Installation & Inspection

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FCIA

NFCA®
National Fireproofing Contractors Association

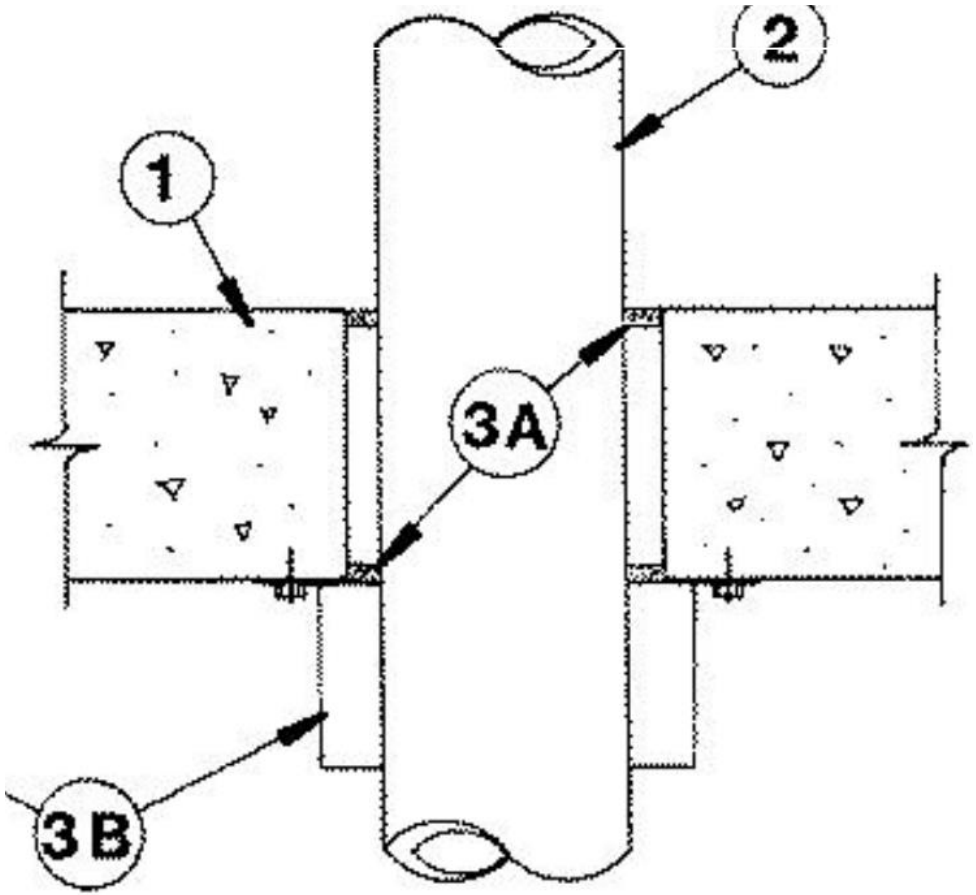
What is a Firestop System?

- Firestop Sealant?
- Firestop Products??
- Fire-Resistance-Rated Floors, Walls?
- Manufacturer’s Product Data Sheets?
- Manufacturers Sell Sheets
- Safety Data Sheets?
- ULC Listings?

What's wrong with this picture?

Heckler Photo

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

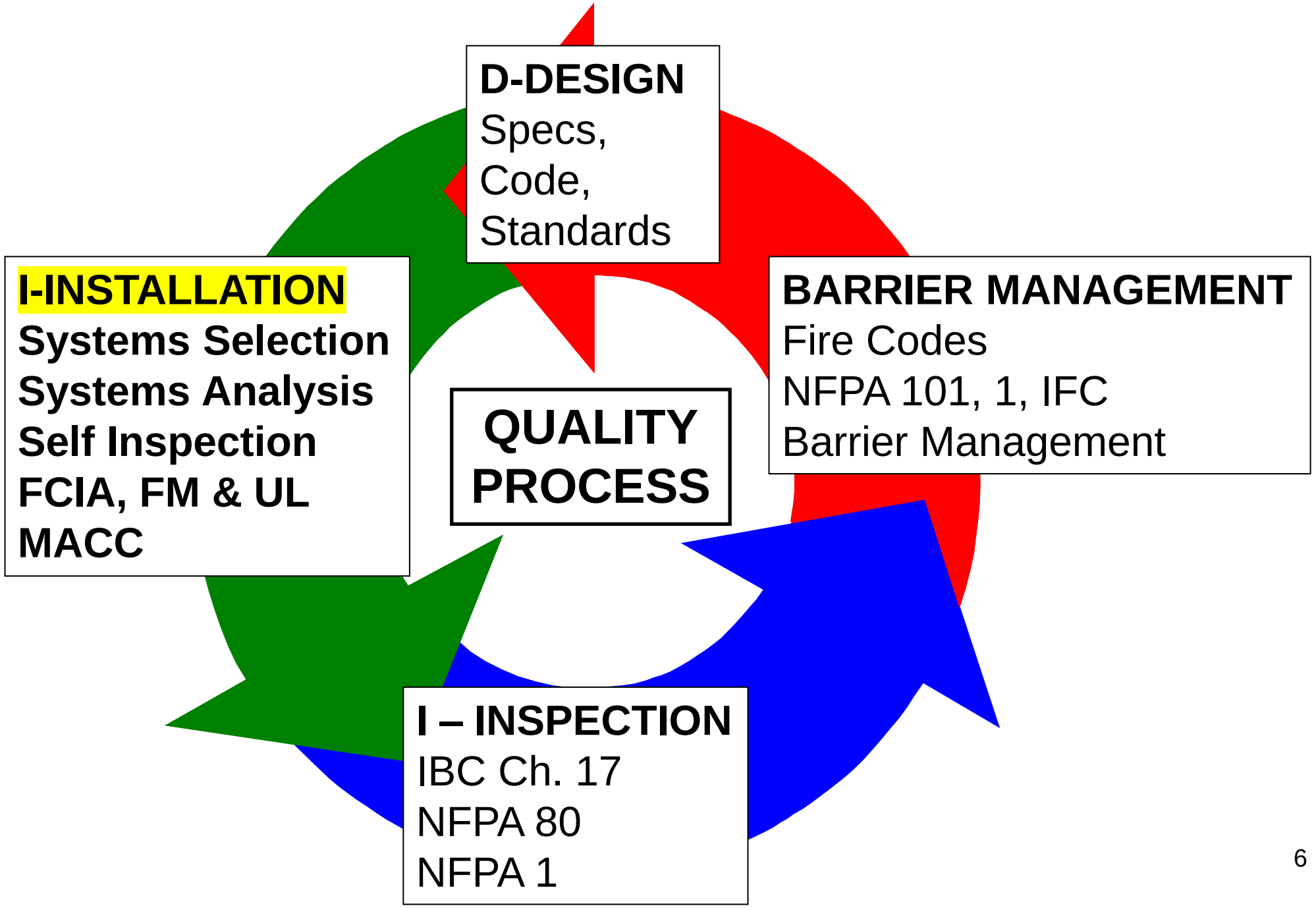


What’s wrong with this picture?

What's wrong with this picture?

Sleeve?
Rags?
No Sealant?

D. Falconer Photo

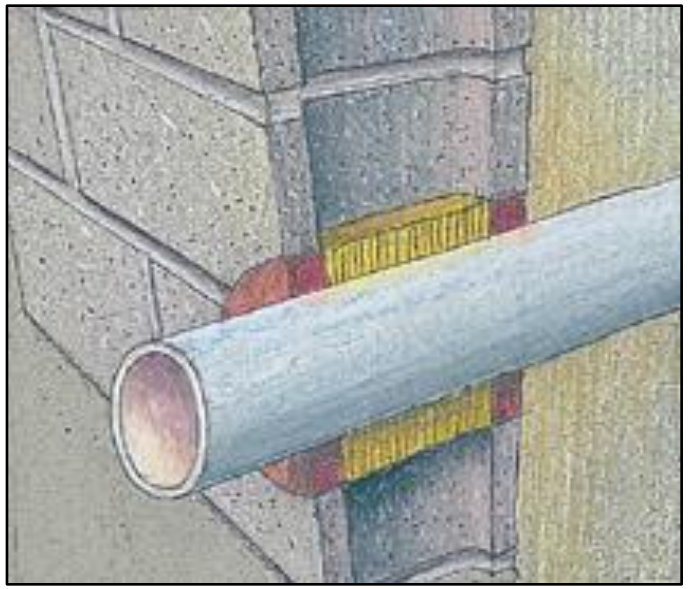

D-DESIGN
Specs,
Code,
Standards
I-INSTALLATION
Systems Selection
Systems Analysis
Self Inspection
FCIA, FM & UL
MACC
QUALITY PROCESS
BARRIER MANAGEMENT
Fire Codes
NFPA 101, 1, IFC
Barrier Management
I – INSPECTION
IBC Ch. 17
NFPA 80
NFPA 1

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

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

= Rated Firestop System

Manufacturers Instructions, Tested and Listed Designs

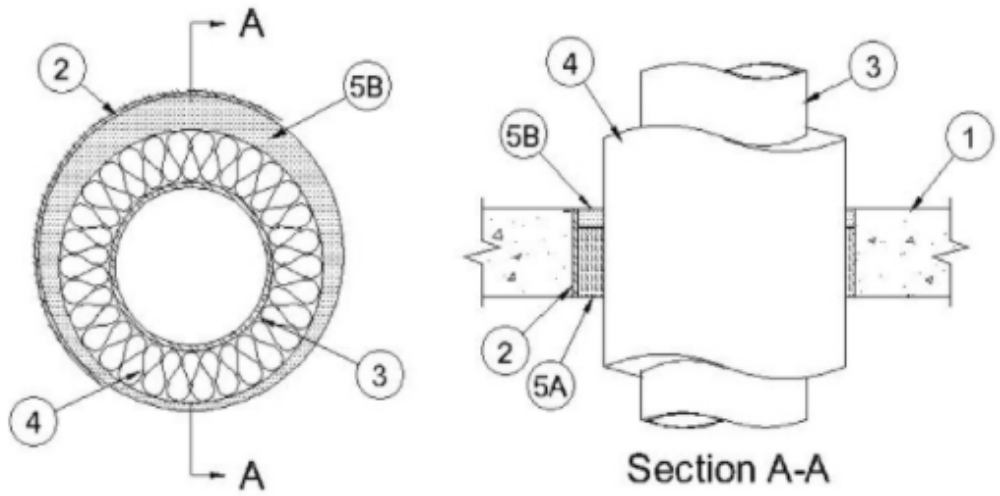


STI Graphic

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).

