

**FIRESTOP &  
Effective Fire-  
Resistance Rated  
Compartmentation**

Design  
Installation  
Inspection  
Maintain Protection  
**Archaic Assemblies,  
Existing Buildings &  
more...**

**Bill McHugh, FCIA**

**Rich Walke, CTI for FCIA**



Firestop Contractors International Association

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# FCIA – Firestop Contractors International Association

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- **Fire Exits??**
- **Housekeeping....Phones, Hands off Keyboard!**
- **Thanks to FCIA Members**
  - Firestop Contractors
  - Manufacturers, Consultants
  - Firestop Distributors, Reps, Friends
- **FREE PDF MOP/ Word Doc Spec - Specifiers @**  
Architect/Engineering firms, Independent Specifiers, AHJ's with  
Municipality Jurisdictions, More

# FCIA – Firestop Contractors International Association

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- **FREE Life Safety Digest**
- **UL/ULC, FM 4991 Contractor Programs, IAS AC 291 Inspection Agency Accreditation Program, Individual Knowledge**
- **ASTM Inspection Standards**
- **Tools @ FCIA.org** for Specifiers, AHJ's, Building Owners, Firestop Contractors & Inspection Agencies
- **Watch FCIA.org for Webinar Announcements!**



# FCIA Actions – 2021 & 2022

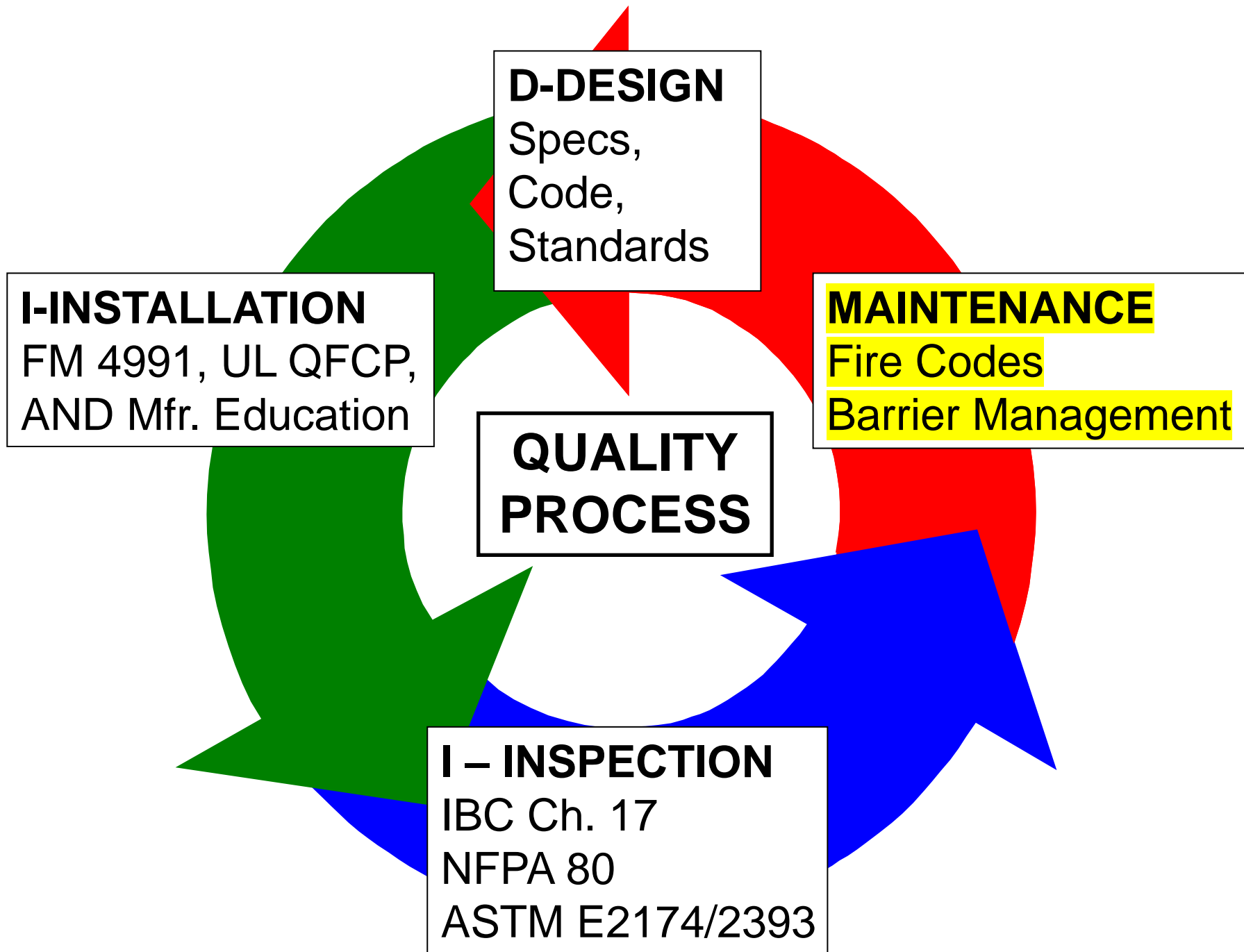
- Conferences - HYBRID
  - FCIA ECA @ Nashville, USA – May 18-20
  - FCIA ME @ Doha, Dubai – June 12-17
  - FCIA CAN @ Vancouver – Oct. 4
  - FCIA FIC @ Amelia Island, FL – Nov. 2-4
- Webinars & Symposiums
- Code Development & Standards Discussions
- Committee Action
- International Discussions
- ***NEW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

# FCIA – Firestop Contractors International Association



- **Thanks FCIA Members**
  - Firestop Contractors
  - Manufacturers, Consultants
  - Firestop Distributors, Reps, Friends
- **FREE PDF MOP/ Word Doc Spec** - Specifiers @ AE, Independents, AHJ's with Jurisdictions, More....
- **Not a member? Join today – Email us –**

**Info@FCIA.org**



# Building & Fire Code Requirements

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- International Codes –
  - New and Existing Buildings –
  - International Building Code – Chapter 7
  - International Existing Building Code
  - **International Fire Code – Chapter 7**
- NFPA 5000 / 101 – Chapter 8
- National Building Code of Canada
- UAE Fire and Life Safety Code
- Saudi Building and Fire Code
- ***Minimum Requirements – Construction & Maintenance*** <sup>7</sup>

