

National Fire Code of Canada

Division A, Compliance, Objectives and Functional Statements

- 3.2.1.1. Functional Statements

1) The objectives of this Code are achieved by measures, such as those described in the acceptable solutions in Division B, that are intended to allow the *building* or facility or its elements to perform the following functions (see Note A-3.2.1.1.(1)):

F10 To **facilitate the timely movement of persons to a safe place** in an emergency.

F11 To notify persons, in a timely manner, of the need to take action in an emergency.

F12 To facilitate emergency response.

F13 To notify emergency responders, in a timely manner, of the need to take action in an emergency.

F20 To **support and withstand expected loads and forces.**

F21 To limit or accommodate dimensional change.

F22 To limit movement under expected loads and forces.

National Fire Code of Canada

Division A, Compliance, Objectives and Functional Statements

- **F31** To minimize the risk of injury to persons as a result of **contact with hot surfaces** or substances.
- **F34** To **resist or discourage unwanted access or entry.**
- **F40** To **limit the level of contaminants**.
- **F44 To limit the spread of hazardous substances beyond their point of release**.
- **F80 To resist deterioration resulting from expected service conditions**.
- **F82 To minimize the risk of inadequate performance due to improper maintenance or lack of maintenance.**

National Fire Code of Canada

National Fire Code of Canada

Division B, Part 2 - Building and Occupant Fire Safety

Section 2.2. Fire Separations - 2.2.1. General - 2.2.1.1. Fire Separations

1) Where a *building* contains more than one *major occupancy*, such *occupancies* shall be separated from each other in conformance with the NBC.

2) Where rooms or spaces within a *building* contain a *high-hazard industrial occupancy*, such *occupancy* shall be separated from the remainder of the *building* by *fire separations* in conformance with this Code and the NBC.

3) Rooms, corridors, shafts and other spaces shall be separated where practicable by *fire separations* conforming to the NBC.

2.2.1.2. Damage to Fire Separations

1) Where *fire separations* are damaged so as to affect their integrity, they shall be repaired so that the integrity of the *fire separation* is maintained.

National Fire Code of Canada

Division B, Part 2 - Building and Occupant Fire Safety

2.2.2.4. Inspection and Maintenance

1) Defects that interfere with the operation of closures in fire separations shall be corrected, and such closures shall be maintained to ensure that they are operable at all times by

a) keeping fusible links and other heat-actuated devices undamaged and free of paint and dirt,

b) keeping guides, bearings and stay rolls clean and lubricated,

c) making necessary adjustments and repairs to door hardware and accessories to ensure proper closing and latching, and

d) repairing or replacing inoperative parts of hold-open devices and automatic releasing devices.

National Fire Code of Canada

Division B, Part 2 - Building and Occupant Fire Safety

3) Doors in fire separations shall be operated at intervals not greater than one month to ensure that they are properly maintained in accordance with Sentence (1), ….

…. as specified in the fire safety plan prepared in conformance with Section 2.8.

4) Closures in fire separations shall not be obstructed, blocked, wedged open, or altered in any way that would prevent the intended operation of the closure.

National Fire Code of Canada

Division B, Part 2 - Building and Occupant Fire Safety

5) Fire dampers, smoke dampers, combination smoke/fire dampers and fire stop flaps shall be….

a) inspected at intervals not greater than 12 months to ensure that they are in place and not obviously damaged or obstructed, and

b) tested in accordance with NFPA 80, “Fire Doors and Other Opening Protectives.”

National Fire Code of Canada

Division B, Part 2 - Building and Occupant Fire Safety
Section 2.8. Emergency Planning - 2.8.1. General - 2.8.1.1. Application

1) Fire emergency procedures conforming to this Section shall be provided for

a) every building containing an assembly, care, treatment or detention occupancy,

b) every building required by the NBC to have a fire alarm system,

c) demolition and construction sites regulated under Section 5.6.,

d) storage areas required to have a fire safety plan in conformance with Articles 3.2.2.5. and 3.3.2.9.,

e) areas where flammable liquids or combustible liquids are stored or handled, in conformance with Article 4.1.5.5., and

f) areas where hazardous processes or operations occur, in conformance with Article 5.1.5.1.

National Fire Code of Canada

Division B, Part 2 - Building and Occupant Fire Safety

2.8.2.1. Measures in a Fire Safety Plan

1) In buildings or areas described in Article 2.8.1.1., a fire safety plan conforming to this Section shall be prepared in cooperation with the fire department and other applicable regulatory authorities and shall include

a) the emergency procedures to be used in case of fire, including

i) sounding the fire alarm (see Note A-2.8.2.1.(1)(a)(i)),

ii) notifying the fire department,

iii) instructing occupants on procedures to be followed when

the fire alarm sounds,

iv) evacuating occupants, including special provisions for

persons requiring assistance (see Note A-2.8.2.1.(1)(a)(iv)),

v) confining, controlling and extinguishing the fire,

National Fire Code of Canada

Division B, Part 2 - Building and Occupant Fire Safety

2.8.2.1. & 2.8.2.2. Measures in a Fire Safety Plan

b) the appointment and organization of designated supervisory staff to carry out fire safety duties,

c) the training of supervisory staff and other occupants in their responsibilities for fire safety,

d) documents, including diagrams, showing the type, location and operation of the building fire emergency systems,

e) the holding of fire drills,

f) the control of fire hazards in the building, and

g) the inspection and maintenance of building facilities provided for the safety

of occupants. (See Note A-2.8.2.1.(1).)

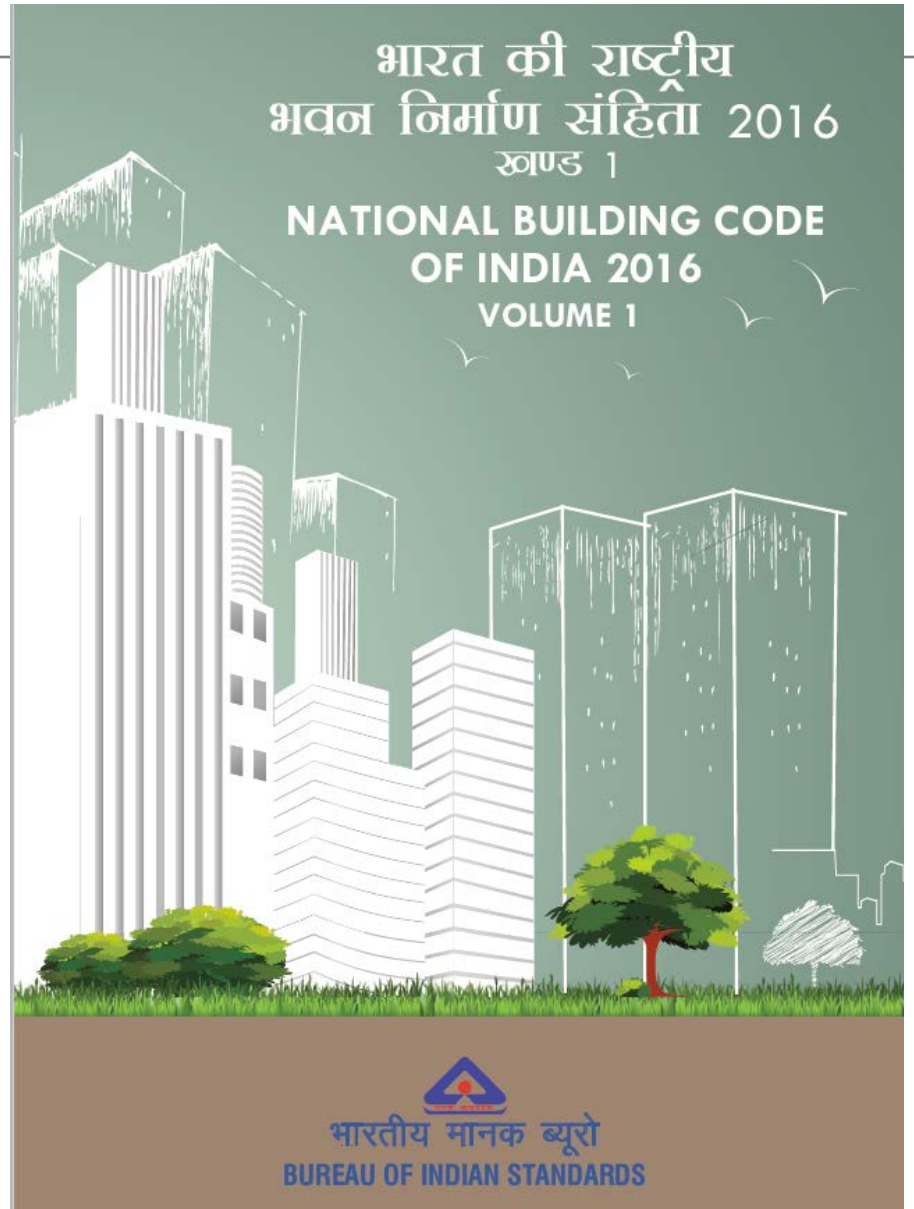
2) The fire safety plan shall be reviewed at intervals not greater than 12 months to ensure that it takes account of changes in the use and other characteristics of the building.

National Fire Code of Canada

Notes to Division B, Part 2 - Building and Occupant Fire Safety

A-2.1.3.1.(1) The National Building Code of Canada is most often applied to existing buildings **when an owner wishes to rehabilitate a building, change its use, or build an addition; or when an enforcement authority decrees that a building, or a class of buildings, be altered for reasons of public safety**. ***It is not intended that either the NBC or the NFC be used to enforce the retrospective application of new requirements in the NBC*** to existing buildings. Although the NFC could be interpreted to require the installation of fire alarm, standpipe and hose and automatic sprinkler systems in an existing building for which there were no requirements before the National Building Code of Canada 2005 was issued, it is the intent of the Canadian Commission on Building and Fire Codes that the NFC not be applied in this manner to these buildings.