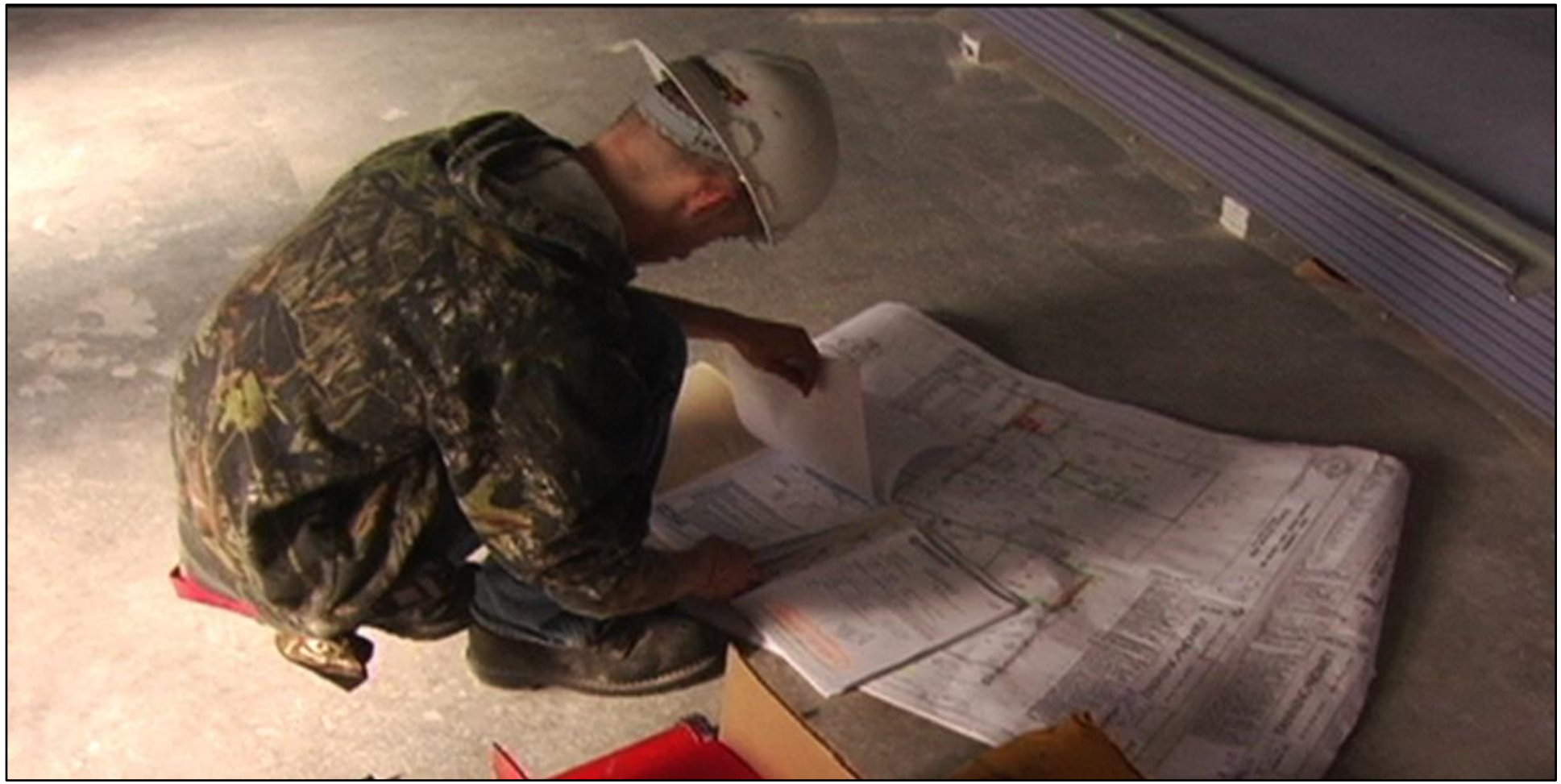
   See **Pipe and Equipment Covering - Materials** - (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a smoke Developed Index of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


FCIA


FCIA
FCIA
Firestop Contractors International Association

Barrier Continuity
I – Installation – Listed Systems



Systems & Materials….

Firestopping for Continuity – Firestop Products

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

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

3 Firestop Installation Methods

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

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 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

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Qualified Firestop Contractor Program

Underwriters' Laboratories of Canada®
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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

FM Approvals
Member of the FM Global Group

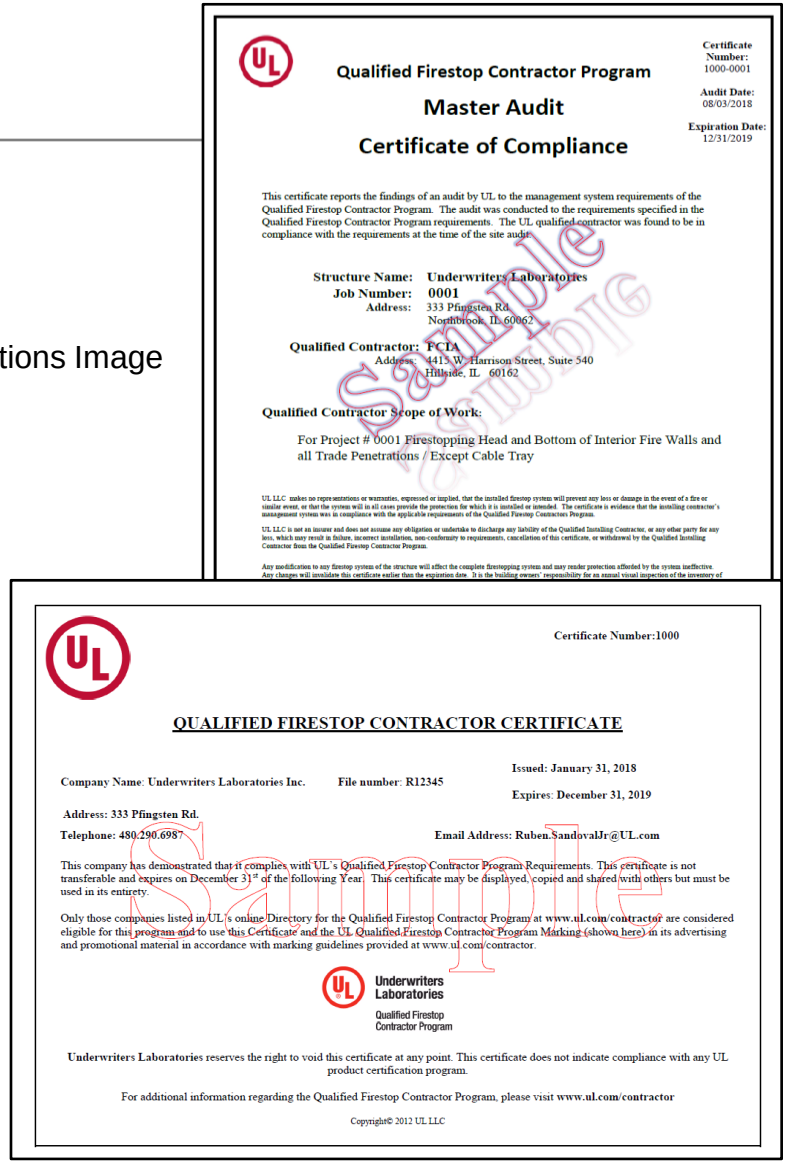
Underwriters Laboratories Inc.
Qualified Firestop Contractor Program

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

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

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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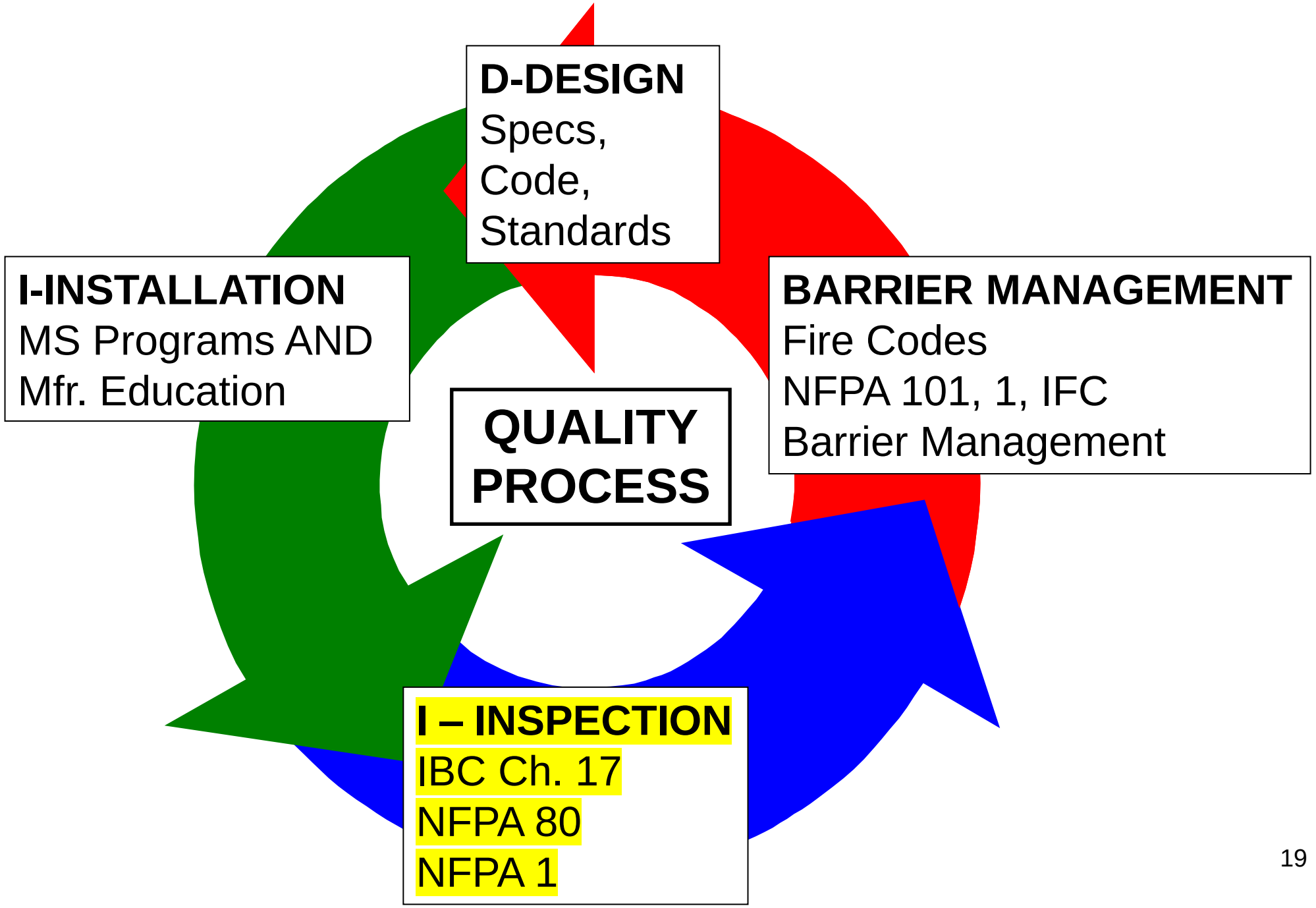
Sample

UL Solutions Image

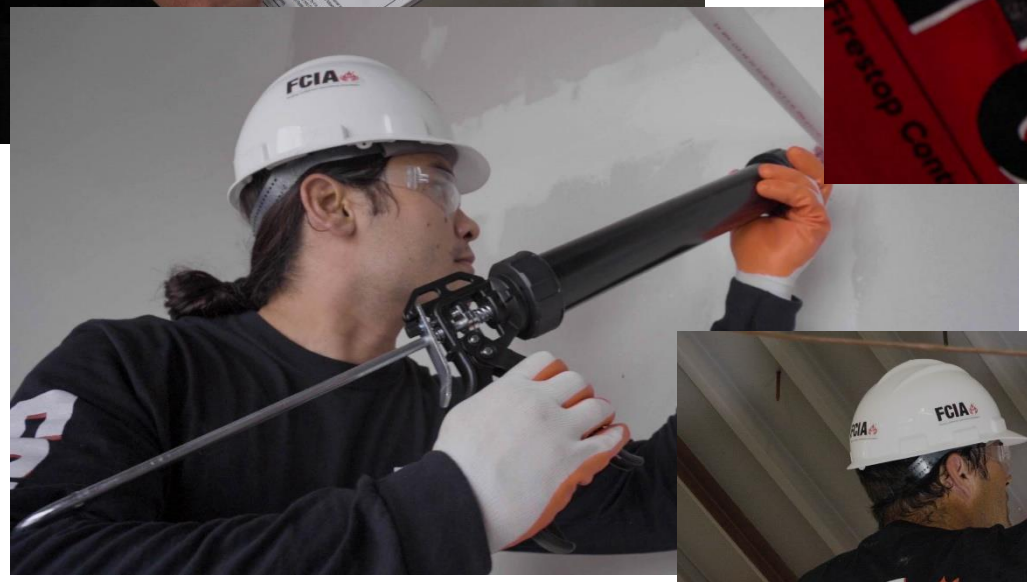

D-DESIGN
Specs,
Code,
Standards
I-INSTALLATION
MS Programs AND
Mfr. Education
BARRIER MANAGEMENT
Fire Codes
NFPA 101, 1, IFC
Barrier Management
QUALITY
PROCESS
I – INSPECTION
IBC Ch. 17
NFPA 80
NFPA 1

Firestop & Inspection

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

Firestop & Inspection

MII & Listings, Install
MII & Listings, Inspect



I – Inspection – Options

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

I – Inspection –
IBC Code Requirements (Not in NBC)

- **Required, International Building Code – Chapter 17**
- **Not Required in NBC**
- **FCIA NBC Code Proposal – 2020 … and 2025**

FCIA & KOFFEL
2002-2023

Firestop Systems Inspection Introduction
ASTM E2174 – ASTM E2393

- Standard Inspection Procedure
- Special Inspection Agency Companies & Other Firms
- Inspection Agency & Hired by & Report to Building Owner, Architect, Owners Rep, AHJ…other than GC
- Inspector Approved by AHJ
  - ***Drawings, LISTINGS & Manufacturers Instructions***
  - Destructive (2%) or Observation (10%)
  - Final Report

Firestop Inspection in Codes
ASTM E2174 – ASTM E2393

- **CANADA – PROPOSALS – NBC ‘20, ’25…**
- 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