# Building & Fire Code Requirements

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



# Building & Fire Code Requirements

## Similar Fire Test Time-Temperature Curves

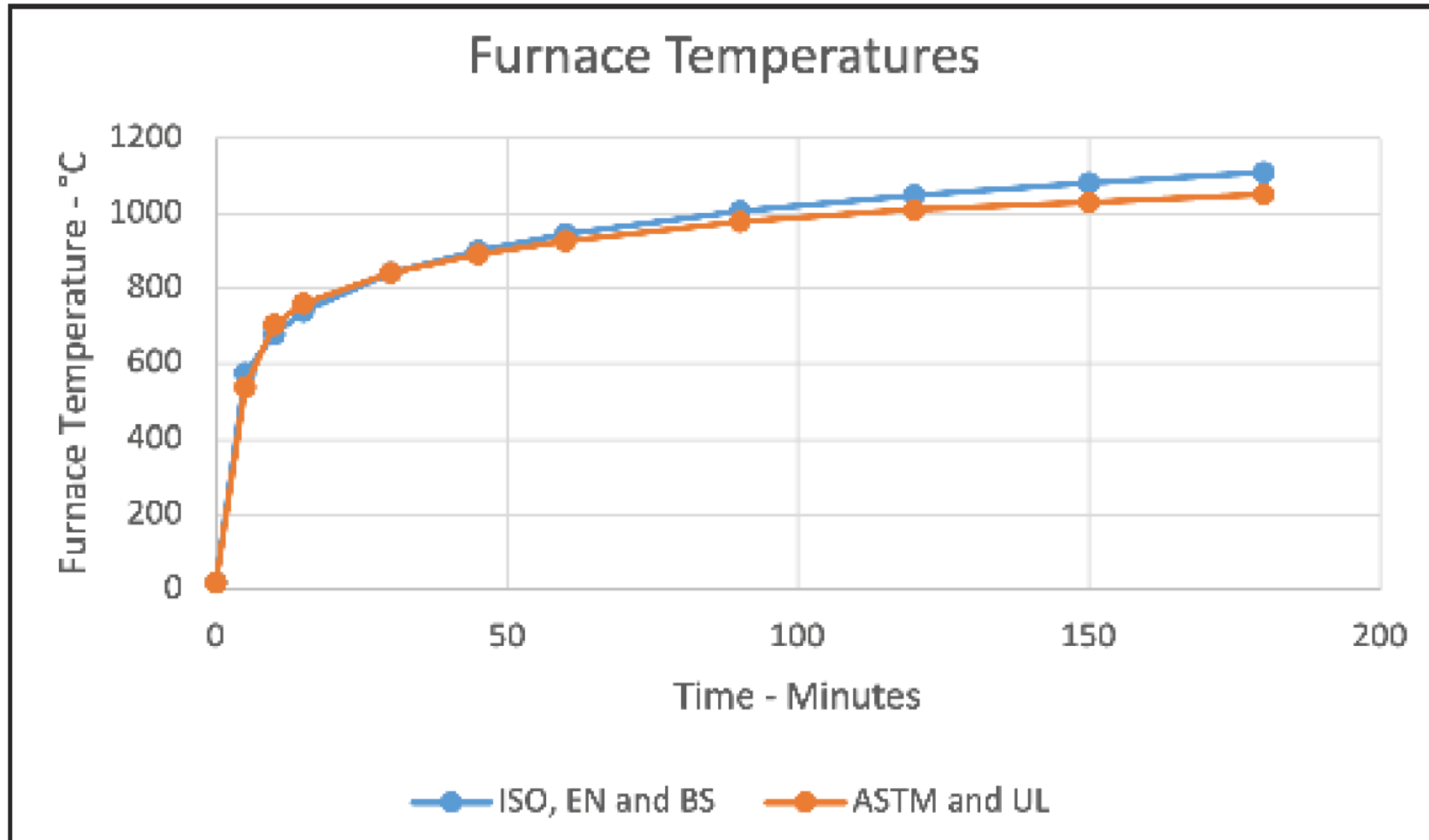


Figure 1 - Comparison of furnace temperatures, the time/temperature curve  
Berhinig Image

# Firestopping for Safety “DIIM”

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

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

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- 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

# Systems & Materials....

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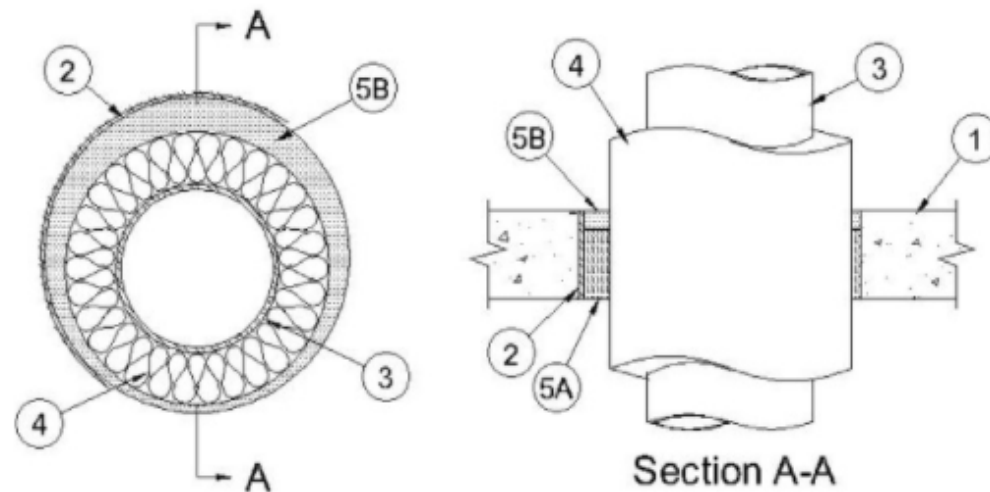


**Possible UL  
System Nos.:  
C-AJ-5138,  
C-AJ-5209,  
W-J-5091,  
Etc.**

Affinity Firestop Photo

**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<sup>3</sup>) 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.**



PANEL 133 SECTION  
DATE: \_\_\_\_\_  
JOB NO.: \_\_\_\_\_  
DRAWING NO.: \_\_\_\_\_  
SCALE: \_\_\_\_\_  
PROJECT: \_\_\_\_\_  
SHEET NO.: \_\_\_\_\_  
SHEET TOTAL: \_\_\_\_\_



The mesh is made of stainless steel with a diameter of 1.2mm and a thickness of 0.1mm. The mesh is welded to the pipe wall. The mesh is made of stainless steel with a diameter of 1.2mm and a thickness of 0.1mm. The mesh is welded to the pipe wall. The mesh is made of stainless steel with a diameter of 1.2mm and a thickness of 0.1mm. The mesh is welded to the pipe wall.





# How to **SURVEY?**

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- 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***

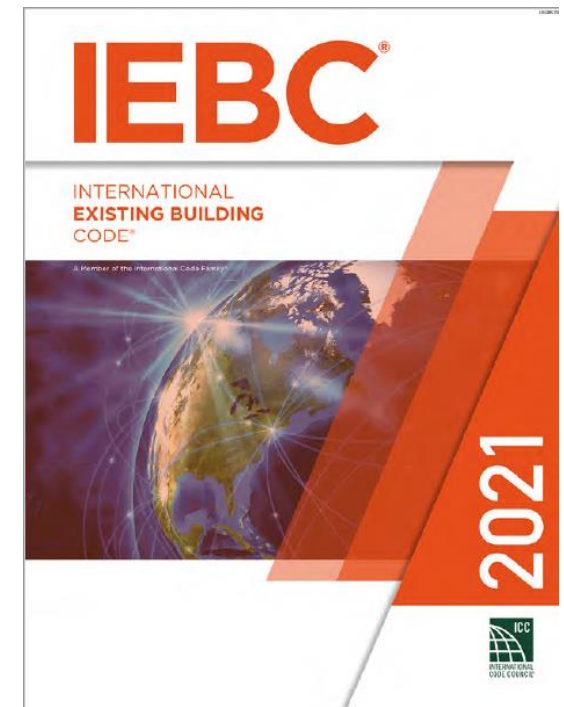
***Manufacturers Instructions, Tested and Listed Designs***

***- Seems to VISUALLY COMPLY or NOT TO COMPLY***

**Scope.** The provisions of this code shall apply to the *repair, alteration, change of occupancy, addition to and relocation of existing buildings.*

**CHAPTER TOPICS**

<b>Chapter</b>	<b>Subjects</b>
1–2	Administrative Requirements and Definitions
3	Provisions for all Compliance Methods
4	Repairs
5	Prescriptive Compliance Method for Existing Buildings
6–12	Work Area Compliance Method for Existing Buildings
13	Performance Compliance Method for Existing Buildings
14	Relocated Buildings
15	Construction Safeguards
16	Referenced Standards
Appendix A	Guidelines for Seismic Retrofit of Existing Buildings
Appendix B	Supplementary Accessibility Requirements for Existing Buildings
Appendix C	Guidelines for Wind Retrofit of Existing Buildings
Appendix D	Board of Appeals
Resource A	Guidelines on Fire Ratings of Archaic Materials and Assemblies



Thx Ed Goldhammer  
for presenting this 05/22

# IEBC Definitions – Chapter 2

## Repairs – Chapter 4

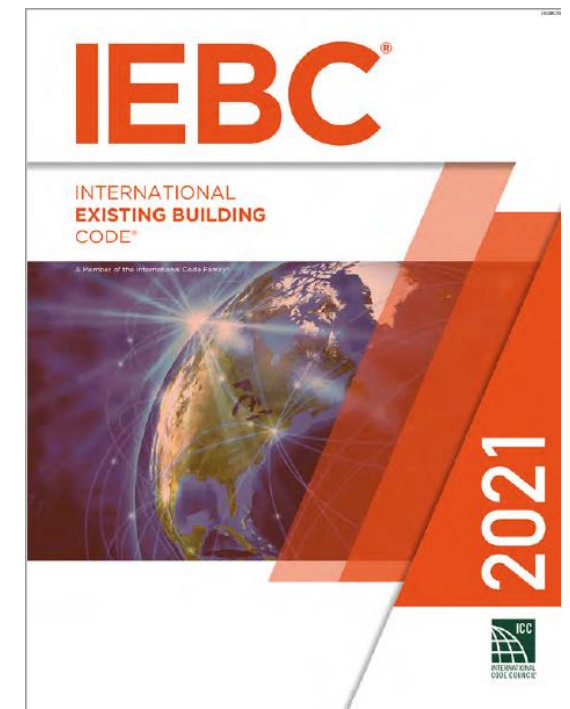
**REPAIR.** The reconstruction, replacement or renewal of any part of an *existing building* for the purpose of its maintenance or to correct damage.