Existing Buildings – NBC India



Fire Codes Require Maintenance

- 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….”.**

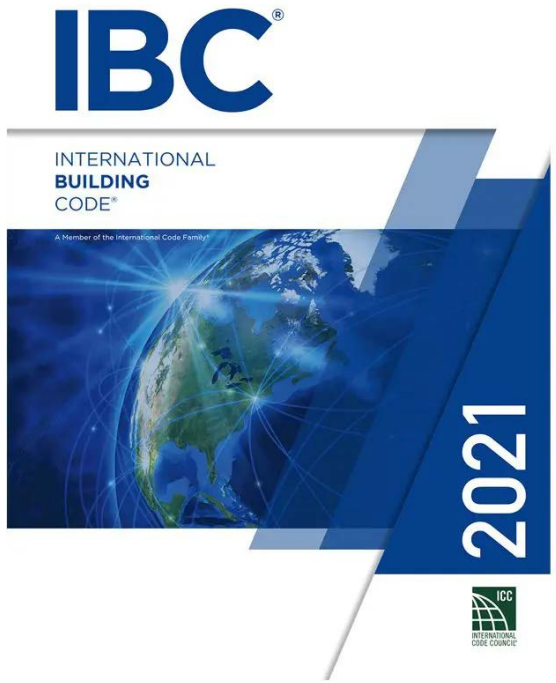
National Fire Code of Canada

Notes to Division B, Part 2 - Building and Occupant Fire Safety

Existing Buildings? Did you know…

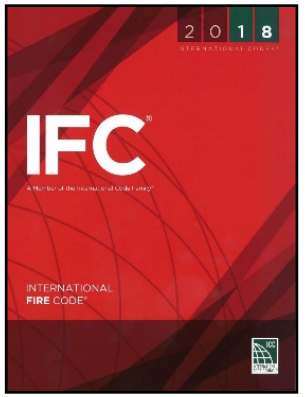
- **Fire, existing building codes have existed for decades**

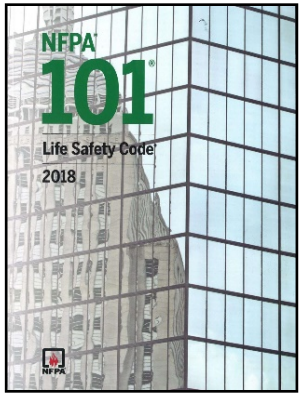
- Fire Codes dictate maintaining protection of structural fire-protection and fire-resistance-rated compartmentation



Fire Codes Require Maintenance

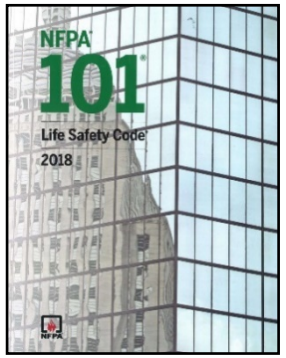
- National Fire Code of Canada
  - Maintain Protection, PERIOD…
- NFPA 101
  - No Frequency
- NFPA 1
  - Inspection 3 Years High Rise
- International Fire Code
  - Annual Visual Inspection





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

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

- **701.5 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

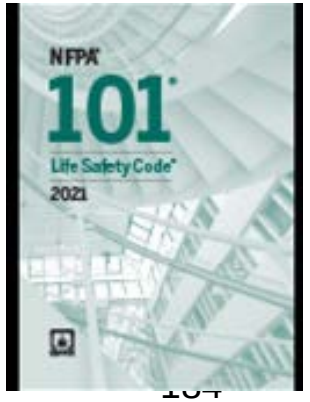
Existing Buildings? Educate

- **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



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**

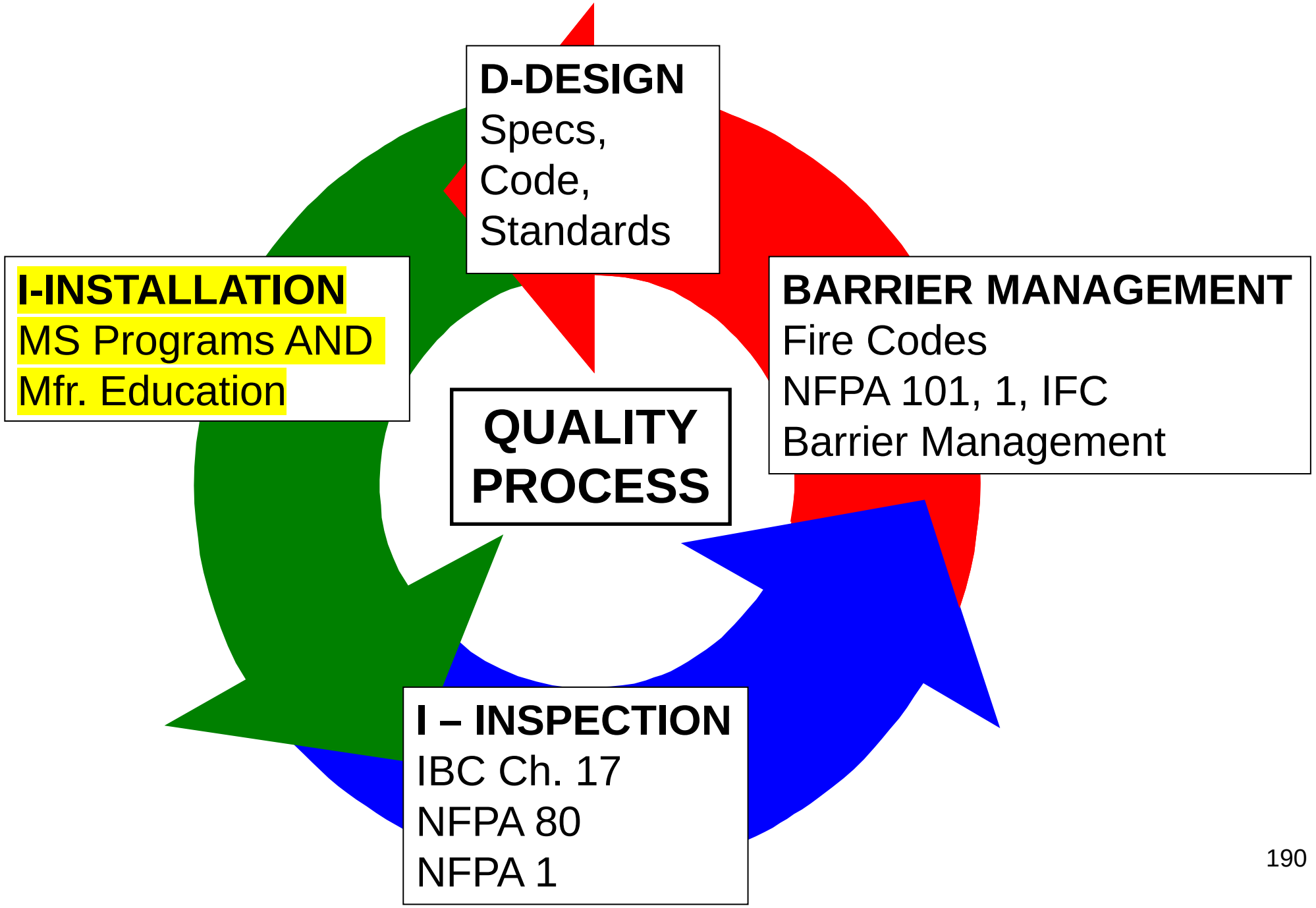
Firestop (& Other Fire-Resistance Repairs)

- 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**


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

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)