I – Inspection –
IBC Code Requirements

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

1705.16.1 Penetration firestops. Inspections of penetration firestop systems that are tested and listed in accordance with Sections 714.3.1.2 and 714.4.1.2 **shall be conducted by an approved inspection agency in accordance with ASTM E2174.**

1705.16.2 Fire-resistant joint systems. Inspection of fire resistant joint systems that are tested and listed in accordance with Sections 715.3 and **715.4 shall be conducted by an approved inspection agency in accordance with ASTM E2393.**

[IBC 1705.17.1 & .2]

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

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

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

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

- **Inspection Agency *Company* Qualification –**
  - **NONE REQUIRED….SPEC's.**

- **Consider IAS AC-291**

INTERNATIONAL ACCREDITATION SERVICE®

Firestop Inspection in Codes
NFPA 1 – 2018

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

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

Firestop Inspection Process
ASTM E2174 – ASTM E2393

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

Firestop Inspection Process
ASTM E2174 – ASTM E2393

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

Affinity Firestop Photo

Firestop Inspection Process
ASTM E2174 – ASTM E2393

- **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 Contractor**
  - **E2393 - 5% of Total Lineal Feet** for each **type** of Fire Resistance Rated Joint System
    - **Type = By System, By 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

Fire Stopping for Continuity
Fire Stop Products

- Sealants
  - Silicone, Acryic/Latex, Intumescent
- Wrap Strips & Collars, Sleeves
  - “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

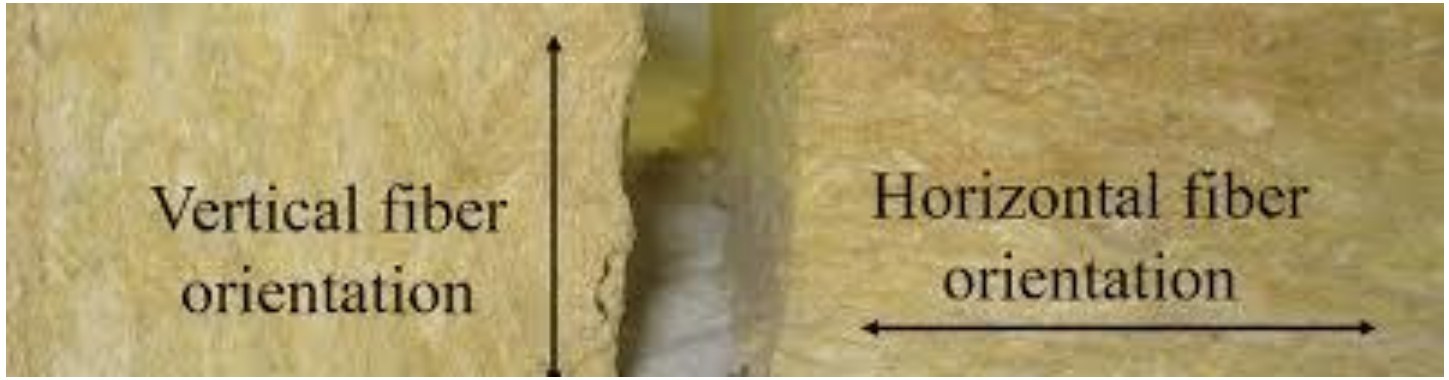
I – Inspection – Procedures

- **Forming Materials**
  - **Density**
  - **Compression**
  - **Fiber Orientation**
  - **Depth**

HILTI Image

I – Inspection – Procedures

- Forming Materails
- Multiple Locations
- Forming Materials
  - Fiber Orientation



STI Image

I – Inspection – Procedures

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

OC Thermafiber Image

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?

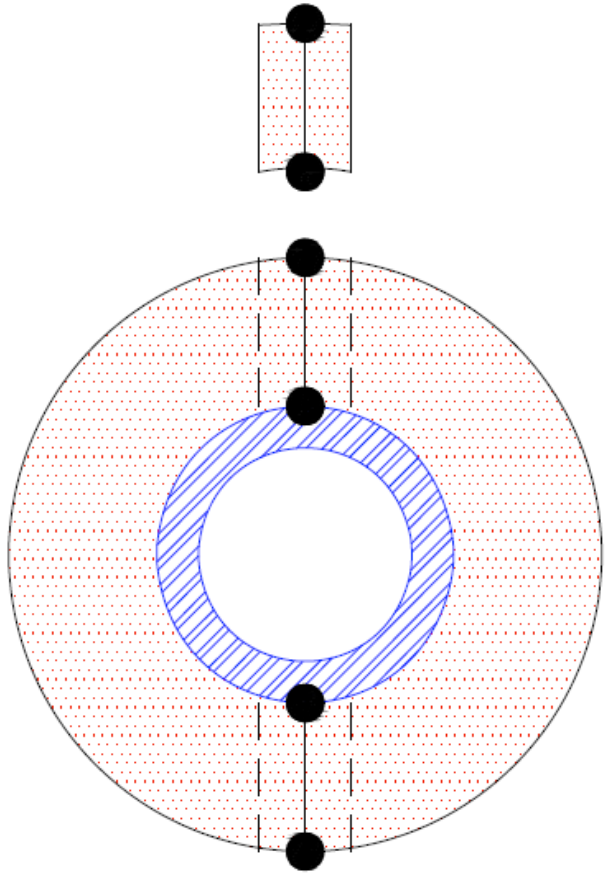


Figure 4

IFC Image

I – Inspection – Procedures

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

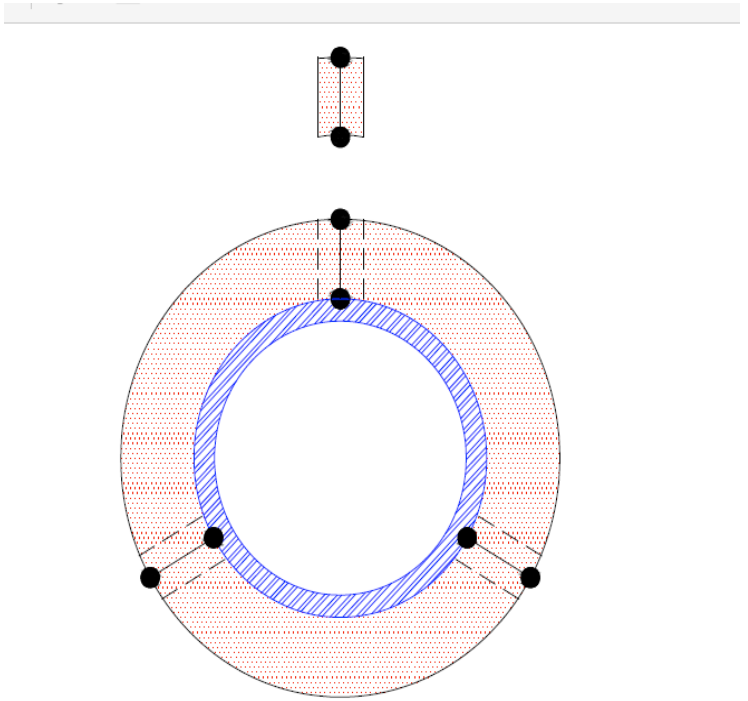


Figure 3

IFC Image

I – Inspection – Procedures

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

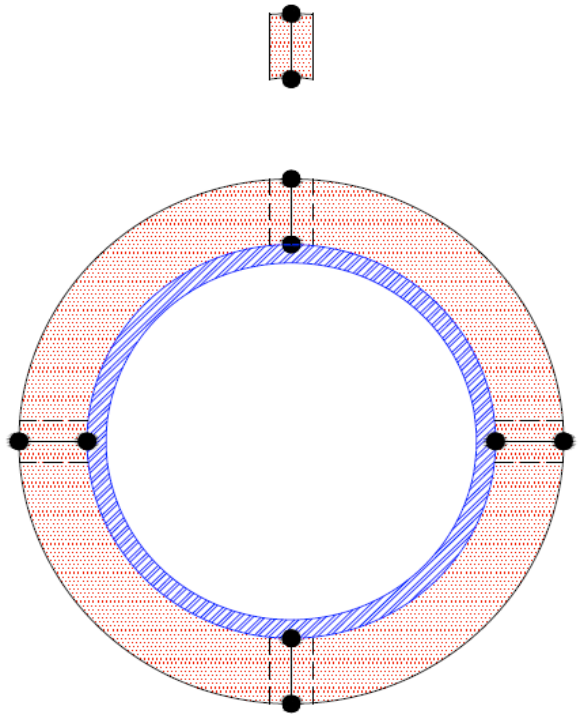
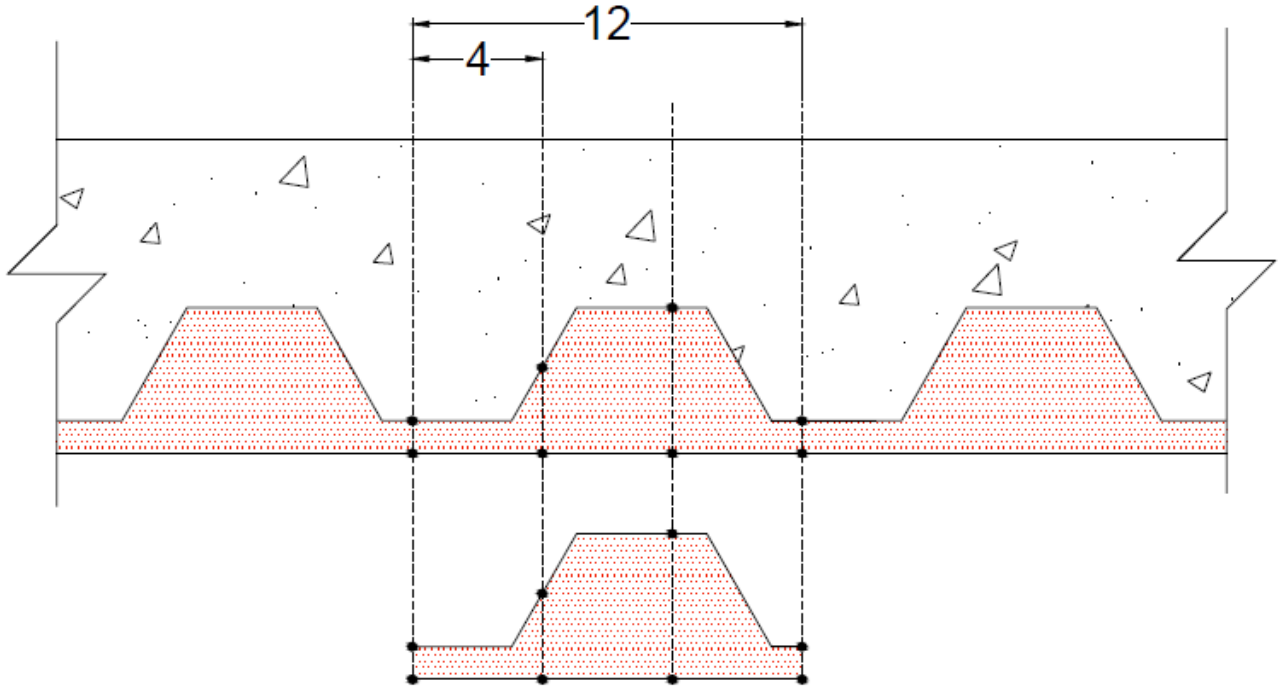


Figure 2

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

- **Multiple Locations**
- **Sealants**
  - **SHRINKAGE**

I – Inspection – Procedures

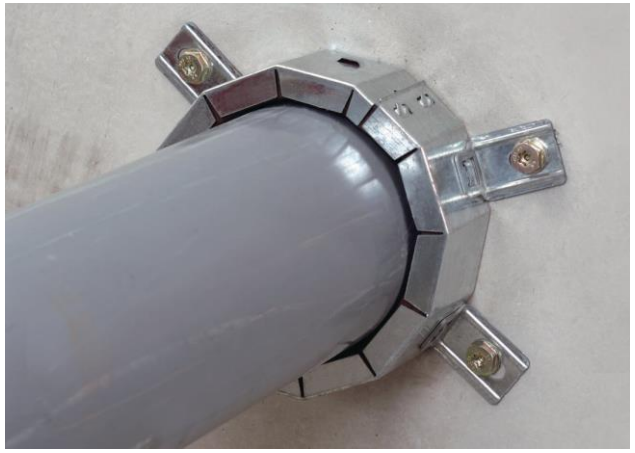
- **Wrap Strips – Devices**
  - **Elastomer Count/Size**
- **Composite Sheet**
- **Kits**
  - **Fasteners**
  - **Attachments**
  - **Bands**
- **Bags**
- **Bricks**
- **Foam**