### CHAPTER 4 REPAIRS

#### SECTION 403

#### FIRE PROTECTION

**403.1 General.** *Repairs* shall be done in a manner that maintains the level of fire protection provided.



Thx Ed Goldhammer  
for presenting this 05/22

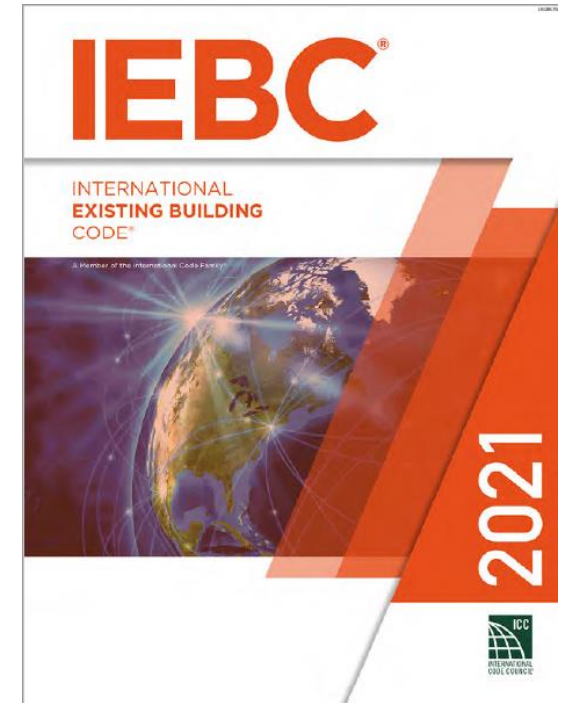
# IEBC Definitions – Chapter 2

## Alterations – Chapter 5

[A] **ALTERATION.** Any construction or renovation to an *existing structure* *other than a repair or addition.*

### CHAPTER 5 – ALTERATIONS

**503.1 General.** *Alterations* to any building or structure shall comply with the requirements of the *International Building Code* for new construction. *Alterations* shall be such that the *existing building* or structure is not less complying with the provisions of the *International Building Code* than the *existing building* or structure was prior to the *alteration*.



# WORK AREA COMPLIANCE METHOD

## ALTERATION—LEVEL 1 (may only require existing level of firestopping)

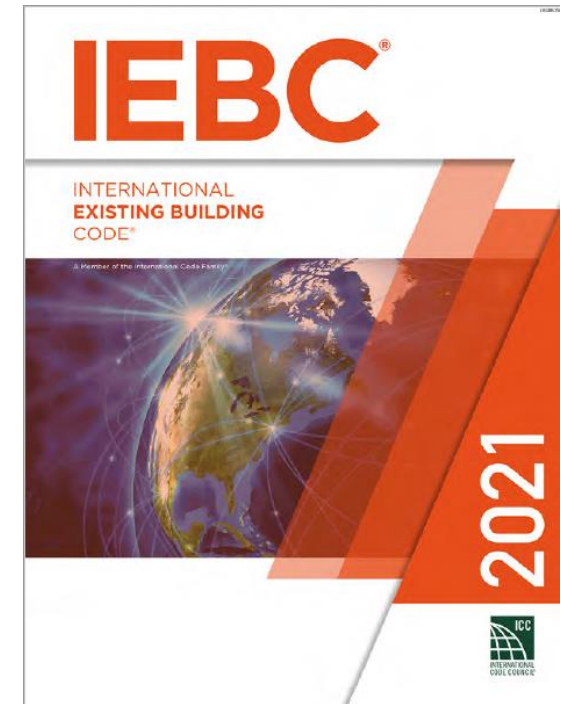
- Level 1 alterations include the removal and replacement or the covering of existing materials, elements, *equipment* or *fixtures* using new materials, elements, *equipment* or *fixtures* that serve the same purpose.
- *Building cannot be less safe than it was prior to alteration.*

## ALTERATION—LEVEL 2 (would require firestop systems)

- Level 2 *alterations* include the addition or elimination of any door or window, the reconfiguration or extension of any system, or the installation of any additional equipment, and shall apply where the *work area is equal to or less than 50 percent* of the building area.
- *New construction elements, components, systems and spaces comply with IBC...*

## ALTERATION—LEVEL 3 (would require firestop systems)

- Level 3 *alterations* apply where the *work area exceeds 50 percent of the building area.*



Thx Ed Goldhammer  
for presenting this 05/22;  
FCIA added Emphasis

# EXCERPTS FROM RESOURCE A – GUIDELINES ON FIRE RATINGS OF ARCHAIC MATERIALS AND ASSEMBLIES

The *Guidelines on Fire Ratings of Archaic Materials and Assemblies* – IEBC – fire-related performance of archaic construction.

- Archaic construction, typical of “earlier time”, generally prior to 1950.
- Fire-related performance = fire resistance, flame spread, smoke production and degree of combustibility.
- Performance can include experimental and/or theoretical approach.
- Typically design team would validate that the building materials and their fastening, joining and incorporation into the building structure are sound mechanically.
- More....

Thx Ed Goldhammer  
for presenting this 05/22.  
Some FCIA Edits



# EXCERPTS FROM RESOURCE A – GUIDELINES ON FIRE RATINGS OF ARCHAIC MATERIALS AND ASSEMBLIES

The *Guidelines on Fire Ratings of Archaic Materials and Assemblies* – IEBC – fire-related performance of archaic construction.

**The problem with archaic materials is simply that documentation of their fire performance is not readily available.** The application of engineering judgment is more difficult... because building officials may not be familiar with the materials or construction method involved.

As a result, either a full-scale fire test is required or the archaic construction in question removed and replaced.

Both alternatives are time consuming and wasteful.

Thx Ed Goldhammer  
for presenting this 05/22.  
Some FCIA Edits...



# RESOURCE A GUIDELINES ON FIRE RATINGS OF ARCHAIC MATERIALS AND ASSEMBLIES

## Example

A contractor would like to keep a partition –

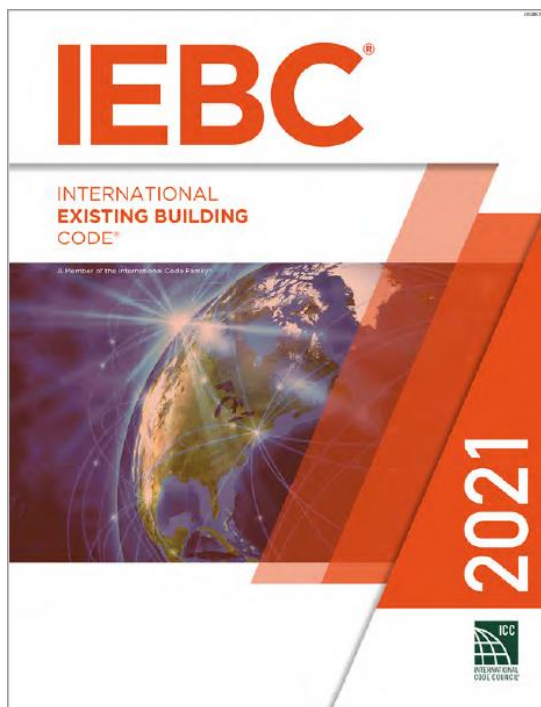
- 3 3/4 inch thick layer of red clay brick,
  - 1 1/4 inch thick layer of plywood,
  - 3/8 inch thick layer of gypsum wallboard,
- .....where 2-hour fire endurance is required.

**Is this assembly capable of providing a 2-hour protection?**

**Solution (using IEBC appendix tables for fire resistance)**

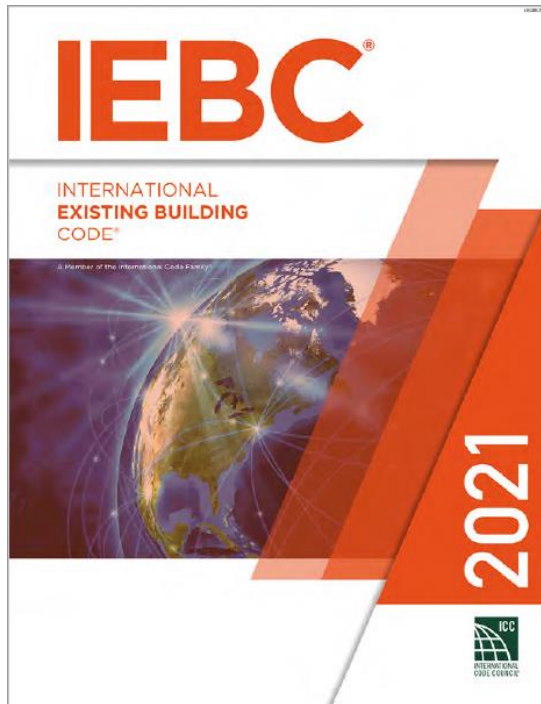
- Bricks of this thickness yield fire endurances of approximately 75 minutes (Table 1.1.2, Item W-4-M-2).
- The 1 1/4 inch (32 mm) thick plywood has a finish rating of 30 minutes.
- The 3/8 inch (9.5 mm) gypsum wallboard has a finish rating of 10 minutes.