= Rated Firestop System

Manufacturers Instructions, Tested and Listed Designs

STI Graphic

Firestopping for Continuity – Firestop Products

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





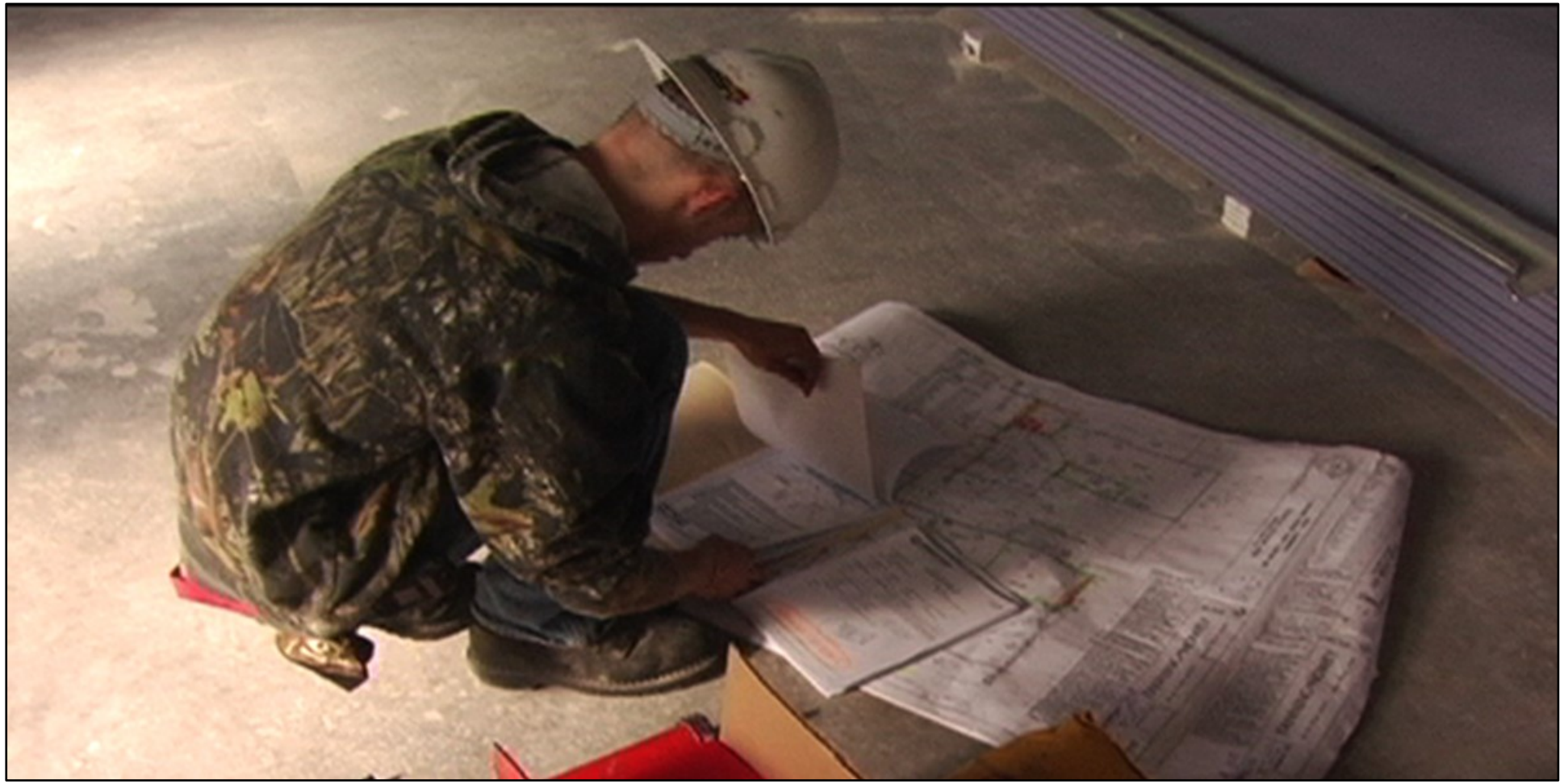


STI, 3M, AD, HILTI, Nelson Photos

Review of UL Firestop and Joint Systems on UL Product iQ

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

Barrier Continuity
I – Installation – Listed Systems



Installation – Who?

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

Conclusion –

Without Single Firestop Installation Contractor….

Fire & life safety risks

Adler Photo

3 Firestop Installation Methods

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

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 of Canada
Laboratoires des Assureurs du Canada
Qualified Firestop Contractor Program

Why Contractor Qualifications?

- **Documentation = Inventory**
  - **Fire-Resistance SYSTEMS Selection & Analysis**
  - **SYSTEMS & As Builts – Maintain Protection**
  - 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

- **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 – ULC, FM

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

Management System – ULC, FM

- **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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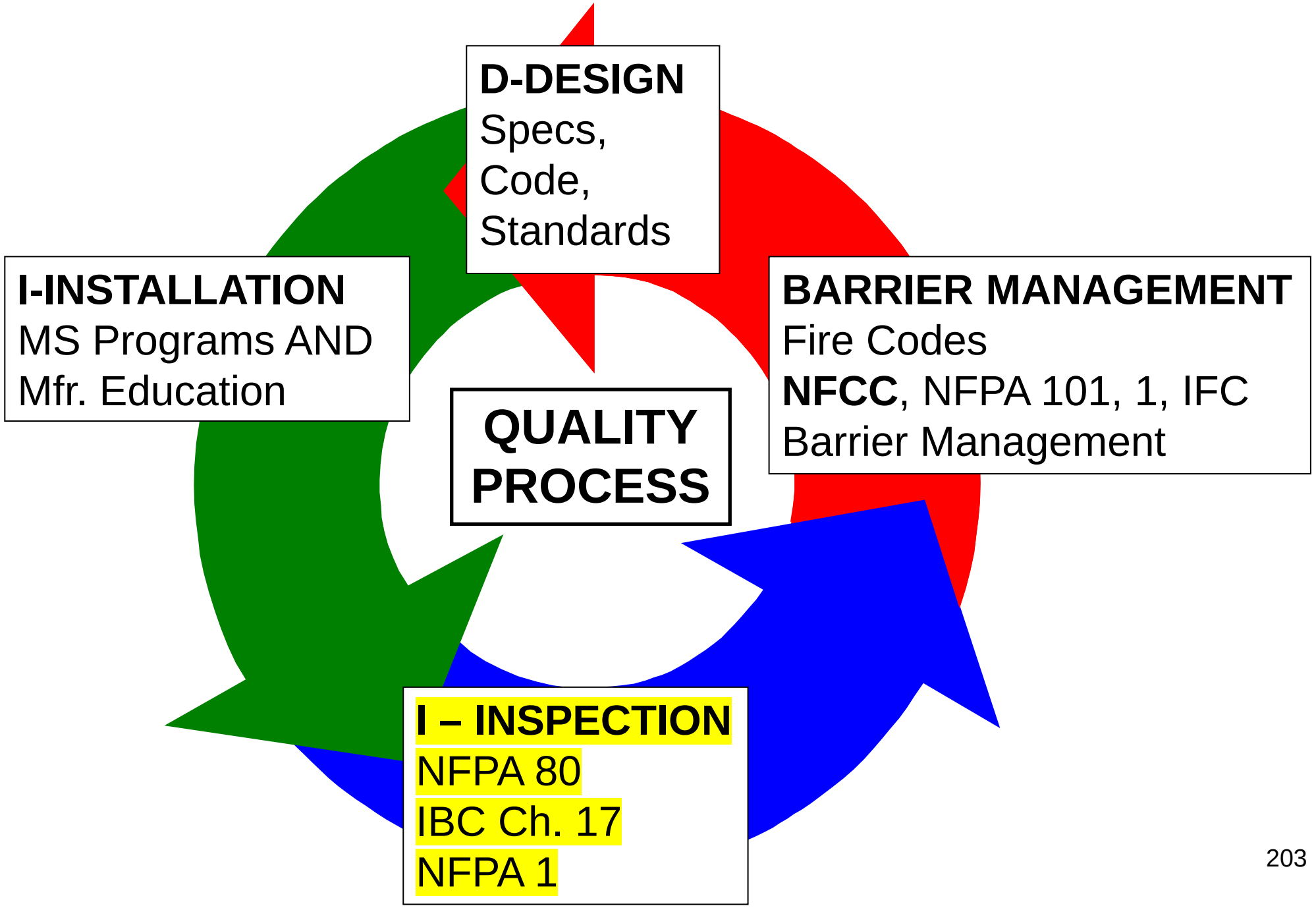
Sample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NFPA 1