STI Image

Hilti Image

I – Inspection – Procedures

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

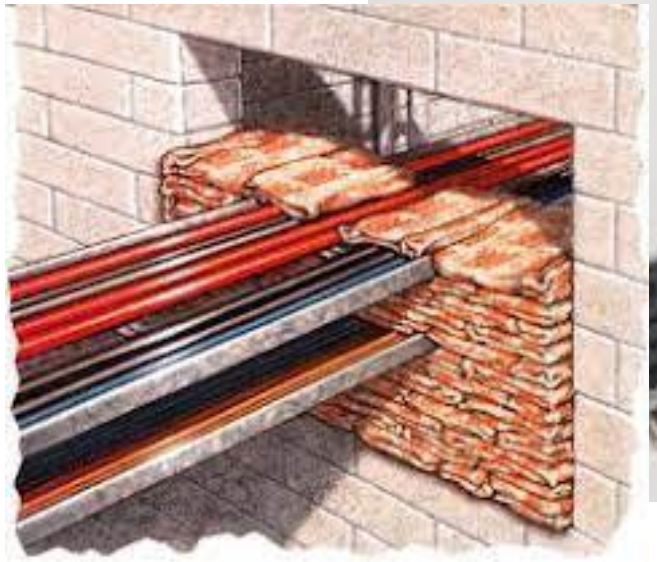


Hilti Image

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 Image

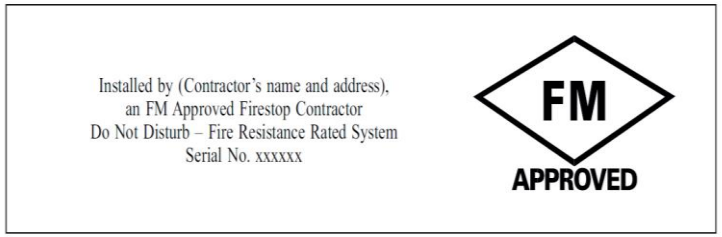
I – Inspection – Procedures

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

Affinity Firestop Photo

Firestop Inspection Process
ASTM E2174 – ASTM E2393

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

Affinity Firestop Photo

Firestop Inspection Process
ASTM E2174 – ASTM E2393

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

Affinity Firestop Photo

Firestop Evaluation & Repairs

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

Firestop Repairs

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

Affinity Firestop Photo

Firestop Inspection Forms & Variance Notices

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

Firestop Inspection Final Report
ASTM E2174 - ASTM E2393

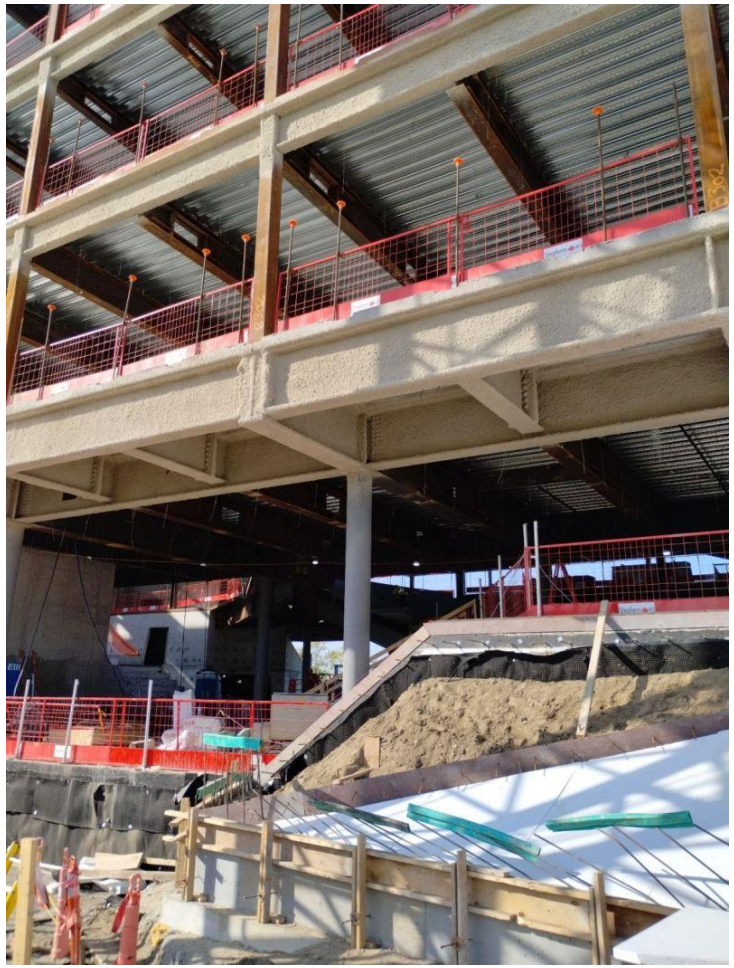
- Project name and location
- Project team contact info
- Firestops reviewed (inspected)
  - Type and quantity
  - Verification method
  - Percentage of total deficiencies
- All documents submitted to AA

Affinity Firestop Photo

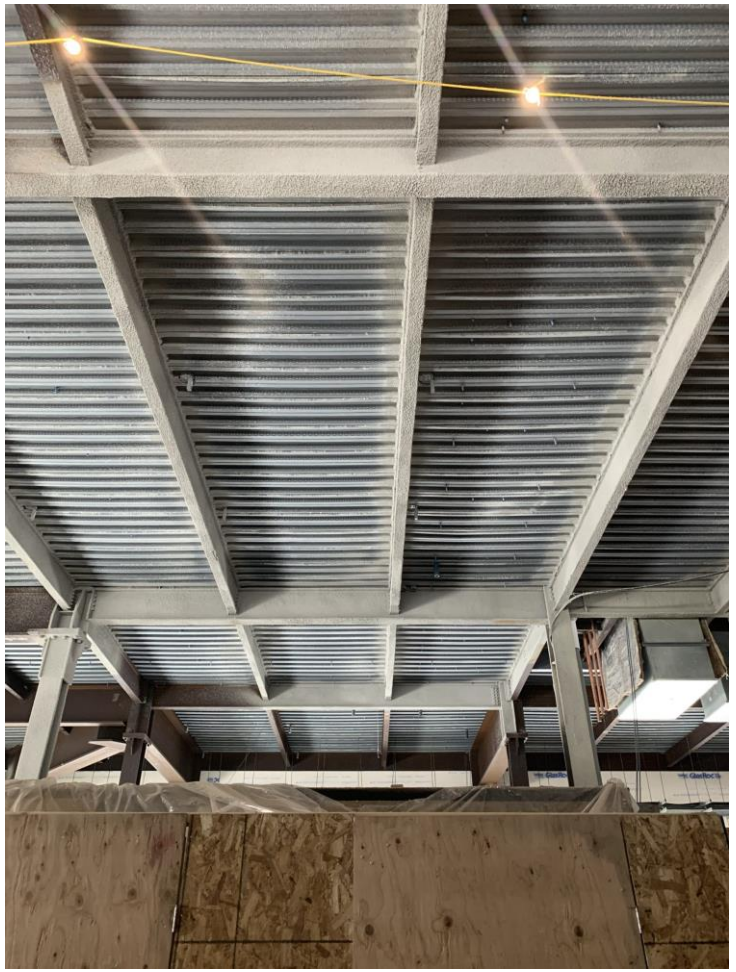
Fireproofing Inspection……

- **CANADA – PROPOSALS NBC ‘20, ’25…**
- IBC Ch.17 - Special Inspection
  - SFRM - Prescriptive
  - IFRM - AWCI 12-B
  - *Boards & Wraps – New Standard Coming*
- Abu Dhabi International Building Code

Fireproofing Inspection – Typical Bay



Nexlevel Photo



Trinity Photo

Ch. 17 Special Inspection

1705.15 Sprayed fire-resistant materials. *Special inspections* and tests of sprayed fire-resistant materials applied to floor, roof and wall assemblies and structural members shall be performed in accordance with Sections 1705.14.1 through 1705.14.6. *Special inspections* shall be **based on the fire-resistance design** as designated in the *approved construction documents*. The tests set forth in this section shall be based on samplings from specific floor, roof and wall assemblies and structural members. *Special inspections* and tests shall be performed during construction with an additional inspection after the rough installation of electrical, automatic sprinkler, mechanical and plumbing systems and suspension systems for ceilings, where applicable. The sample size shall not exceed 110% of that specified by the reference standards in section 1705.15.4.1 through 1705.14.4.9 **[IBC 2021, 1705.15]**

Ch. 17 Special Inspection

1705.14.1 Physical and visual tests. The *special inspections* and tests shall include the following to demonstrate compliance with the listing and the *fire-resistance rating*:

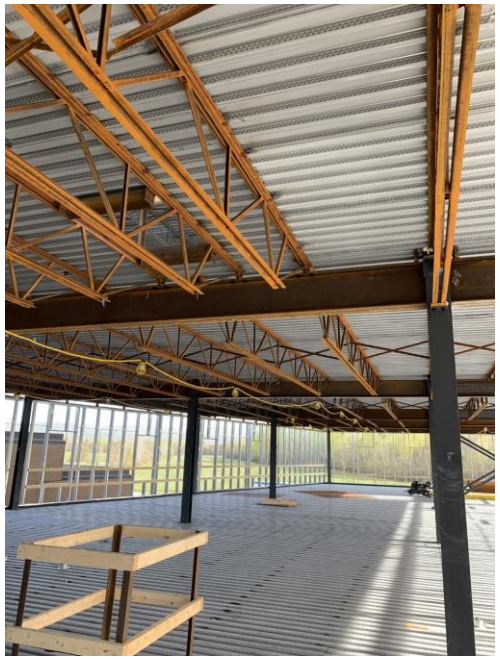
1. Condition of substrates.
2. Thickness of application. (ASTM E605)
3. Density in pounds per cubic foot (kg/m_3).
4. Bond strength adhesion/cohesion. (ASTM E736)
5. Condition of finished application.

[IBC 2018, 2021, 1705.15.1]

Application Conditions

1705.15.3 Application. The substrate shall have a minimum ambient temperature before and after application as specified in the written instructions of *approved* manufacturers. The area for application shall be ventilated during and after application as required by the written instructions of *approved* manufacturers.

[IBC 2018, 2021, 1705.15.3]



Bond Strength…

1705.15.6.1 Floor, roof and wall assemblies.

The test samples for determining the cohesive/adhesive bond strength of the sprayed fire-resistive materials shall be selected from each floor, roof and wall assembly at the rate of not less than **one sample for every 2,500 square feet (232 m2)** of the sprayed area, or portion thereof, in each *story*.

1705.15.6.2 Structural members.

The test samples for determining the cohesive/adhesive bond strength of the sprayed fire-resistant materials shall be selected from beams, girders, trusses, columns and other structural members at the rate of **not less than one sample for each type of structural member for each 2,500 square feet** (232 m2) of floor area or portion thereof in each *story*.