Using the recommended values from tables and applying **Harmarthy's rule**, the fire endurance (FI) of the assembly is larger than the sum of the individual layers, or **FI > 75 + 30 + 10 = 115 minutes – AHJ APPROVAL?**



Thx Ed Goldhammer  
for presenting this 05/22  
Slight FCIA Edits.





# RESOURCE A GUIDELINES ON FIRE RATINGS OF ARCHAIC MATERIALS AND ASSEMBLIES

## Harmarthy's Ten Rules

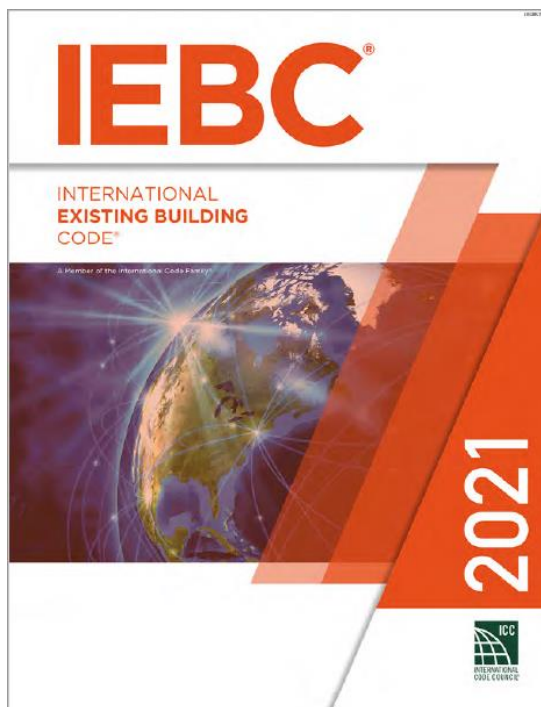
*Rule 1: The “thermal” fire endurance of a construction consisting of a number of parallel layers is greater than the sum of the “thermal” fire endurances characteristic of the individual layers when exposed separately to fire.*

*Rule 2: The fire endurance of a construction does not decrease with the addition of further layers.*

*Rule 3: The fire endurance of constructions containing continuous air gaps or cavities is greater than the fire endurance of similar constructions of the same weight, but containing no air gaps or cavities.*

*Rule 4: The farther an air gap or cavity is located from the exposed surface, the more beneficial is its effect on the fire endurance.*

## Harmarthy's Ten Rules



*Rule 5: The fire endurance of a construction cannot be increased by increasing the thickness of a completely enclosed air layer.*

*Rule 6: Layers of materials of low thermal conductivity are better utilized on that side of the construction on which fire is more likely to happen.*

*Rule 7: The fire endurance of asymmetrical constructions depends on the direction of heat flow.*

*Rule 8: The presence of moisture, if it does not result in explosive spalling, increases the fire endurance.*

*Rule 9: Load-supporting elements, such as beams, girders and joists, yield higher fire endurances when subjected to fire endurance tests as parts of floor, roof, or ceiling assemblies than they would when tested separately.*

*Rule 10: The load-supporting elements (beams, girders, joists, etc.) of a floor, roof, or ceiling assembly can be replaced by such other load-supporting elements which, when tested separately, yielded fire endurances not less than that of the assembly.*

# Archaic Assemblies

- Gypsum Block
- Plaster Walls
- Clay Tile-Block Horizontal Assemblies
- Clay Tile Block Walls
- Concrete
- Concrete Block
- What else?

# **Archaic Assemblies**

# Archaic Assemblies

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- Drawings?
- Literature?
- Listings in Directories?
- Assigned Fire-Resistance-Ratings?
- How to protection continuity?
  - Firestop
  - Fire Dampers
  - Fire Rated Glazing
  - Joints and Voids
  - Perimeter fire containment



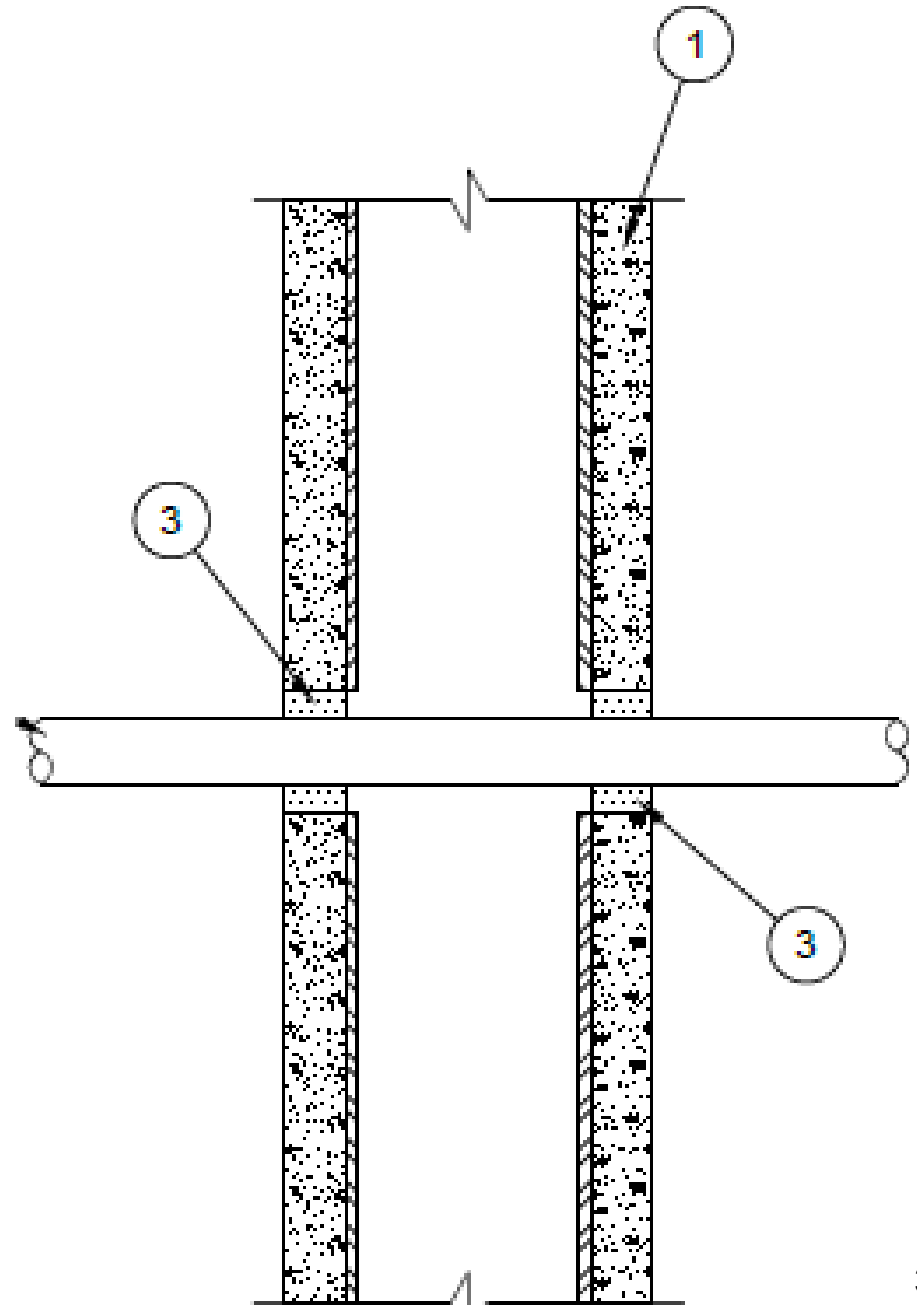
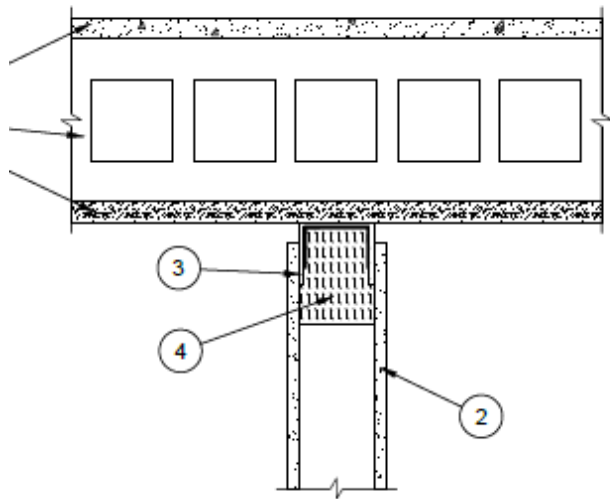