Affinity Firestop Photo


2
Affinity Firestop Photo

Affinity Firestop Photo

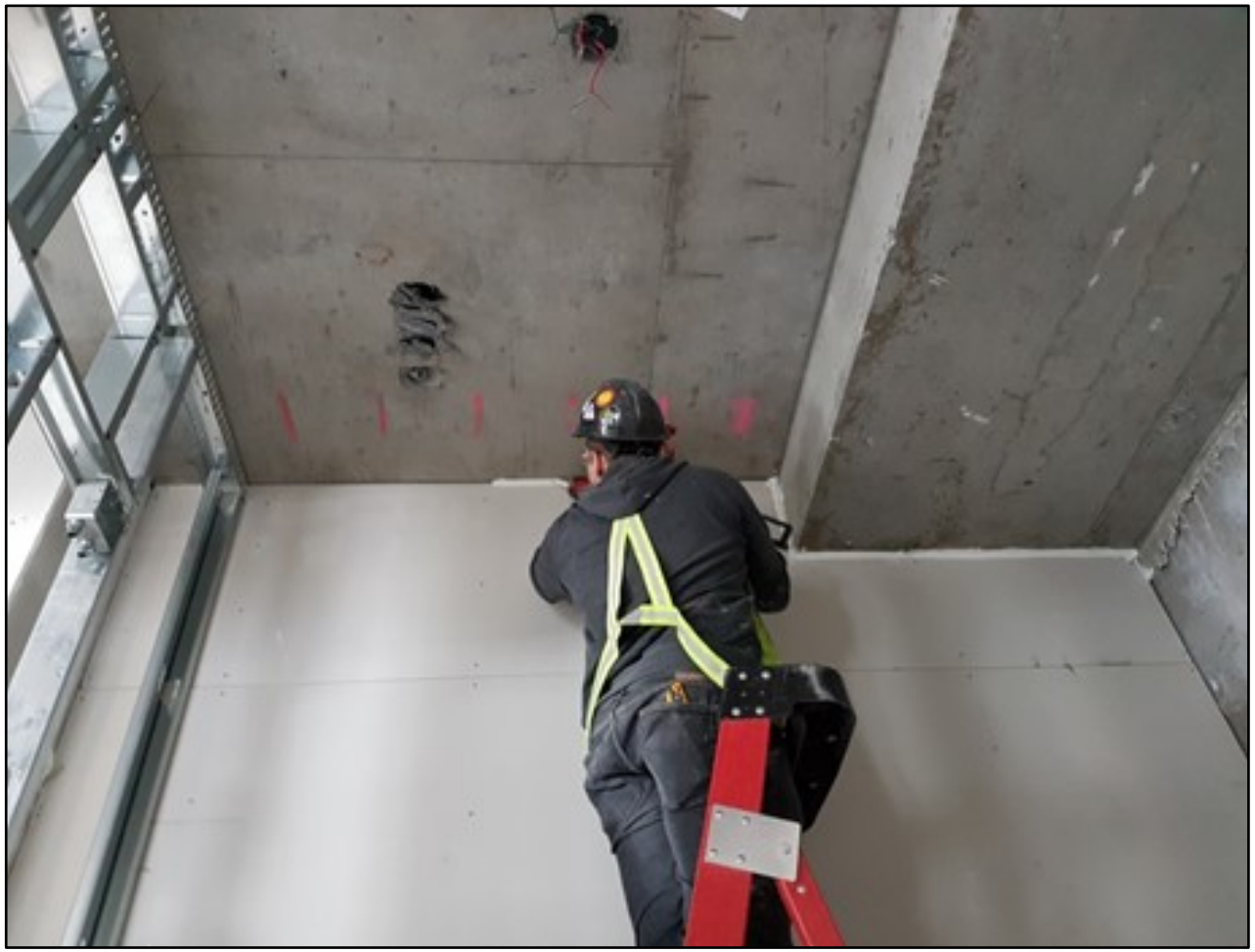

Affinity Firestop Photo


Affinity Firestop Photo

Affinity Firestop Photo

Affinity Firestop Photo

Professional Installations



Affinity Firestop Photo

Affinity Firestop Photo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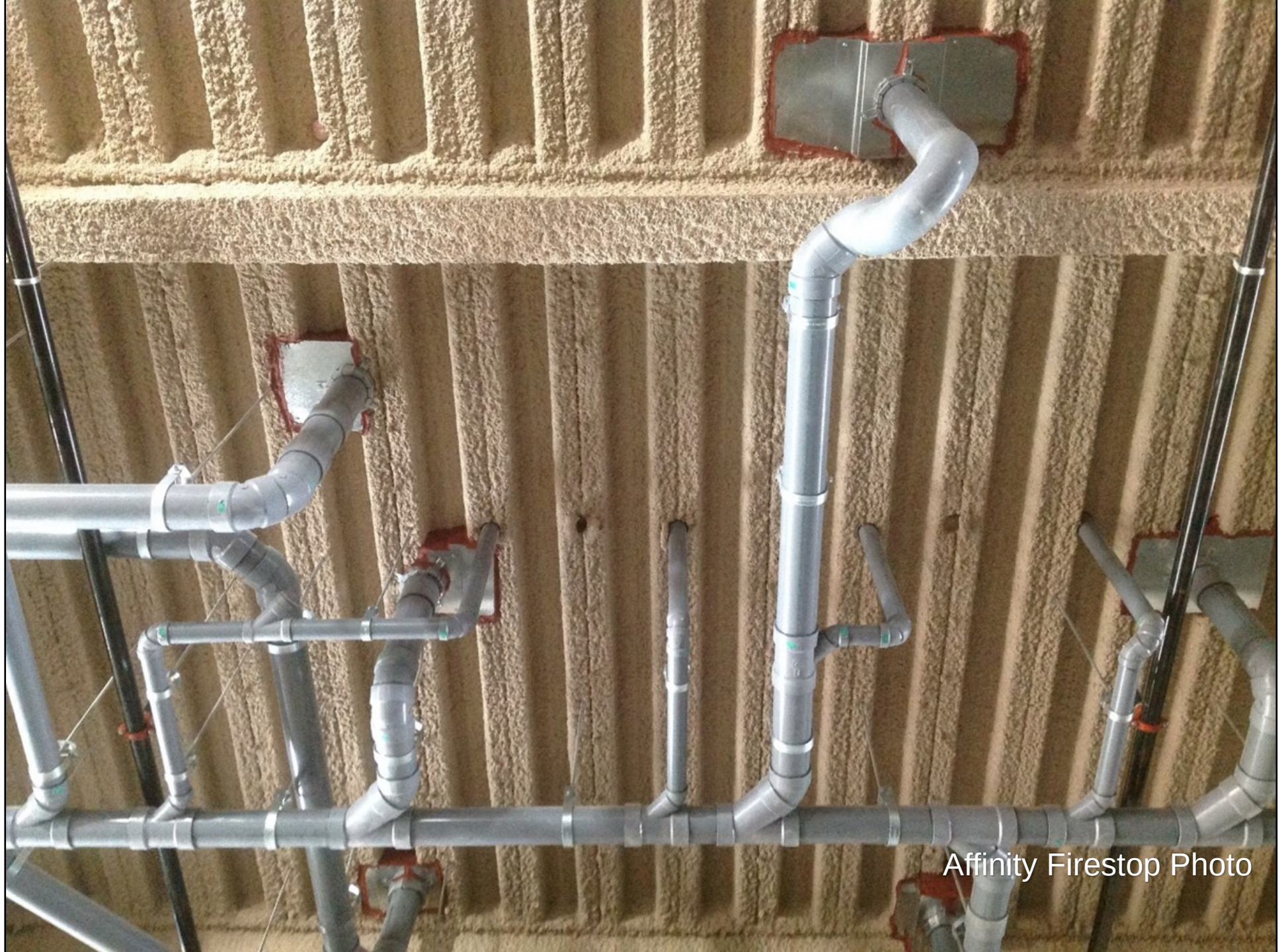

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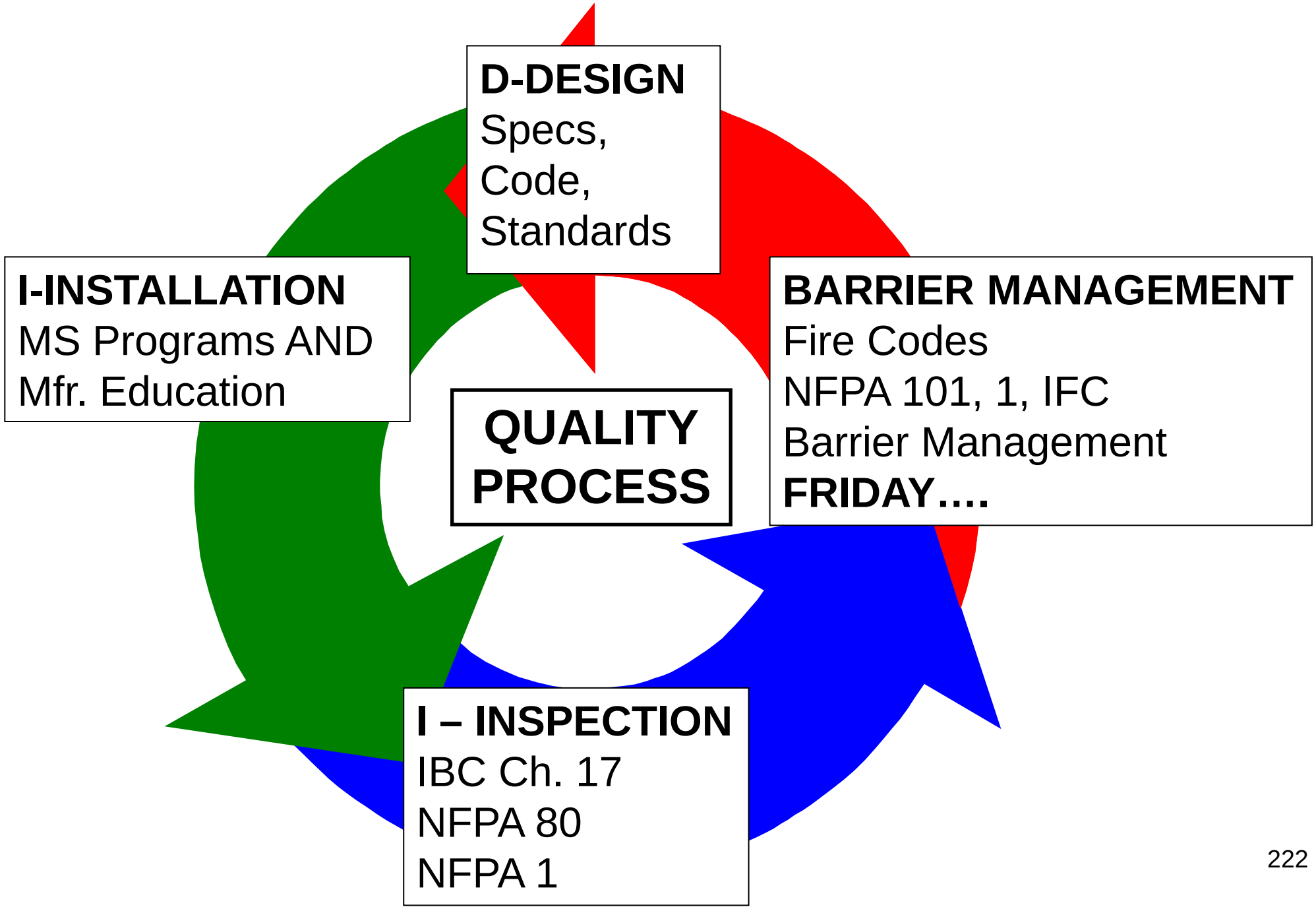
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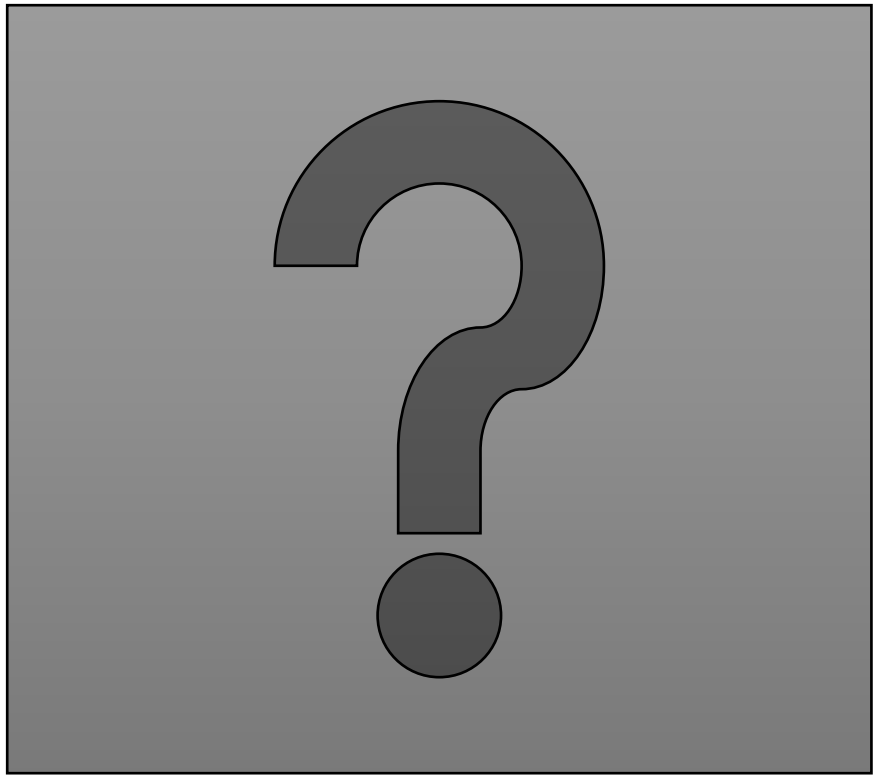
Questions??