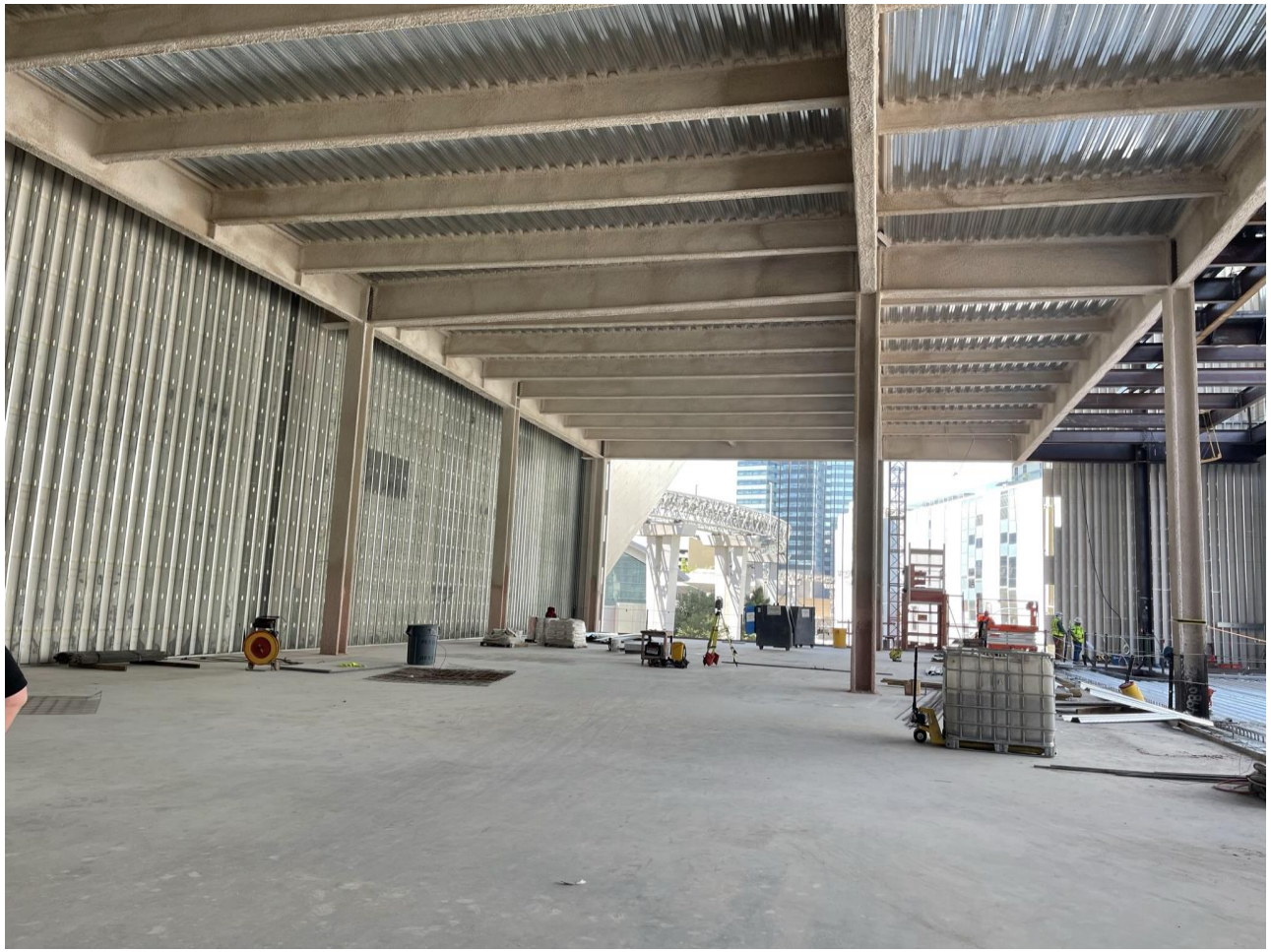
[IBC 2018, 2021, 1705.15.6.1 & 6.2]

Primers, Paints, Encapsulants…

1705.15.6.3 Primer, paint and encapsulant bond tests. Bond tests to qualify a primer, paint or encapsulant shall be conducted where the sprayed fire-resistive material is applied to a primed, painted or encapsulated surface for which acceptable bond strength performance between these coatings and the fire-resistive material has not been determined. **A bonding agent *approved* by the SFRM manufacturer shall be applied to a primed, painted or encapsulated surface where the bond strengths are found to be less than required values.**

[IBC 2018, 2021, 1705.15.6.3]

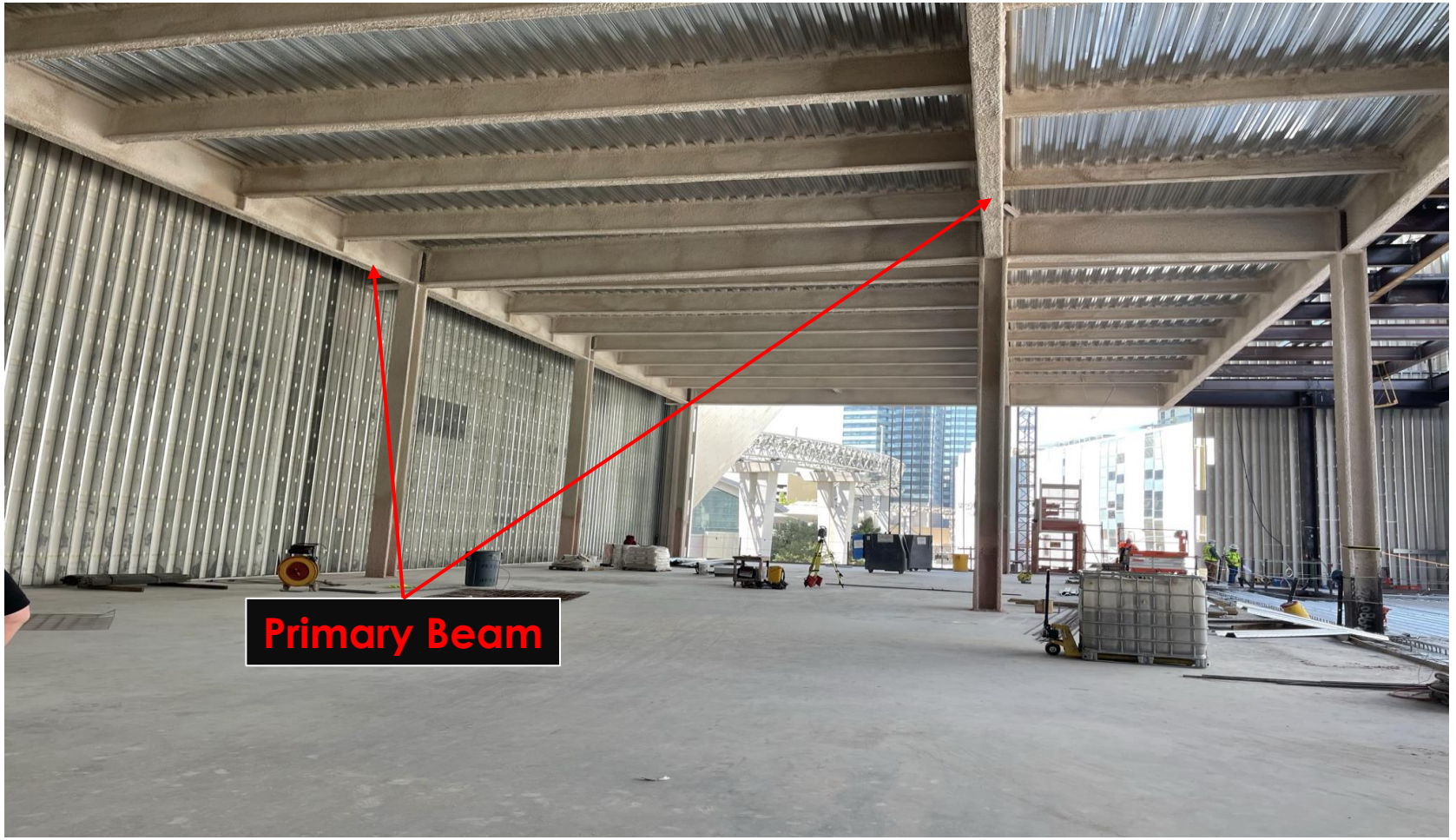
Fireproofing Inspection – Typical Bay



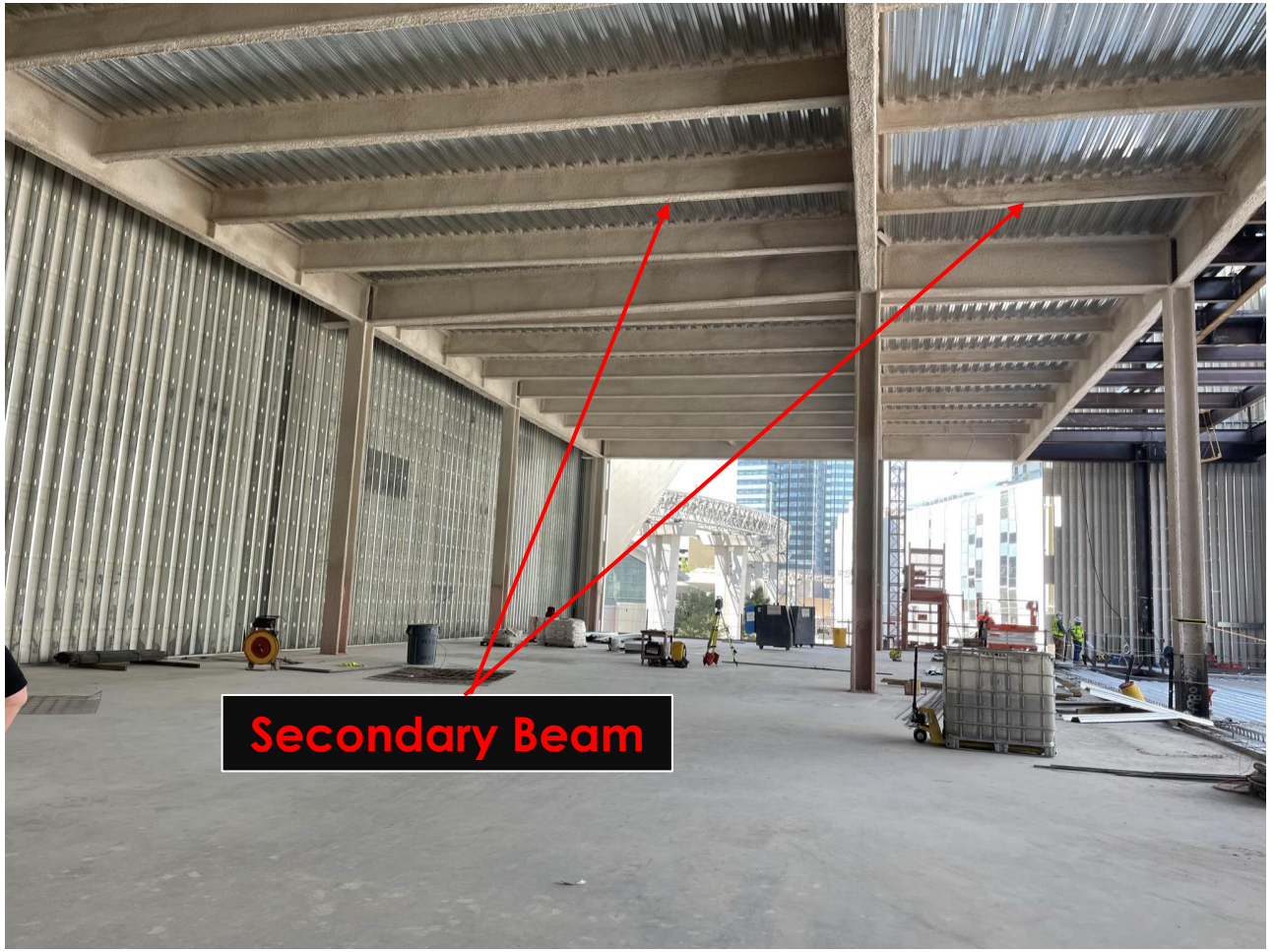
Bottom of Structural Floor Deck

Column

Primary Floor Beam or Joist



Secondary Beam or Joist



Measuring Thickness

Thicknesses

1705.15.4 Thickness. Not more than 10 percent of the thickness measurements of the sprayed fire-resistive materials applied to floor, roof and wall assemblies and structural members shall be less than the thickness required by the *approved* fire-resistance design, and none shall be less than the minimum allowable thickness required by Section 1705.15.4.1.