STI Images

# **Engineering Judgments**

## **Equivalent Fire- Resistance Rated Assemblies**





# Engineering Judgments/EFRRA

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



J. Sharp – ProFirestop Photo



C. Zussman – Pepper Photo

# Engineering Judgments/EFRRA

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International Firestop Council – Manufacturers – [www.firestop.org](http://www.firestop.org)

*IFC Recommended Guidelines for Evaluating Firestop Systems in Engineering Judgments*

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

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

# Engineering Judgments/EFRRA

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## IFC EJ Guidelines for the Evaluation ...

### Engineering Judgments for firestop systems should:

- 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



# Who Declares Fire-Resistance Rating of Archaic Assemblies?

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- Architect/Engineer?
- Fire Protection Engineer?
- Fire/Marshal - Code Official?
- Firestop Manufacturer?
- Firestop Installation Contractor?
- Firestop Inspection Agency?

# Archaic Assemblies

- **Some FCIA Resources...**



# Hollow Block

COMBINATION LONG SPAN FLOORS ONE-WAY SYSTEM

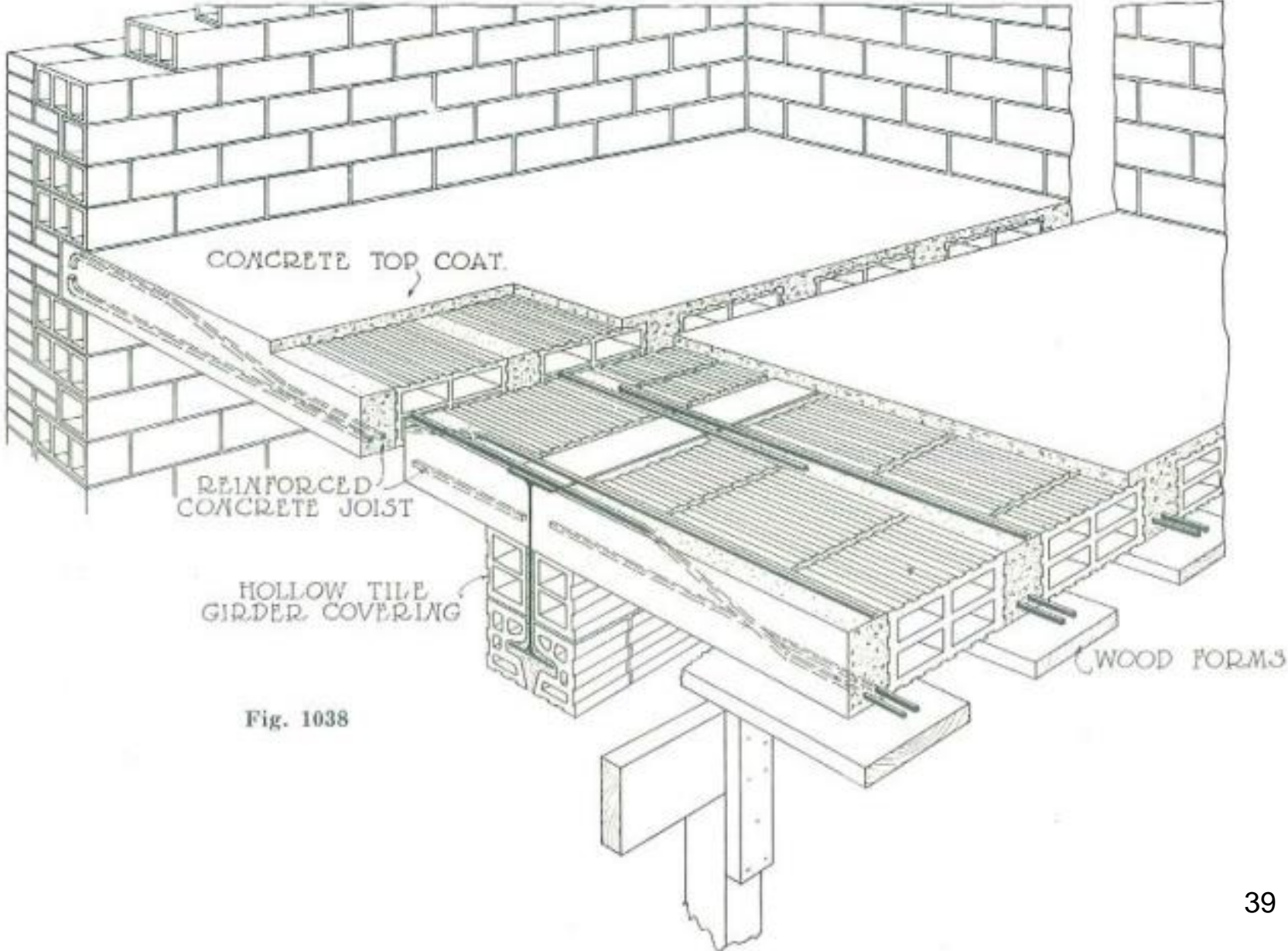


Fig. 1038

STANDARD SHAPES OF PARTITION OR FLOOR TILE

# Hollow Block

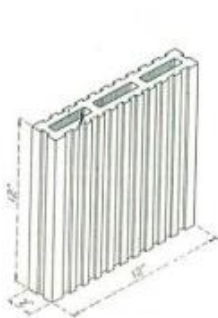


Fig. 1022  
Weight, 14 lbs.

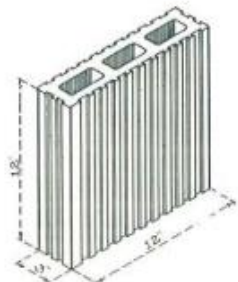


Fig. 1019-C  
Weight, 16 lbs.

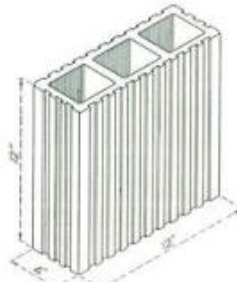


Fig. 1022-A  
Weight, 18 lbs.

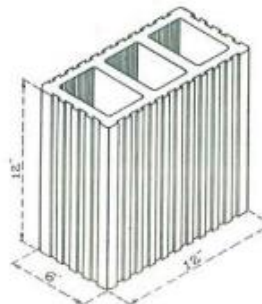


Fig. 1019-D  
Weight, 22 lbs.

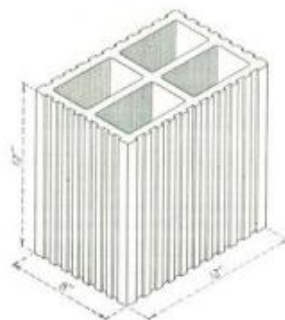


Fig. 1020  
Weight, 30 lbs.

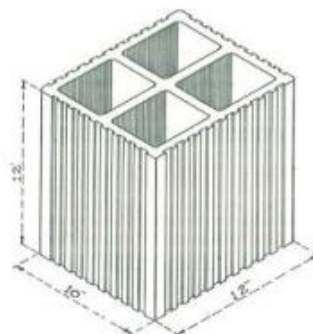


Fig. 1019-E  
Weight, 36 lbs.

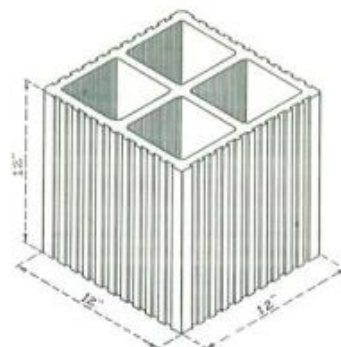


Fig. 1019-F  
Weight, 40 lbs.