Thanks, From FCIA…..

Bill McHugh
Firestop Contractors International Association
4415 W. Harrison St., #540 - Hillside, IL 60162 USA
+1-708-202 -1108 ~ bill@FCIA.org

FREE MOP

Info@FCIA.org

www.FCIA.org

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Installation
Inspection
Maintenance &
Management

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Installation
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Fire-Resistance-Rated Construction

Establishing Fire-Resistance Ratings

Fire-Resistance

- Expressed as an Hourly Time Period
- Ratings range from 1/2 to 4 hours
- Contain Fire to Room or Floor of Origin and Maintain Structural Integrity

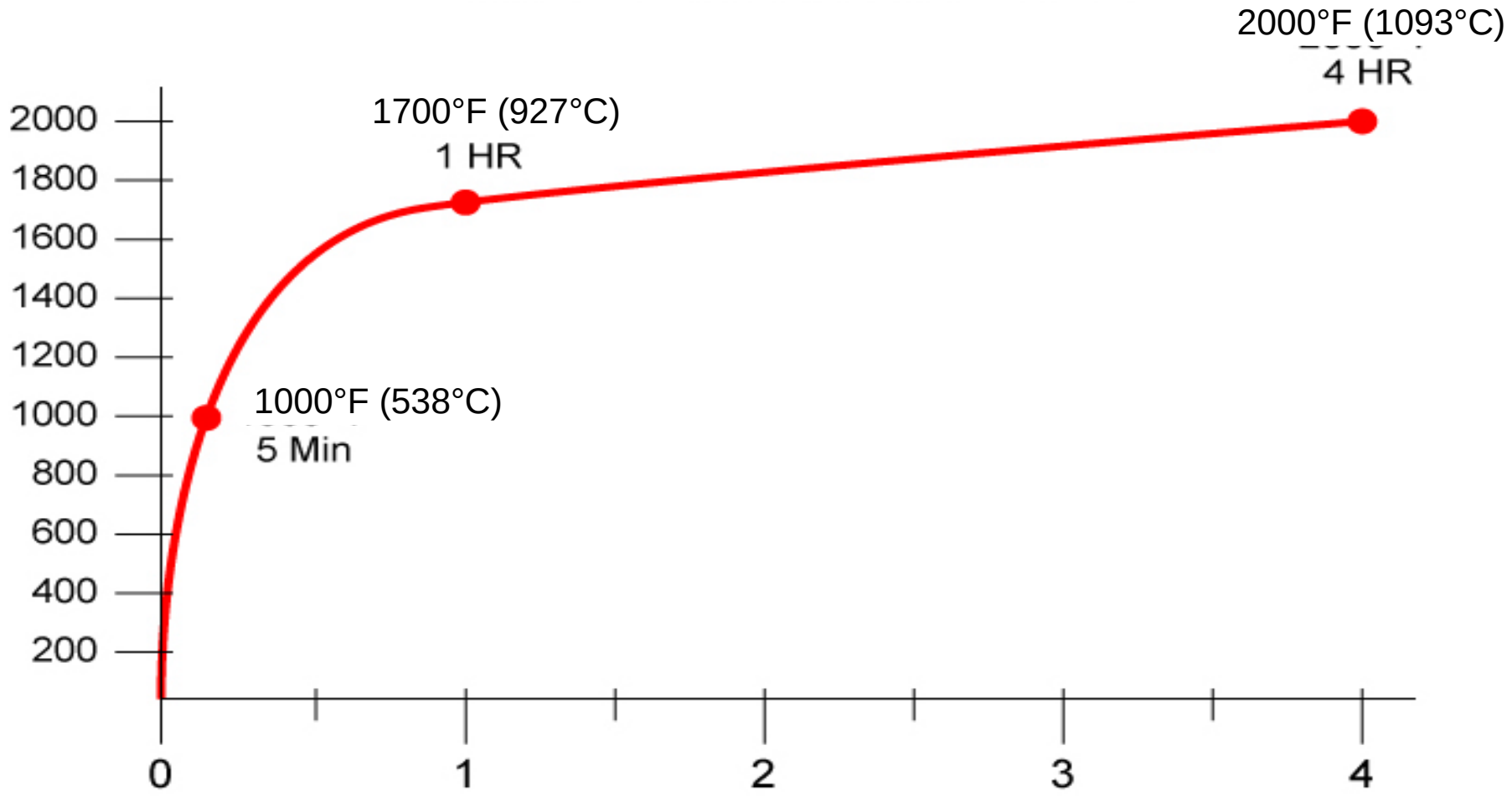
Standards

- CAN/ULC-S101
  - UL 263
  - ASTM E119
  - NFPA 251 (Withdrawn)

Building Components

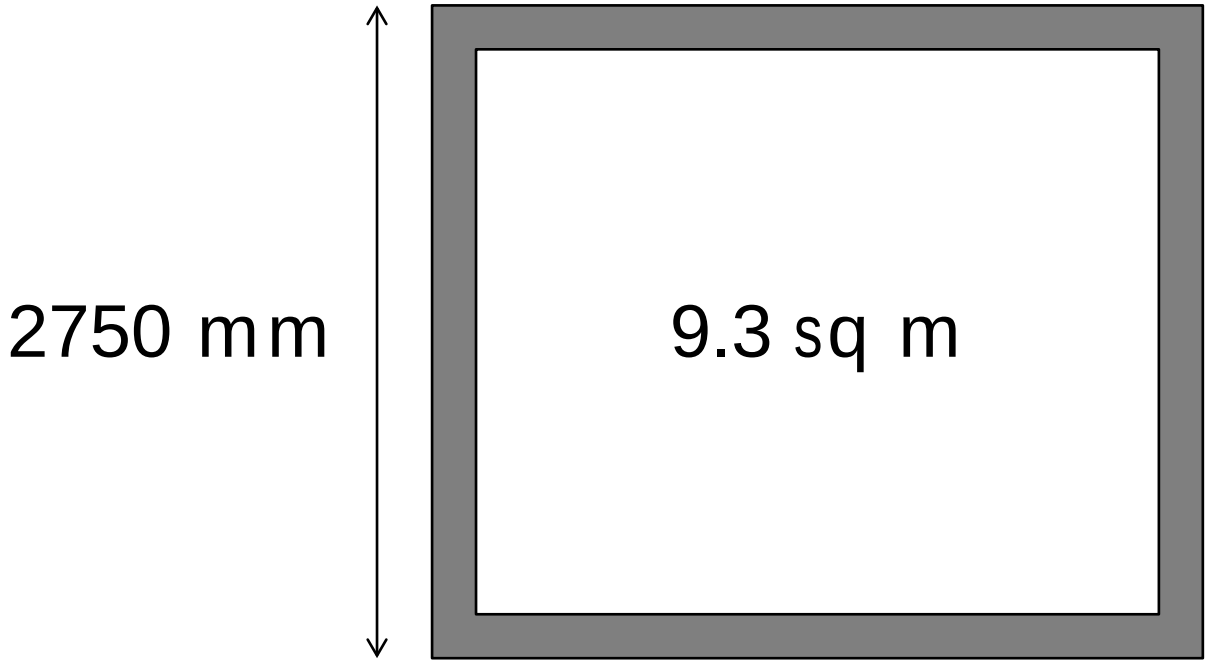
- Columns
- Beams
- Floor/Ceilings or Roof/Ceilings
- Walls