[IBC 2018, 2021, 1705.15.4]

Thicknesses

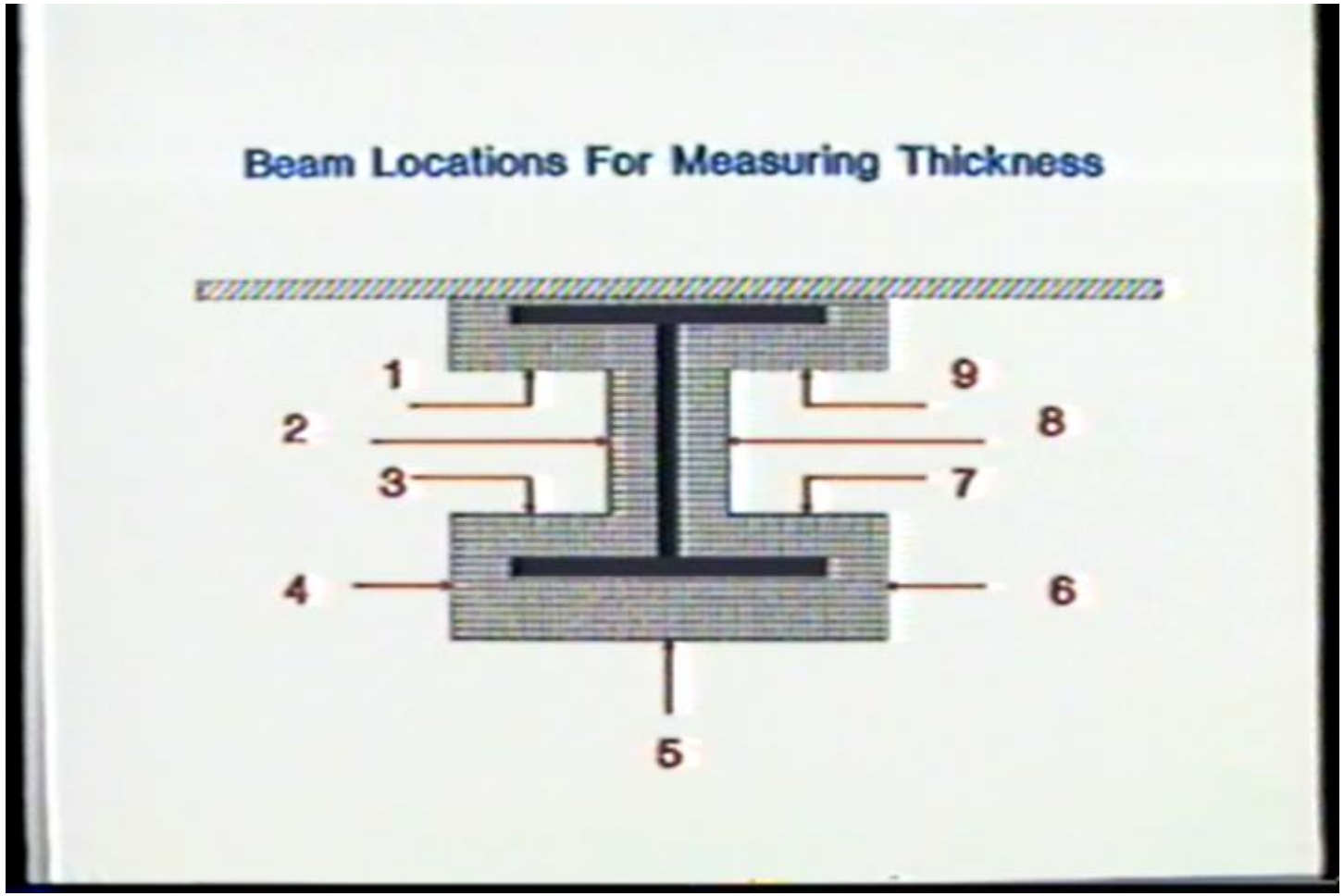
1705.15.4.1 Minimum allowable thickness.

For design thicknesses 1 inch (25 mm) or greater, the minimum allowable individual thickness shall be the design thickness minus 1/4 inch (6.4 mm). For design thicknesses less than 1 inch (25 mm), the minimum allowable individual thickness shall be the design thickness minus 25 percent.

Thickness shall be determined in accordance with ASTM E605. Samples of the sprayed fire-resistive materials shall be selected in accordance with Sections 1705.15.4.2 and 1705.15.4.3.

[IBC 2018, 2021, 1705.15.4.1]

Beam Measurement Locations



Recording Results and Averaging Beam Data

- Full design thickness shall be measured at locations 1, 2, 3, 5, 7, 8, 9.
- ½ of full thickness or a minimum of ¼ inch measured at locations 4 and 6.
- Repeat the above measurements at a location on the beam 12 inches from the first measurement set.
- Calculate full thickness by averaging locations 1, 2, 3, 5, 7, 8, 9.
- Do not include locations 4 and 6 in average of full thickness.

Thicknesses

1705.15.4.2 Floor, roof and wall assemblies.

The thickness of the sprayed fire-resistive material applied to floor, roof and wall assemblies shall be determined in accordance with ASTM E605, making not less than four measurements for each 1,000 square feet (93 m2) of the sprayed area, or portion thereof, in each story.

[IBC 2018, 2021, 1705.15.4.2]

Thicknesses

1705.15.4.3 Cellular decks.

Thickness measurements shall be selected from a square area, 12 inches by 12 inches (305 mm by 305 mm) in size.

Not fewer than four measurements shall be made, located symmetrically within the square area.

[IBC 2018, 2021, 1705.15.4.3]

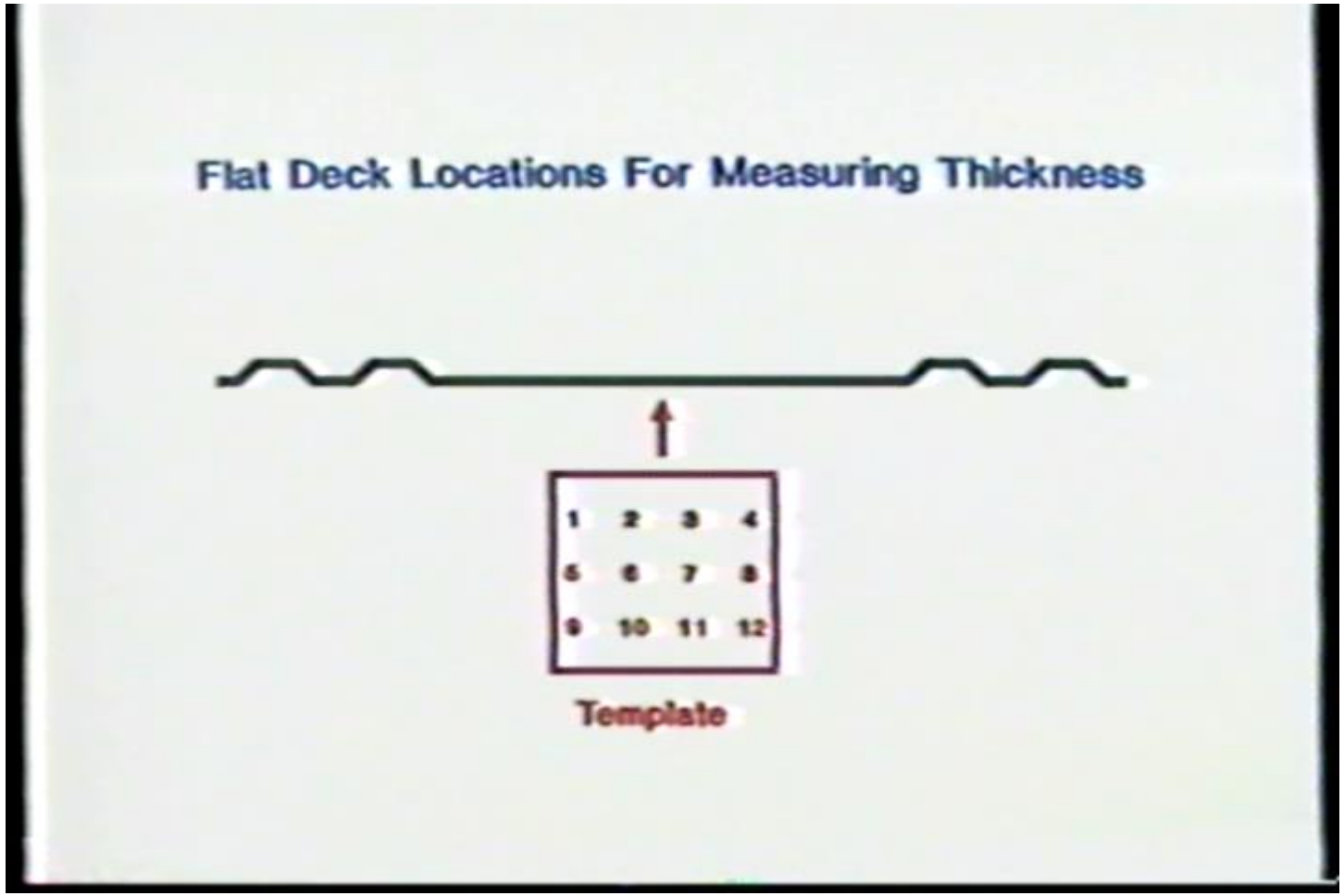
Thicknesses

1705.15.4.4 Fluted decks.

Thickness measurements shall be selected from a square area, 12 inches by 12 inches (305 mm by 305 mm) in size. Not fewer than four measurements shall be made, located symmetrically within the square area, including one each of the following: valley, crest and sides. The average of the measurements shall be reported.

[IBC 2018, 2021, 1705.15.4.4]

12” x 12” Drilled Plate to Locate Thickness Locations on Flat Deck



Using Marking Plate to Define Measurement Area on Flat Deck

Thickness Measurement on Bottom of Deck Flute

Thickness Measurement on Flat of Deck

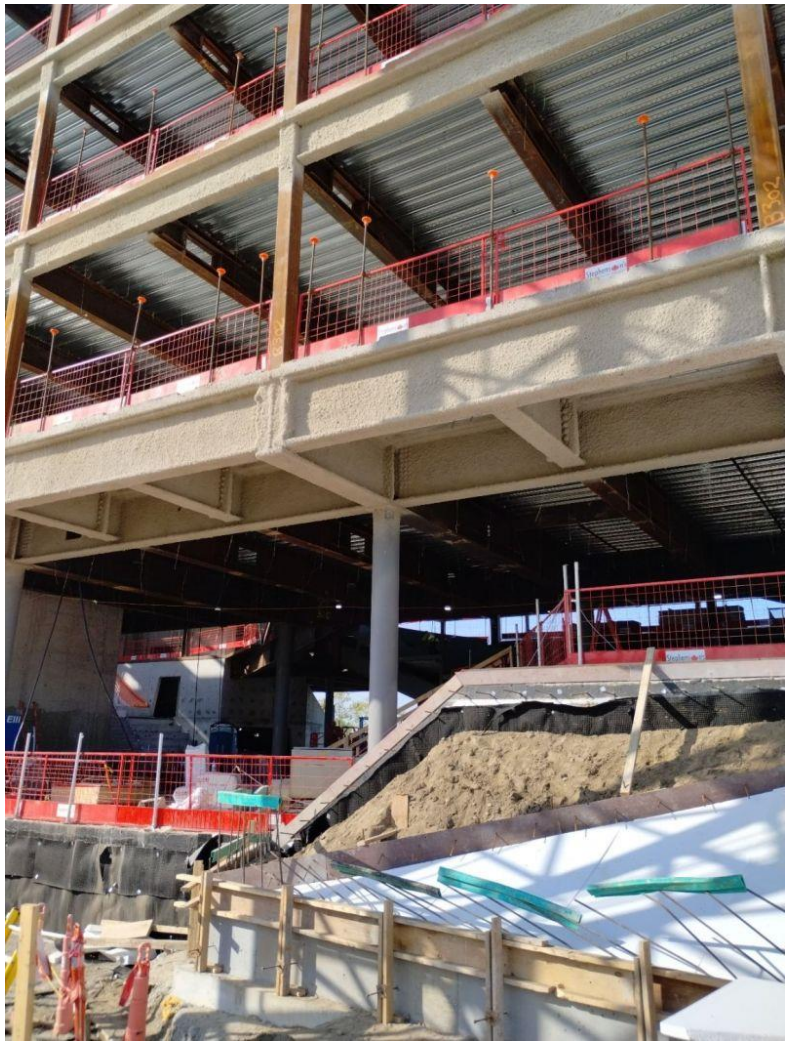
Thickness Measurement on Side of Deck Flute

Thicknesses

1705.15.4.5 Structural members. The thickness of the sprayed fire-resistive material applied to structural members shall be determined in accordance with ASTM E605.

Thickness testing shall be performed on not less than 25 percent of the structural members on each floor.