The following special sizes can be furnished by some manufacturers: 5x12x12, 3 cell, weight 20 lbs.; 7x12x12, 3 cell, weight 25 lbs.; 9x12x12, 4 cell, weight 33 lbs.

SPLIT FURRING TILE



Before Separation

1 1/2x12x12  
Weight, 8 lbs.

2x12x12  
Weight, 9 lbs.

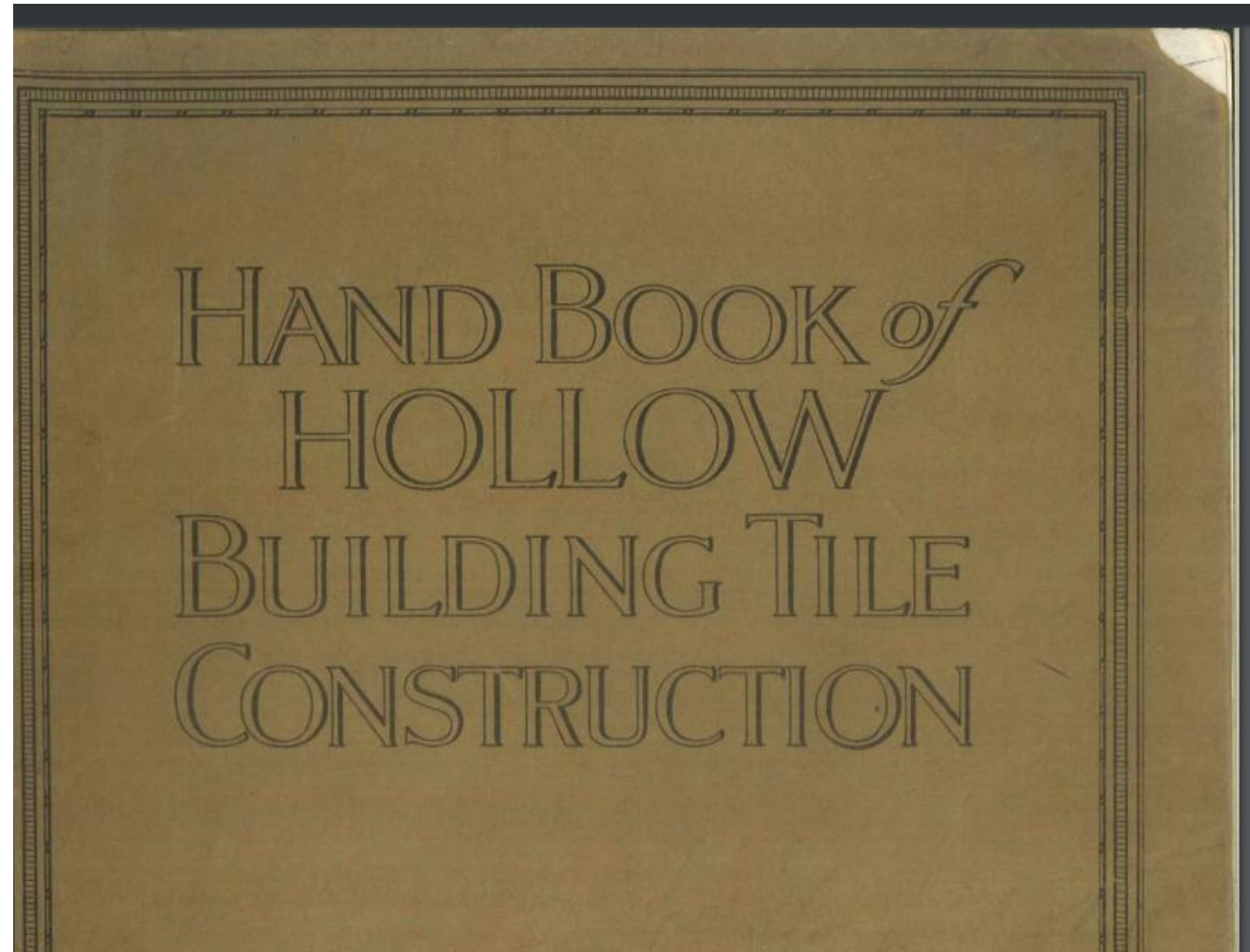


After Separation

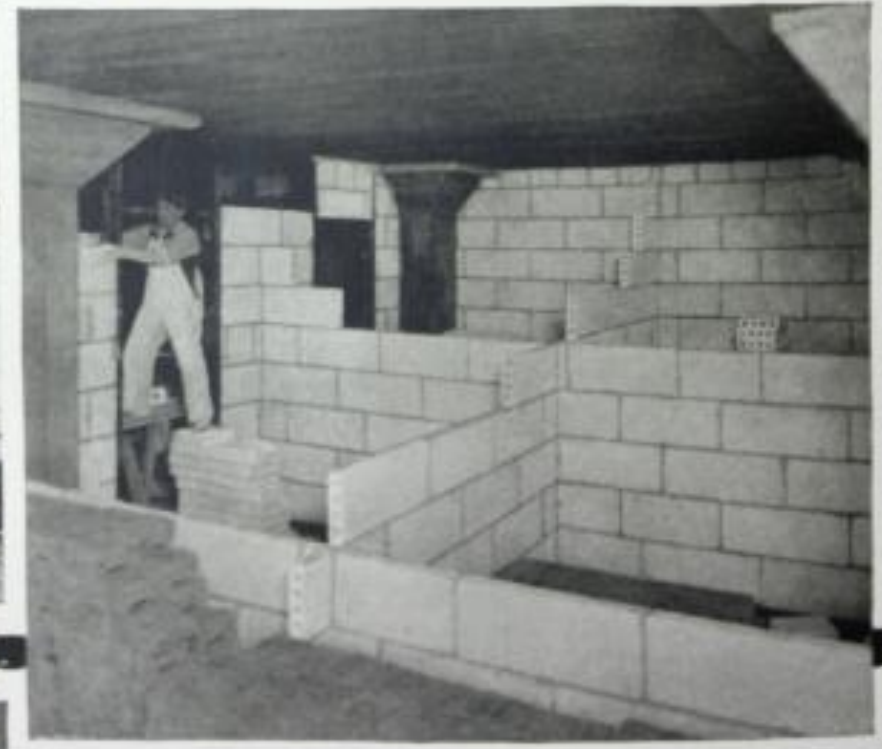
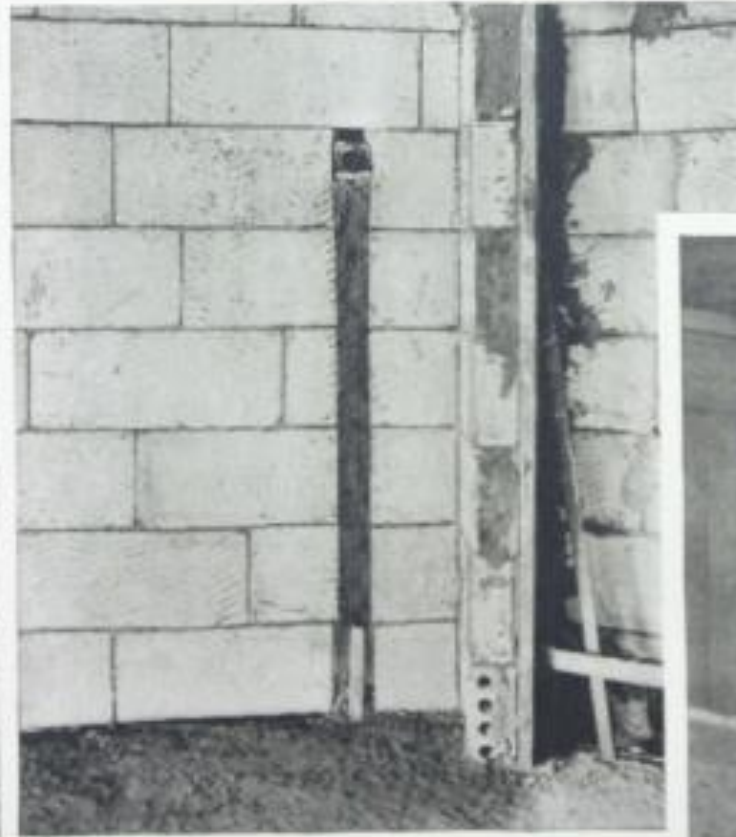
The weights of the tile given above are approximate, as differences in the density of clays and shales make some difference in the actual weights. These figures allow an ample factor of safety for use in figuring loads and stresses.