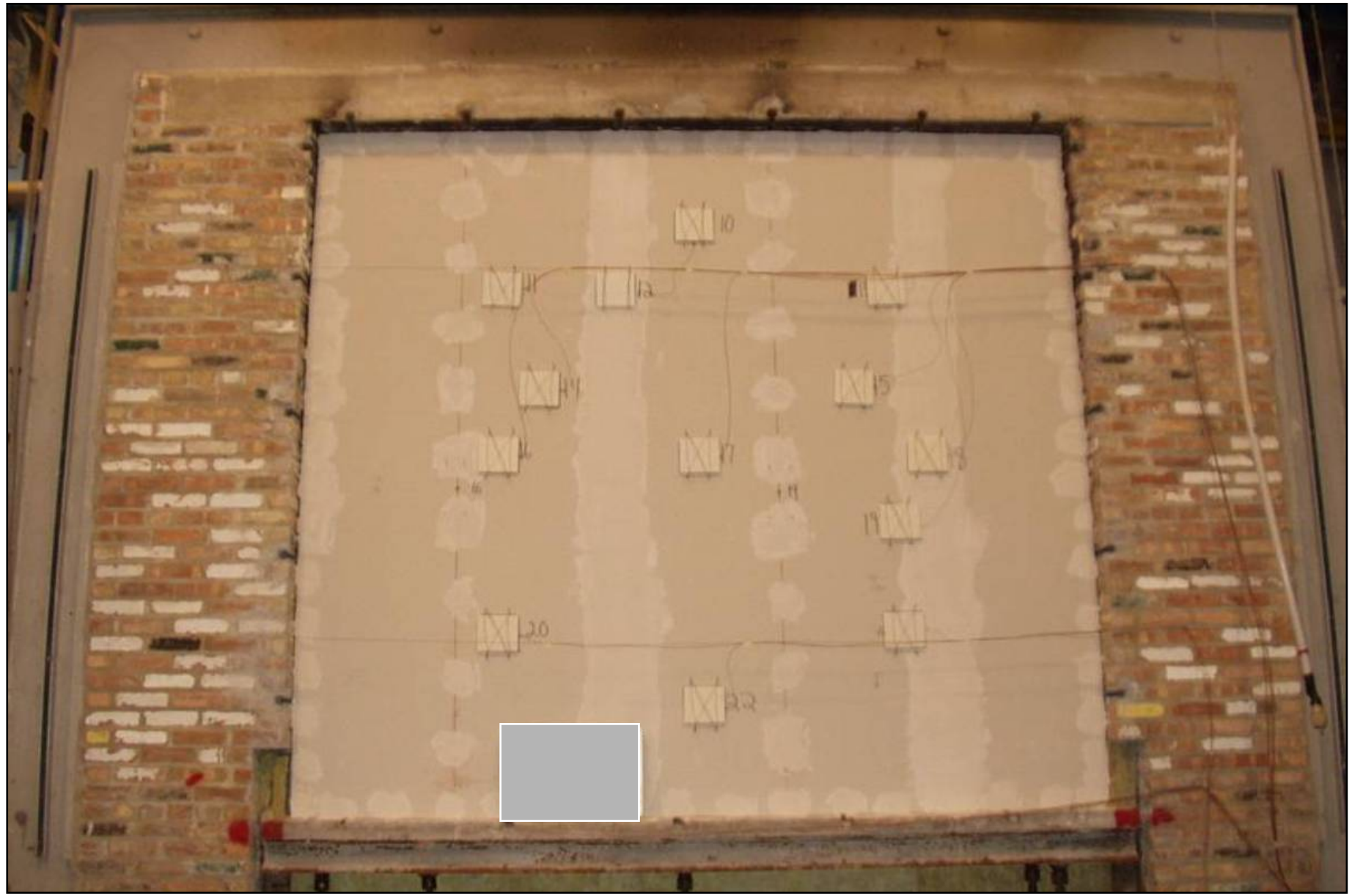
Time - Temperature Curve



Walls

- Sample size – 9.3 sq m / 2750 mm
- Load applied - Per design

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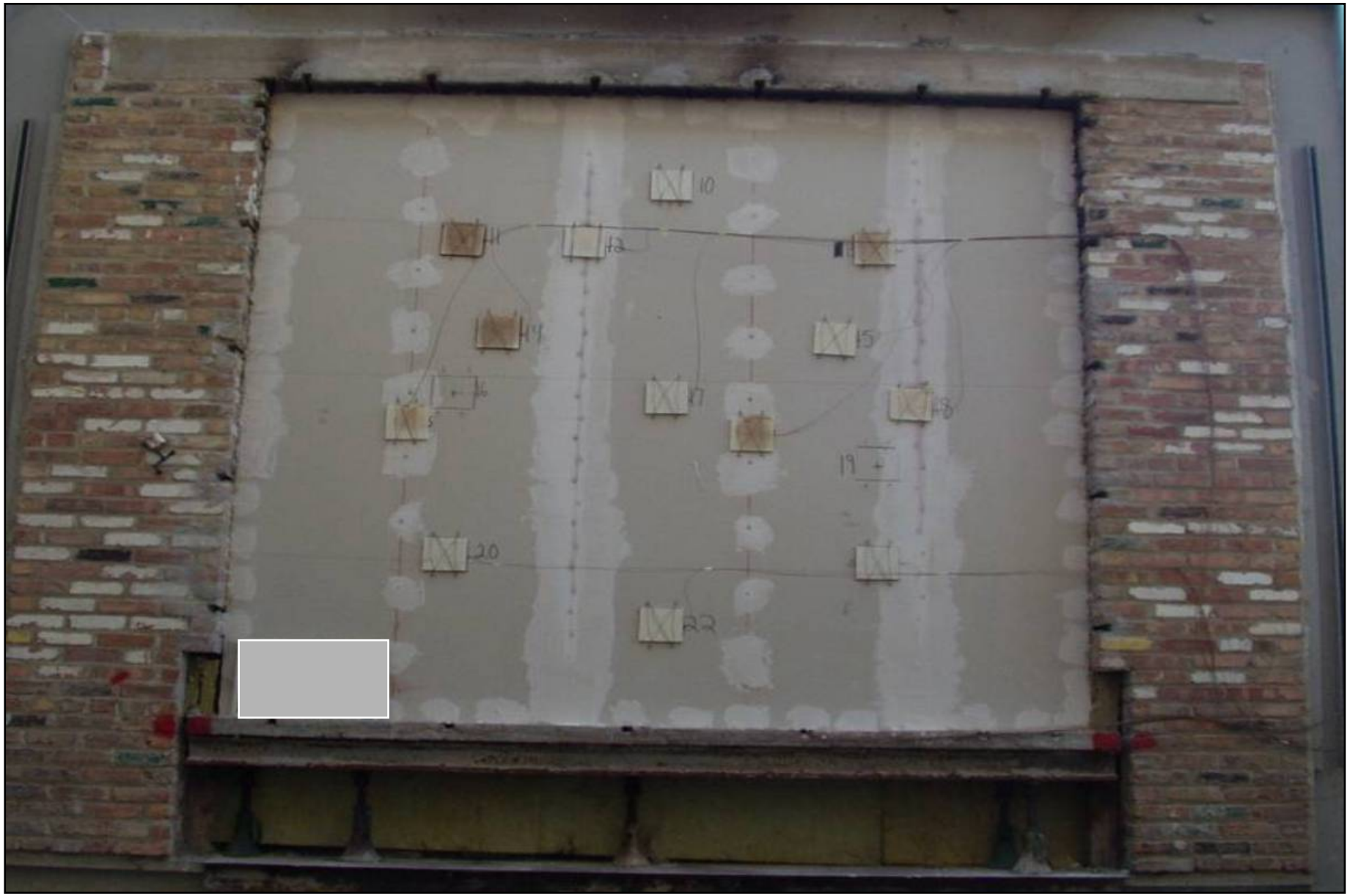
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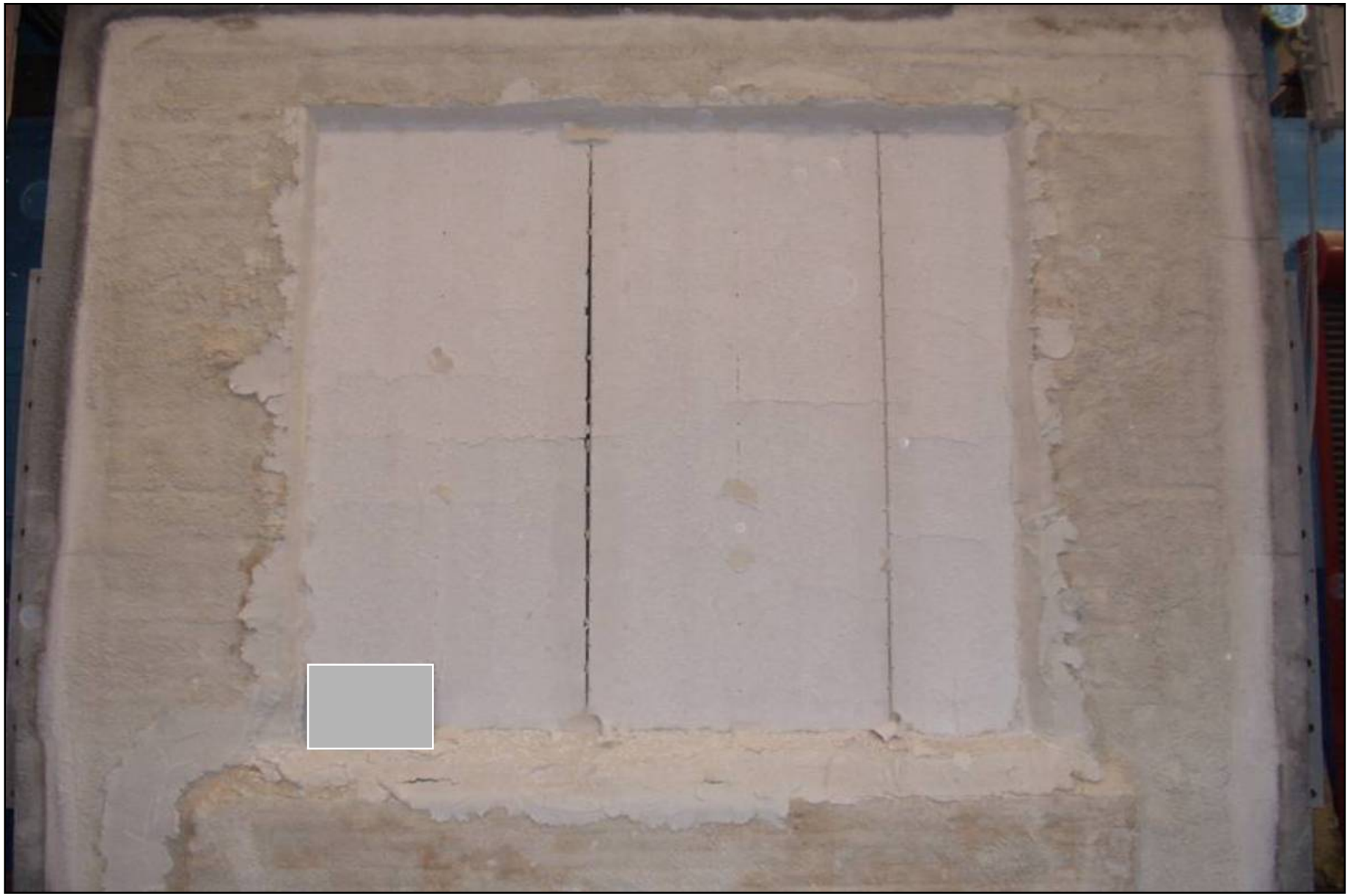
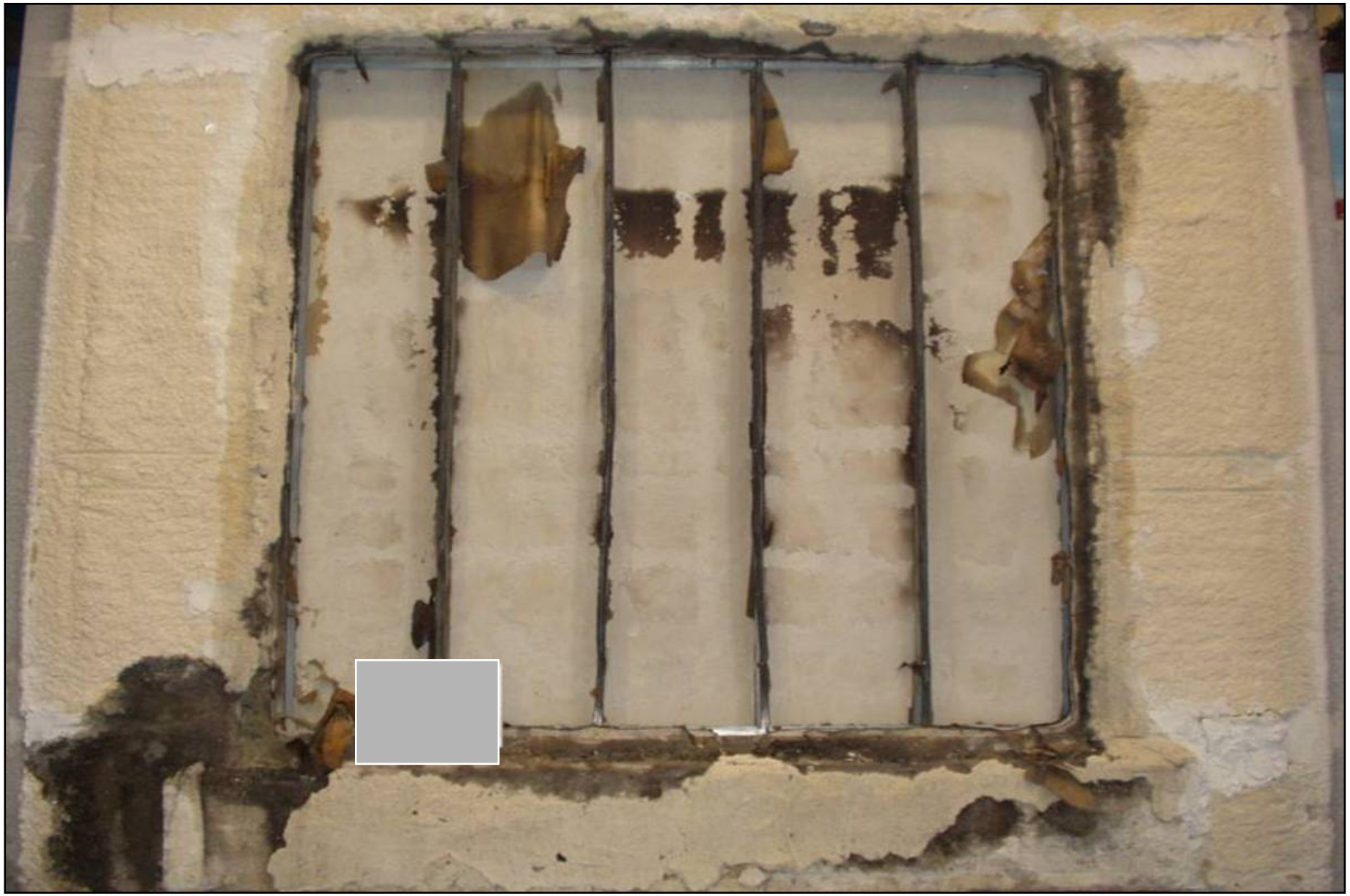