[IBC 2018, 2021, 1705.15.4.5]

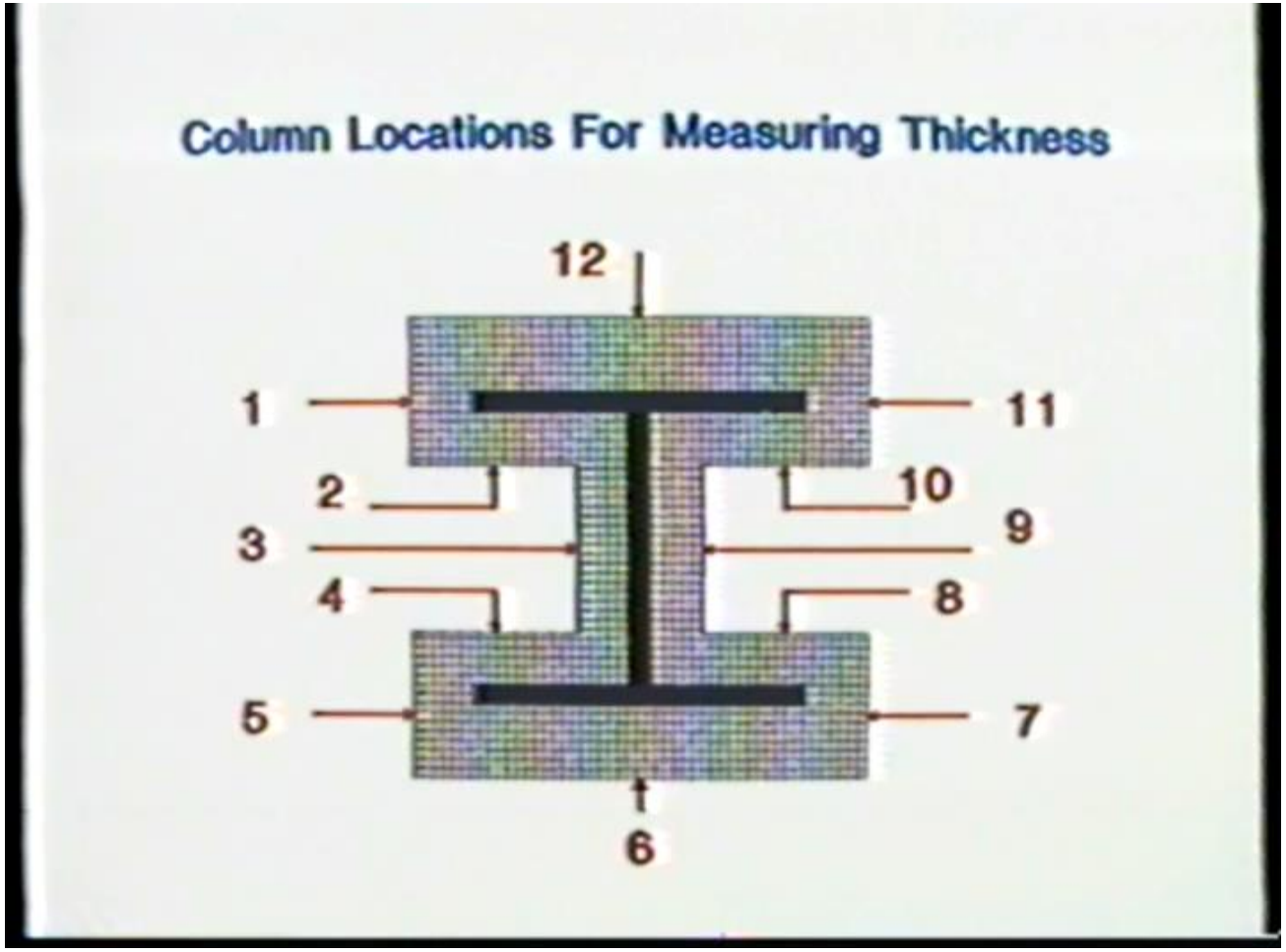


Nexlevel Photo

Measurement Locations

- Two sets of thickness measurements are required on each beam, joist and column.
- When finished making the first set of thickness measurements, move 12 inches away on the same structural element and make a second complete set of measurements.
- A 12” template made of cardboard or wood is helpful.

Locations for Measuring Columns

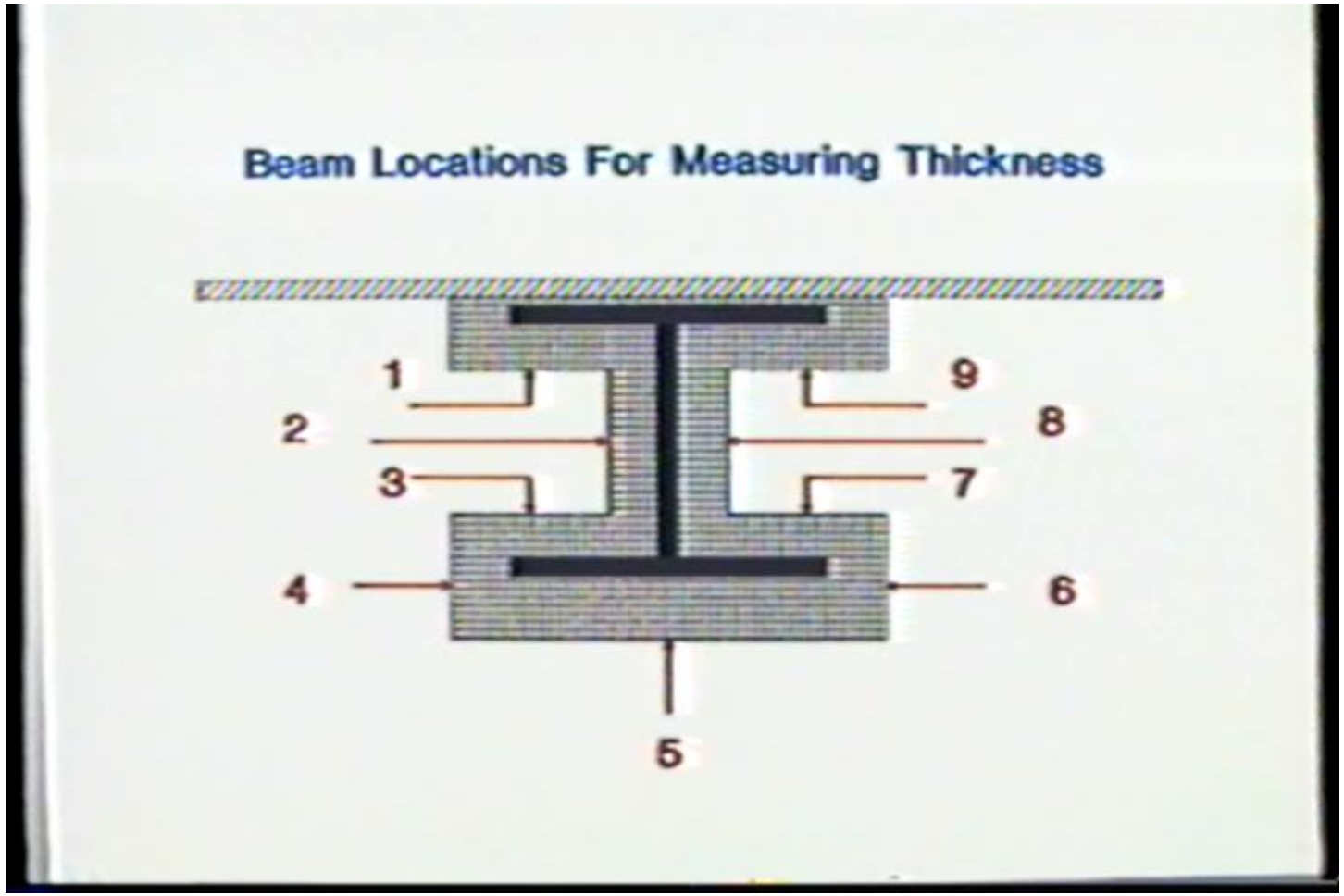


Thicknesses

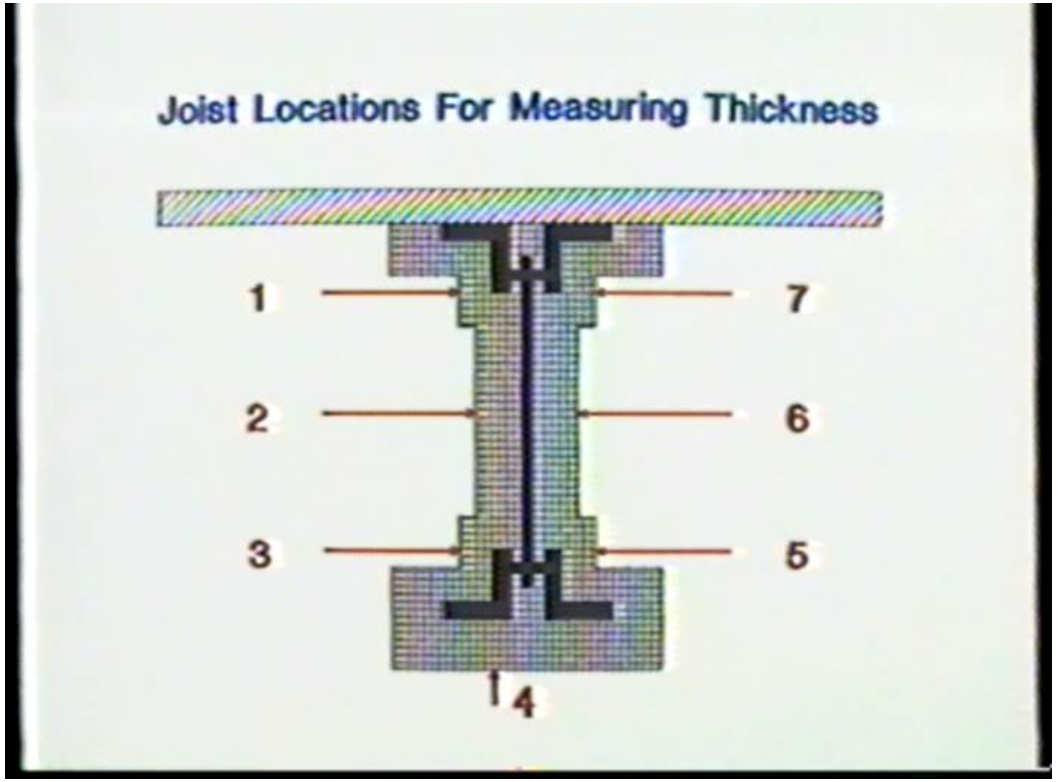
1705.15.4.6 Beams and girders. At beams and girders thickness measurements shall be made at nine locations around the beam or girder at each end of a 12-inch (305 mm) length.

[IBC 2018, 2021, 1705.15.4.6]

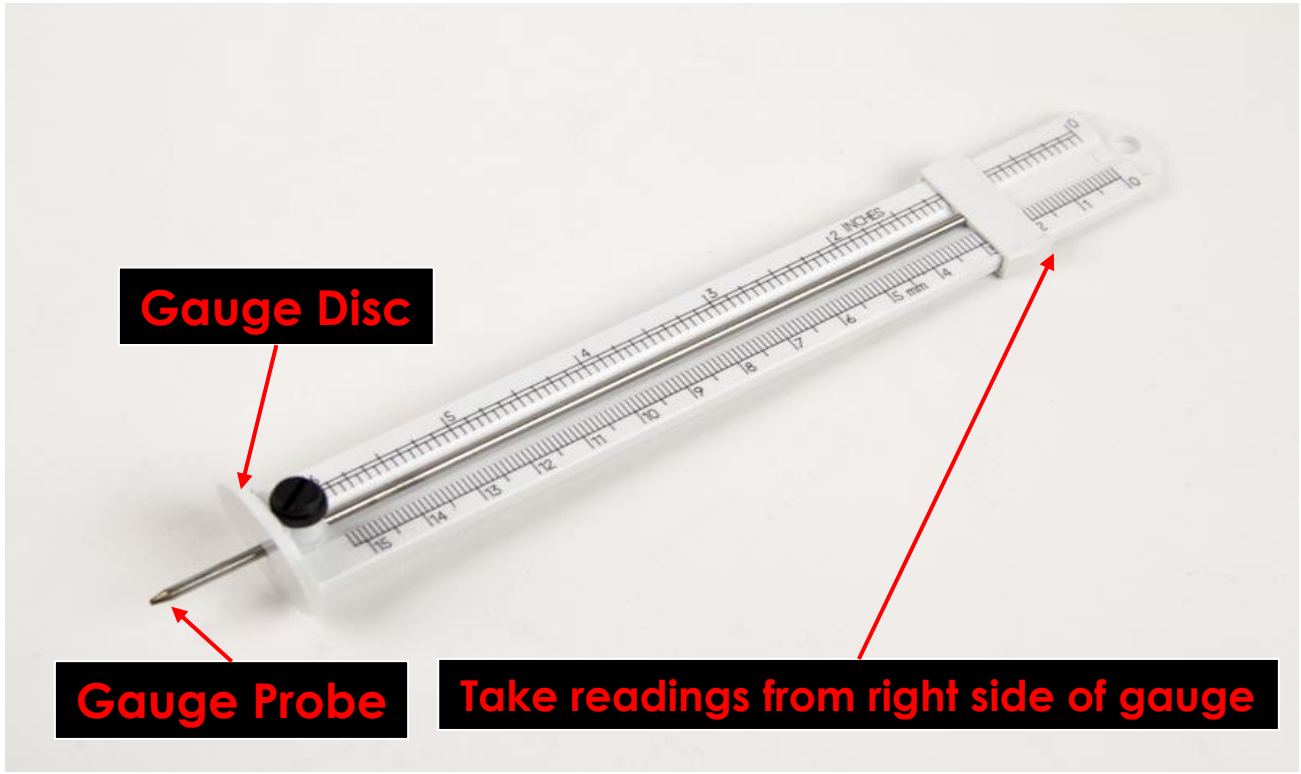
Beams, Girders



Locations for Measuring Joists



SFRM Thickness Inspection Notes



- Ensure the gauge disc is flush with the fireproofing. Do not compress the fireproofing with the gauge.
- Confirm gauge probe is inserted fully and that the probe tip meets the steel substrate.
- Insert gauge as perpendicular as possible to SFRM to ensure accurate thickness reading is obtained.
- If gauge probe becomes bent or damaged, discard it.
- Use a 12” template made of cardboard or wood.