# RESOURCES: Handbook of Hollow Building Tile Construction, May, 1922



# Gypsum Block...



These illustrations show the adaptability of PYROBAR to every condition of building construction.

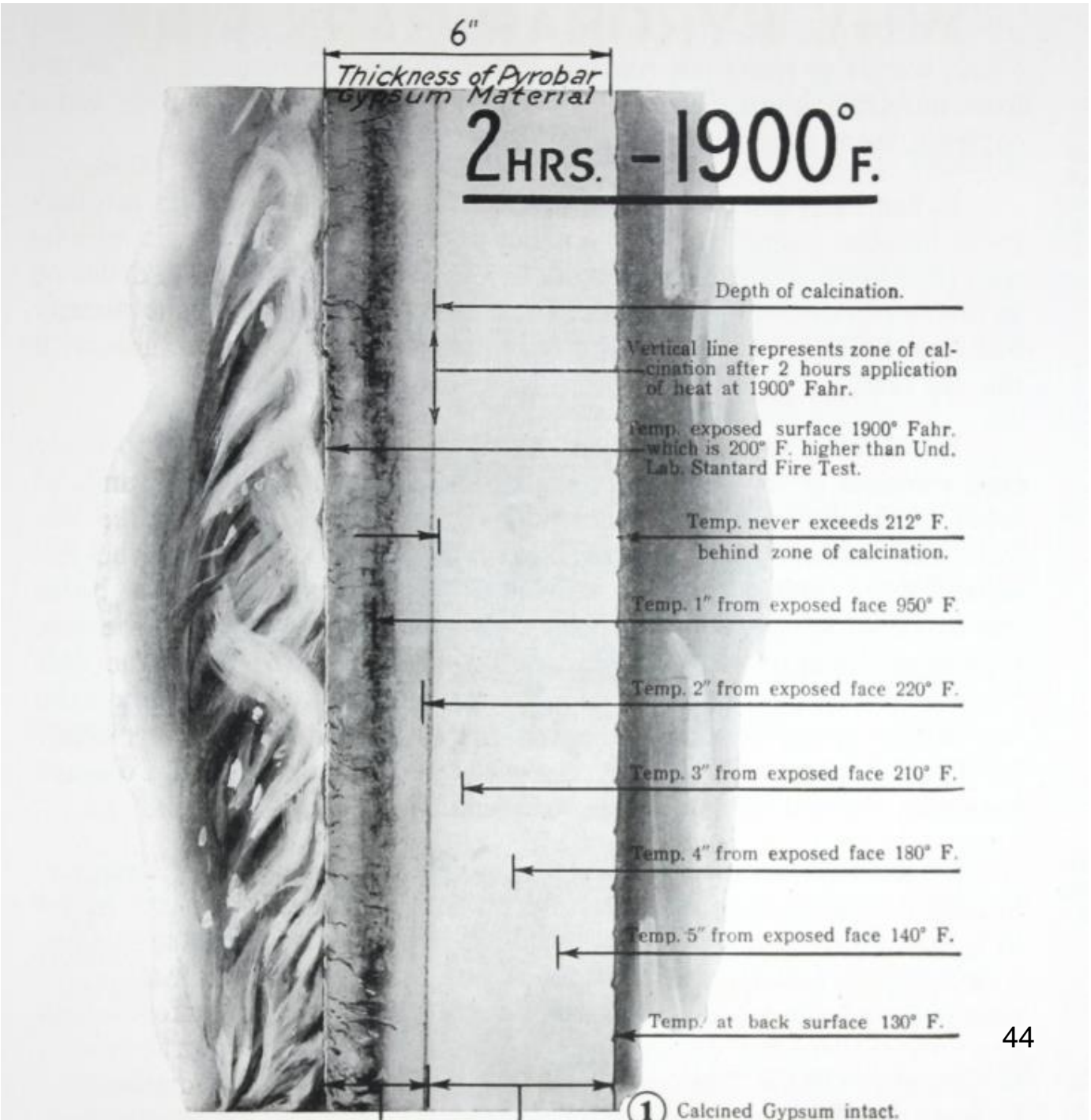
Views at left: curved and intersecting walls; ease of constructing pipe and conduit chases.

Views immediately above and below show use of PYROBAR without plaster for storage warehouse partitions.

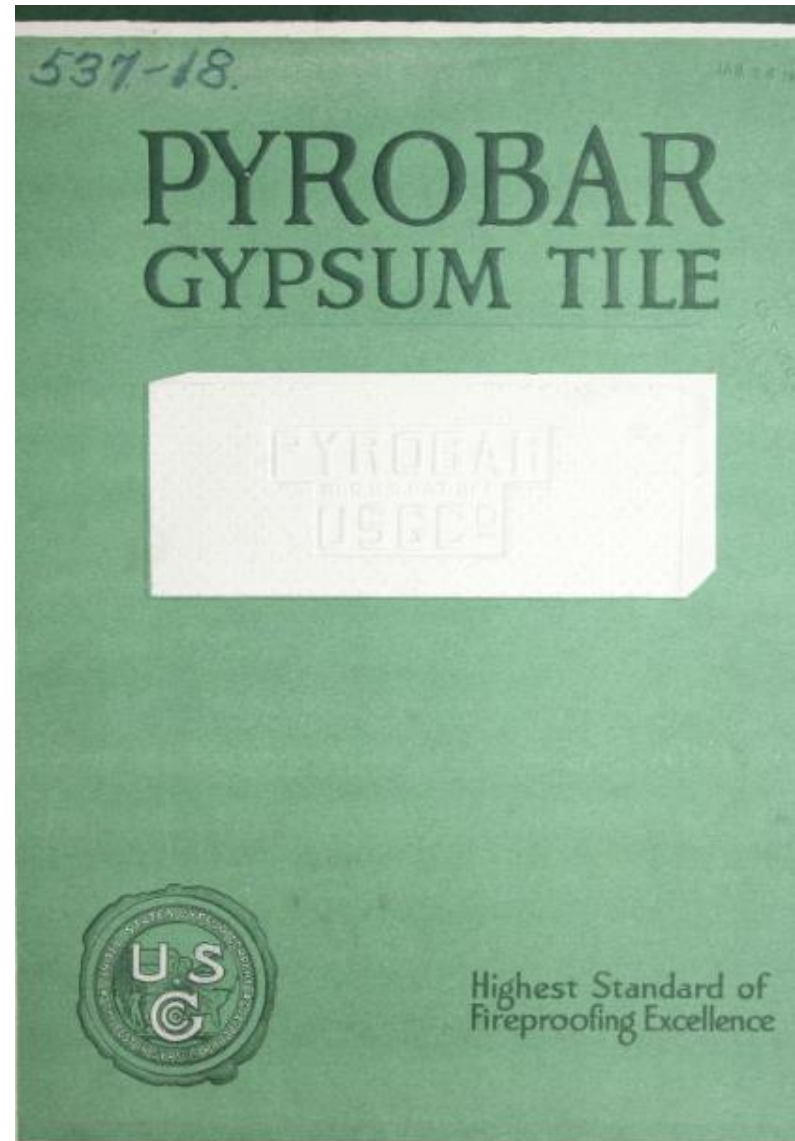
# Gypsum Block Assembly



# 6" Gypsum Block =2 hours



# Gypsum Block Resources



# Fire Ratings



A stylized red flame graphic on the left side of the page, with several tongues of fire extending upwards and outwards.

# HUD Archaic Materials Guide

- **Rec Hours.** This column lists the recommended fire endurance rating, in hours or minutes, of the subject building element. This rating is always less than or equal to the rating under the "Time" column.