Conditions of Acceptance – Walls

- Flame passage
- 140ºC / 180ºC
- Support load
- Hose stream

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

Requirements for Protecting Breaches

- Each type of breach has a unique fire test standard and a smoke leakage test standard associated with it which compliments CAN/ULC-S101

Requirements for Protecting Breaches

- **Penetrations**
  - Fire / Hose Stream Test Standards
    - CAN/ULC-S115
  - Smoke Leakage Standard
    - CAN/ULC-S115

Requirements for Protecting Breaches

- **Joints**
  - Fire / Hose Stream Test Standards
    - CAN/ULC-S115 (Construction Joints), ASTM E2307 (Perimeter Fire Containment), ASTM E2837 (Cont. HW Joints)
  - Smoke Leakage Standard
    - CAN/ULC-S115

Requirements for Protecting Breaches

- **Opening Protectives**
  - Fire / Hose Stream Test Standards
    - CAN/ULC-S104 (Fire Doors), CAN/ULC-S113 (20 min Wood Fire Doors), CAN/ULC-S105 (Fire Door Frames), CAN/ULC-S106 (Fire Windows, FPR Glazing, Glass Blocks), CAN/ULC-S101 (FRR Glazing)
  - Smoke Leakage Standard
    - UL 1784

Requirements for Protecting Breaches

- **Duct and Air Transfer Openings**
  - Fire / Hose Stream Test Standards
    - CAN/ULC-S112 (Fire and Combination Dampers), CAN/ULC-S112.2 (Ceiling Firestop Flap Assemblies)
  - Smoke Leakage Standard
    - ULC-S112.1 (Smoke and Combination Dampers)

Firestopping for Continuity

Products become SYSTEMS Based on Testing

- **‘Field Erected Construction…Tested to…’**
  - Standards – CAN/ULC-S115, ASTM E2307, ASTM E2837
  - F Rating – Flame
  - FT Rating – Temperature
  - FH Rating – Hose
  - FTH Rating – Flame, Temperature & Hose
  - L Rating – Smoke
  - W Rating – Water
  - M Rating – Movement

3M Photo

Conditions of Acceptance
F Rating

- Passage of Flame

Conditions of Acceptance
FT Rating

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

Conditions of Acceptance
FH Rating

- Passage of Flame
- Hose Stream

Conditions of Acceptance
FTH Rating

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

L Rating

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

W Rating

- Optional program, applicable to incidental water
- 0.91 M WC (3 Ft 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 program, applicable to movement of penetrating item
- Penetrating item move perpendicular and/or in plane of barrier in accordance with ASTM E3037
- After movement, firestop system subjected to standard fire and hose stream tests
- Firestop systems assigned a M Rating
  - Rating within plane based on percentage of annular space
  - Rating perpendicular to barrier based on dimension

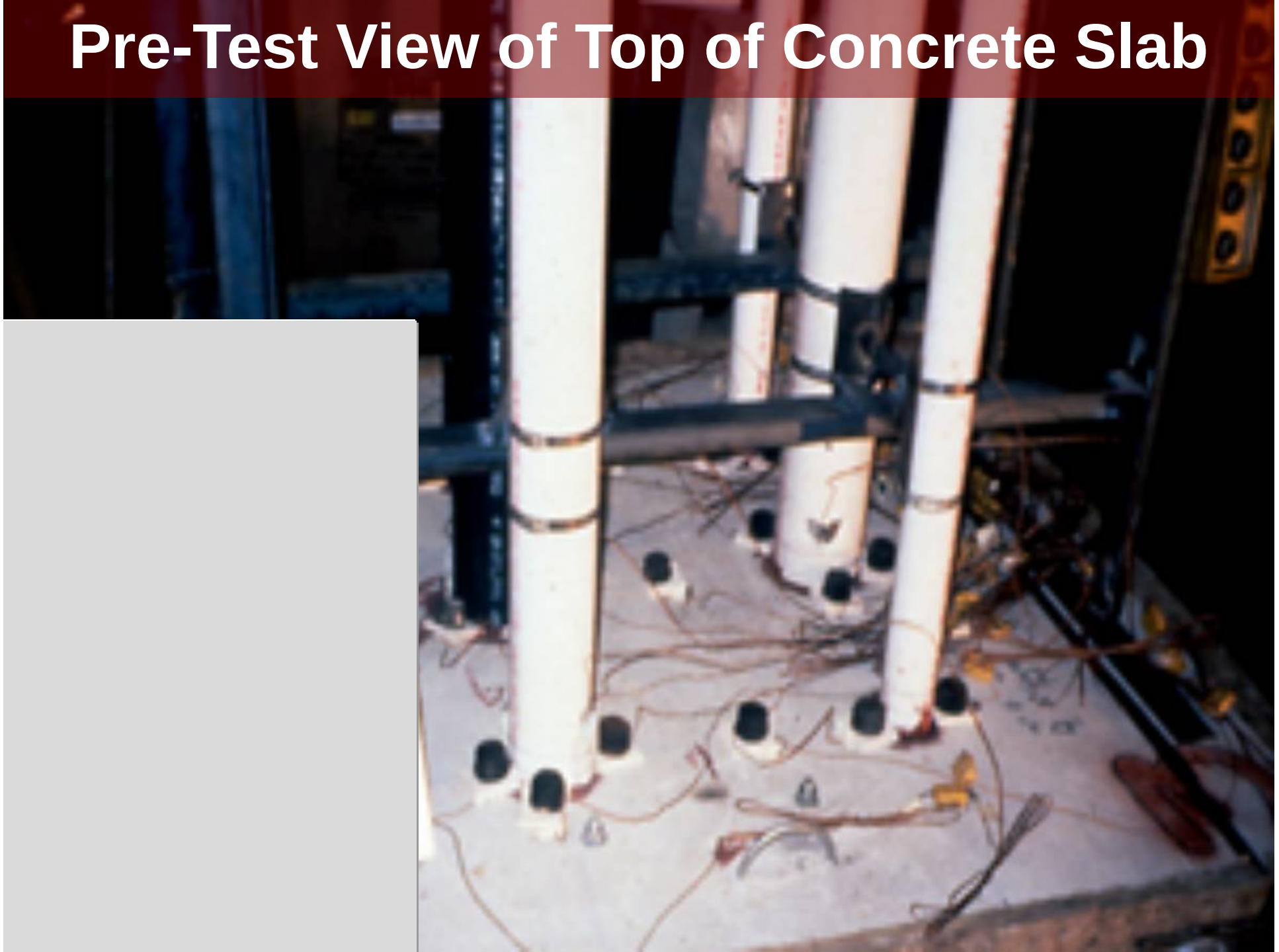
Building & Fire
Worldwide Code Requirements

- *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?