Density

1705.15.5 Density. The density of the sprayed fire resistive material shall be not less than the density specified in the *approved* fire-resistance design. Density of the sprayed fire-resistive material shall be determined in accordance with ASTM E605. The test samples for determining the density of the sprayed fire-resistive materials shall be selected as follows:

1. From **each floor, roof and wall assembly** at the rate of not less than one sample for every 2,500 square feet (232 m2) or portion thereof of the sprayed area in each story.

2. **From beams, girders, trusses and columns** at the rate of not less than one sample for each type of structural member for each 2,500 square feet (232m2) of floor area or portion thereof in each *story*.

[IBC 2018, 2021, 1705.15.5]

Removing Sample for Density Measurement

Weighing Density Sample

Bond Strength Testing

Moving Measuring Slide to SFRM Surface

Measuring Slide Contacting but Not Compressing SFRM

Taking Thickness Measurement

Bond Strength Testing Occurs on Any Sprayed Flat Surface

Mix Urethane Adhesive to Initiate Chemical Reaction

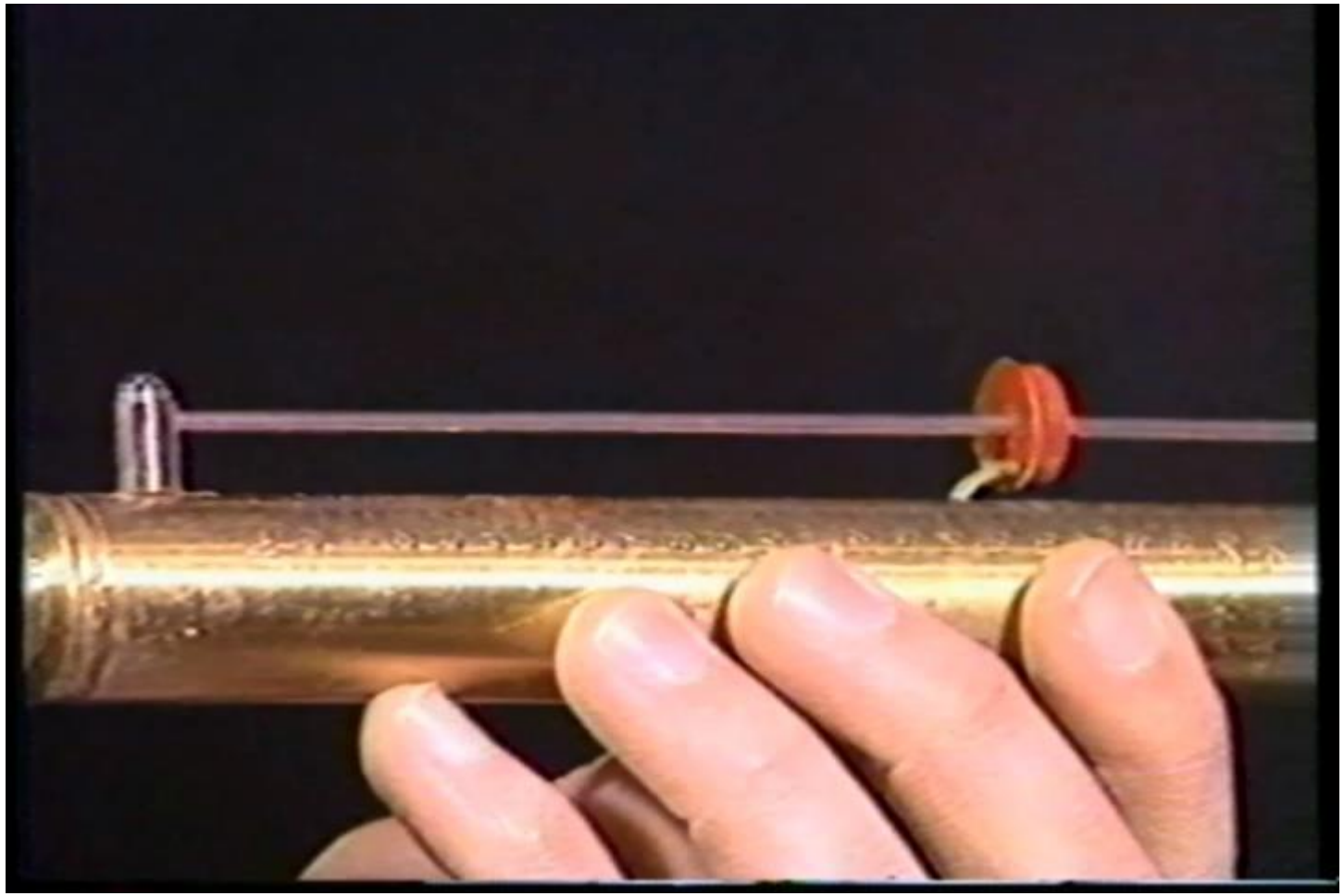
Place Cap onto Surface of SFRM Test Location

Attach Spring Scale to Eye Screw

Adding Fixed Weights May be Used In Place of Spring Scale (horizontal applications)

Pull Spring Scale - Consistent Slow Speed

Record Maximum Load from Spring Scale, lbs.



Intumescent Fire-Resistive Materials Inspection Procedures (IFRM)

Donalco Western Photo

NFCA
National Fireproofing Contractors Association

Intumescent Fire-Resistive Materials (IFRM) Special Inspection

1705.16 Intumescent Fire-Resistive Materials ~~Mastic and intumescent fire-resistant coatings.~~

Special inspections and tests for ~~mastic and~~ *intumescent fire-resistive materials* applied to structural elements and decks shall be performed in accordance with **AWCI 12-B.**

Special inspections and tests shall be based on the fire-resistance design as designated in the *approved construction documents*. *Special inspections* and tests shall be performed during construction. Additional visual inspection shall be performed after the rough installation and, where applicable, prior to the concealment of electrical, automatic sprinkler, mechanical and plumbing systems.

[IBC 2018, 2021, 1705.16]

Measuring Calibration Shim

Adjust Meter to Calibration Reading and Re-measure

Measure Thickness Coating and Record

Thickness Measurements

- Thickness determination shall be the mean of three separate thickness readings within the area of ½ inch diameter circle.
- Small surface irregularities may cause readings to differ even in small areas.
- When moving the probe within the ½ inch diameter, discard any unusually high or low readings that cannot be repeated consistently.

Thickness Measurements (con’t.)

- Make readings at least 1 inch away from any edge or corner of the substrate.

Thickness Measurement Averaging

- A single average thickness shall be calculated from each series of individual thickness determinations on the member tested.
- The calculated average thickness shall be equal to or greater than the thickness specified for the member.
- Reduced thickness on flanges specified in the design shall be averaged separately and not be included in the average thickness for the member.

Thickness Maximum

- Individual thickness determinations that exceed the thickness specified in a fire resistance design criteria by 20 percent shall be recorded as the thickness in the design plus 20 percent.

- The average dry film thickness on any member shall not exceed by more than 10 percent the manufacturer’s maximum tested thickness for the particular member shape and orientation.

Thickness Minimum

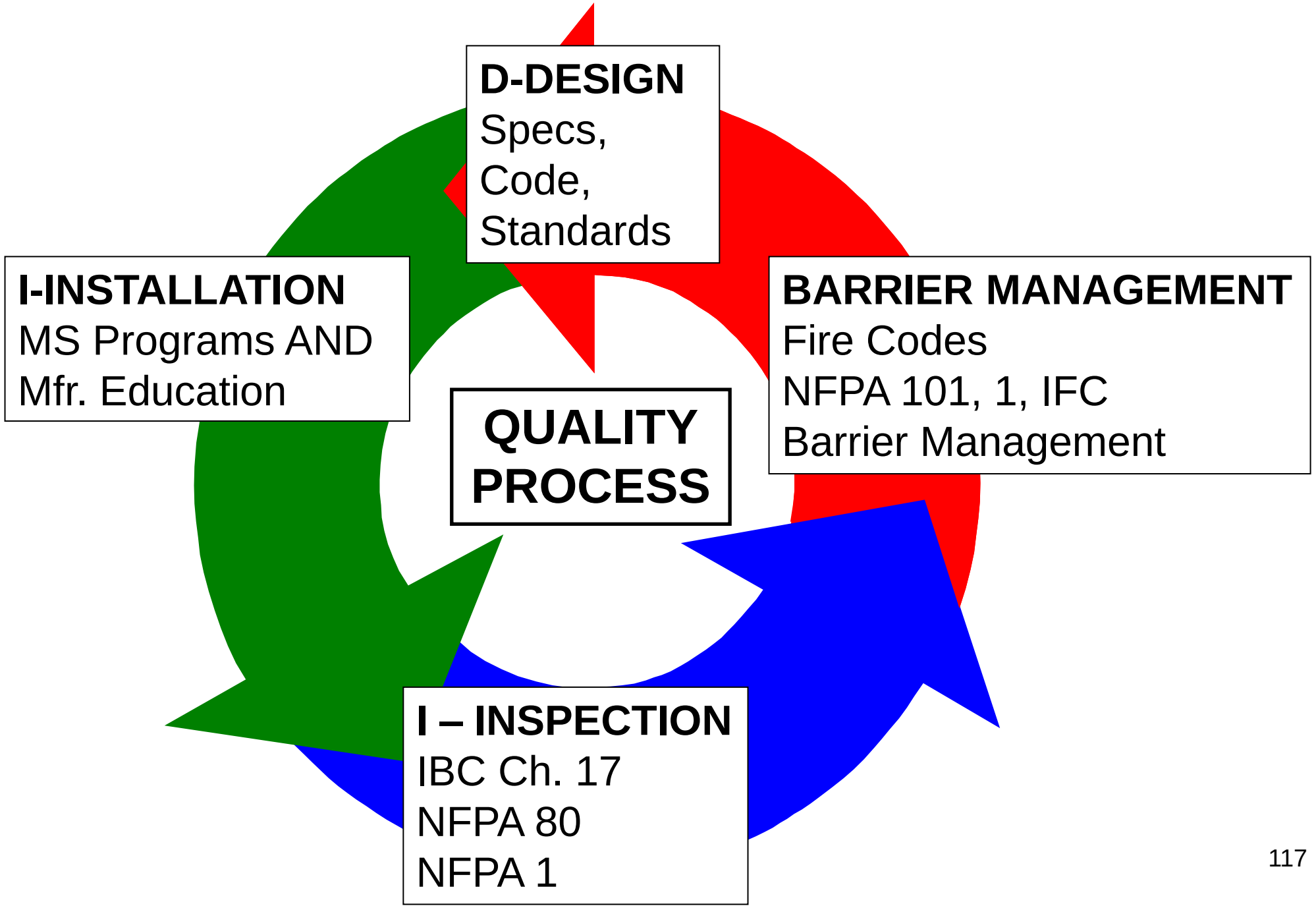
- No individual thickness determination shall be less than 80 percent of the thickness specified in the fire resistance rating design criteria.
- If the member fails to meet the average or individual thickness criteria, corrective action shall be taken and the area re-tested.

Visual Inspection

- Visual inspection of structural elements shall take place upon complete drying or curing before topcoat is applied.

- IFRM’s shall not exhibit deep or wide cracks, voids, blisters, bubbles, delamination or any exposure of the substrate.

- Minor surface irregularities are acceptable.


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

Installation & Inspection

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FCIA

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