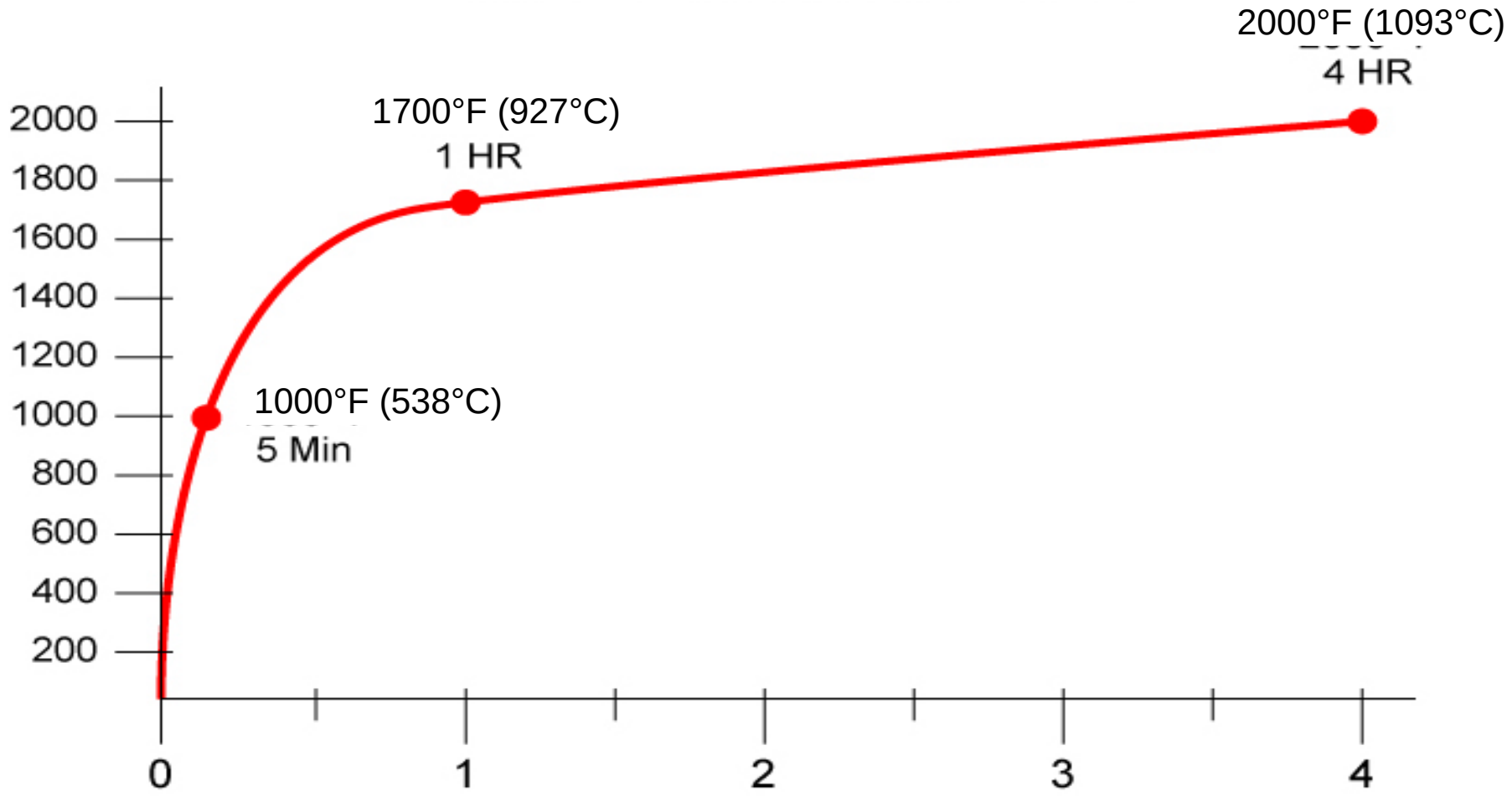
Fire-Resistance-Rated Construction

Establishing Penetration Firestop System Ratings

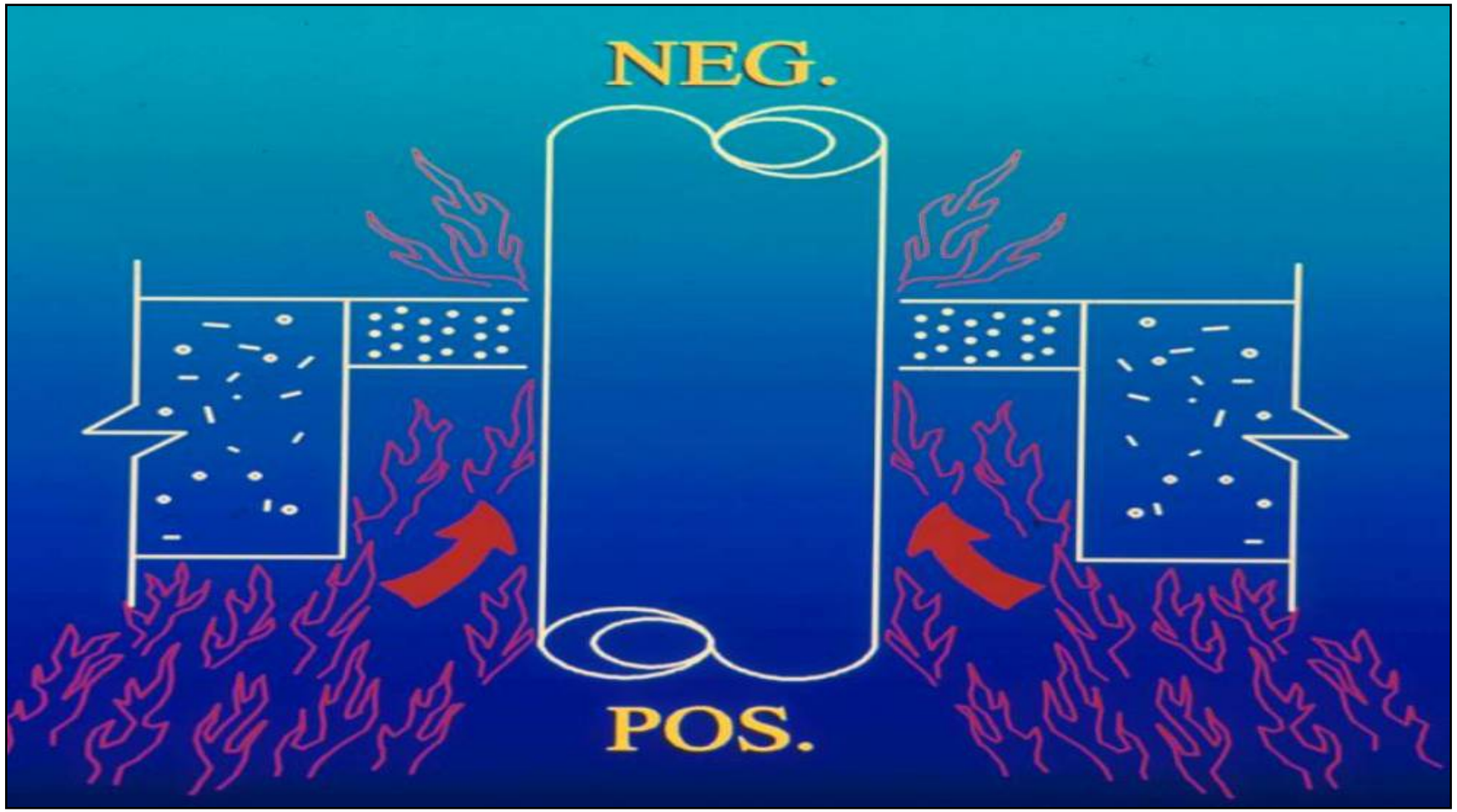
Pre-Test View of Top of Concrete Slab



Time - Temperature Curve



Positive Furnace Pressure



Post-Test View of Bottom of Slab

Hose Stream Test

UL Photo

Barrier Continuity
Products become SYSTEMS

- **Online Directories –**
  - **FM Approval Guide – ApprovalGuide.com**
  - **Intertek Listed Products Directory**
  - **UL/ULC Product iQ Online Directory (Product iQ)**

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

Engineering Judgments/EFRRA

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

Engineering Judgments/EFRRA

International Firestop Council – Manufacturers – www.firestop.org

IFC Guidelines for Evaluating Engineering Judgment Guidelines

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

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

Engineering Judgments/EFRRA

IFC EJ Guidelines - Engineering Judgments for firestop systems should:

- Emphasizes importance of tested designs
- Not a substitute for existing 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