# HUD Archaic Materials Guide

Item Code	Thick-ness	Construction Details	Performance		Reference Number			Notes	Rec Hours
			Load	Time	Pre BMS 92	BMS	Post-BMS 92		
W-2-M-1	2 1/4"	Solid partition; 3/4" gypsum plank—10' x 1'6"; 3/4" + gypsum plaster each side	n/a	1 hr 22 min	-	-	7	1	1 1/4
W-3-M-2	3"	Concrete block (18" x 9" x 3") of fuel ash, portland cement and plasticizer; cement/sand mortar	n/a	2 hrs	-	-	7	2,3	2
W-2-M-3	2"	Solid gypsum block wall; no facings	n/a	1 hr	-	1	-	4	1
W-3-M-4	3"	Solid gypsum blocks, laid in 1:3 sanded gypsum mortar	n/a	1 hr	-	1	-	4	1
W-3-M-5	3"	Magnesium oxysulfate wood fiber blocks; 2" thick; laid in portland cement-lime mortar; facings 1/2" of 1:3 sanded gypsum plaster on both sides	n/a	1 hr	-	1	-	4	1



# Archaic Assemblies ???

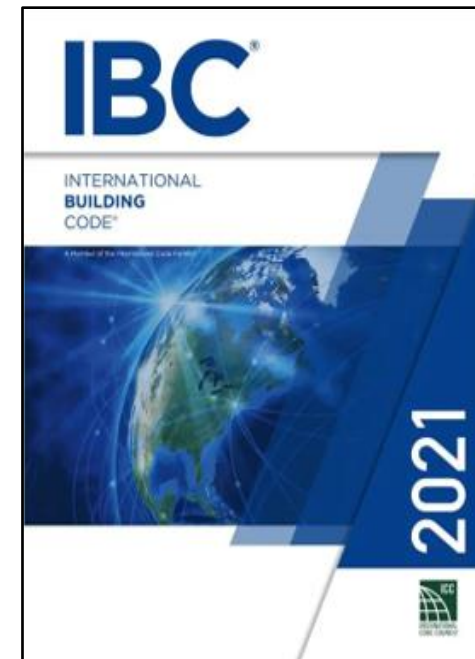
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- **What if the manufacturers stated.....**
  - Concrete Block CAJ System be used for Gypsum Block?
  - Gypsum Wallboard WL Design be used for PLASTER Walls?
  - Concrete CAJ System be used for Clay Tile Block Horizontal Assemblies?
  - Concrete Block CAJ System be used for Clay Tile Block Walls?
- **NOT NOW!!!**
- **EJ/EFRRRA ALWAYS REQUIRED BY FIRESTOP MANUFACTURERS.....**

# Existing Buildings? Did you know...

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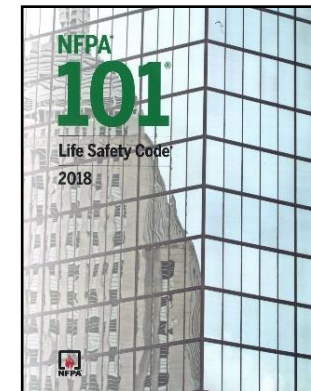
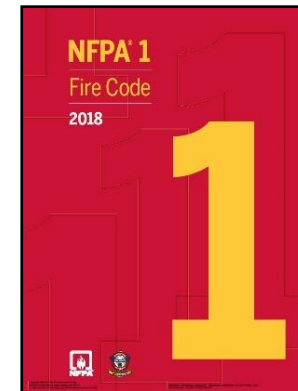
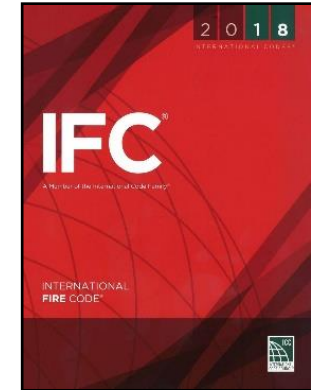
- **Fire, existing building codes have existed for decades**
- Fire Codes dictate maintaining protection of structural fire-protection and fire-resistance-rated compartmentation



# Fire Codes Require Maintenance

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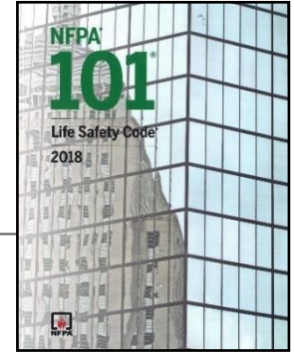
- NFPA 101
  - NFPA 1
  - International Fire Code
  - UAE Fire & Life Safety Code
- 
- Minimum Requirements Stated
  - Frequency
  - **What really happens?**



# National Fire Protection Association

## NFPA 101 – 2018

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- **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

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- **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

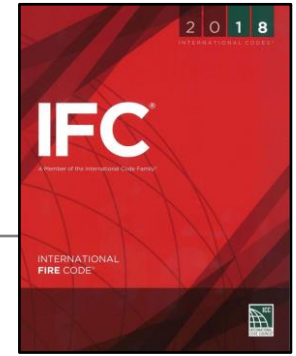
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- 12.3.3.3.1** The **person responsible** for conducting the visual inspection shall demonstrate appropriate **technical knowledge and experience in fire-resistance-rated design and construction** acceptable to the AHJ.
- 12.3.3.3.2** A written report 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

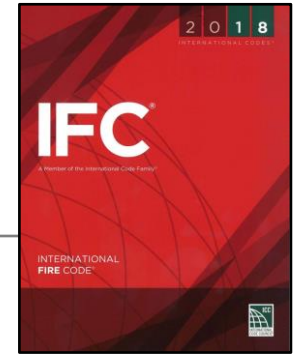


## SECTION 701 GENERAL

- **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



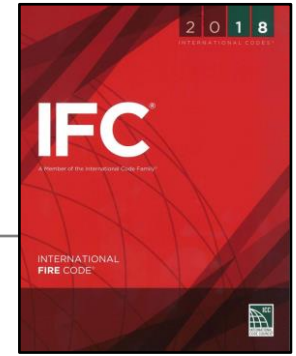
## SECTION 701 GENERAL

- **701.6 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

# International Property Maintenance Code

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

**[F] 703.2 Opening protectives.** Required opening protectives shall be maintained in an operative condition. Fire and smokestop doors shall be maintained in operable condition. Fire doors and smoke barrier doors shall not be blocked or obstructed or otherwise made inoperable.

**703.3 Maintenance.** The required fire-resistance rating of fire-resistance-rated construction, including walls, firestops, shaft enclosures, partitions, smoke barriers, floors, fire-resistive coatings and sprayed fire-resistant materials applied to structural members and joint systems, shall be maintained. Such elements shall be visually inspected annually by the owner and repaired, restored or replaced where damaged, altered, breached or penetrated. Records of inspections and repairs shall be maintained. [IPMC 2018, 703]

# National Fire Code of Canada

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## National Fire Code of Canada

- ***Division B – Part 2, Building and Occupant Fire Safety***

**2.2.1.2 – Damage to Fire Separations** – 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...

- **FCIA Manual of Practice – Appendix, Maintenance**

FCIA recommends Barrier Management for Effective Compartmentation and Structural Protection



# UAE Fire and Life Safety Code of Practice

## Maintenance & Management

**21.15.2** The required fire resistance rating of installed firestop systems shall be **visually inspected by the owner or owner's inspection agency annually.** Damaged, altered or breached firestop systems shall be properly repaired, restored or replaced to comply with applicable codes as per the guidelines of Civil Defense.

**21.15.3** Any new **Openings** made therein for the passage of through penetrants, **shall be protected with approved firestop system** to comply with applicable codes as per the guidelines of Civil defense.

**3.7.2.** The condition of installed firestop systems shall be visually inspected by the owner or owner's representative annually. Damaged, altered or breached firestop systems shall be properly repaired, restored or replaced to comply with applicable codes as per the guidelines of Civil Defense.

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

# UAE Fire & Life Safety Code of Practice

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## 3.7. Maintenance & Management

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

# UAE Fire & Life Safety Code of Practice

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## 3.7. Maintenance & Management

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

Damaged, altered or breached firestop systems shall be properly repaired, restored or replaced to comply with applicable codes as per the guidelines of Civil Defense.

# Fire Codes Require Maintenance - INDIA

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- 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.....”**.

# M–Barrier Management Systems

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



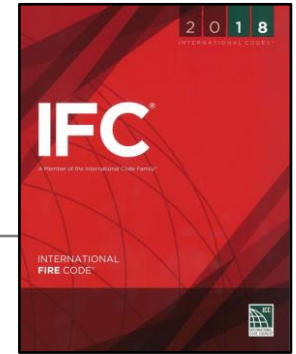
# Saudi Arabia Fire Code

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## **SECTION 107 MAINTENANCE**

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

# 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

# M–Barrier Management System for Building Owners

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

# M-Barrier Management System for Building Owners

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

# M-Barrier Management System for Building Owners

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- **Keep easily retrievable fire-resistance INVENTORY records,** records of inspections and repairs for AHJ's...
  - Paper
  - Spreadsheets
  - Custom Software
- **Repeat the process, for the life of the building**

# M–Barrier Management Systems

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- **Visual Building Survey/Inspection....**
  - Tested and Listed Systems (Listings)
  - Manufacturers installation instructions
- Get a ladder – look up, look down!

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

---

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

**= *Rated Firestop System***



STI Graphic

# Firestop Repairs

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

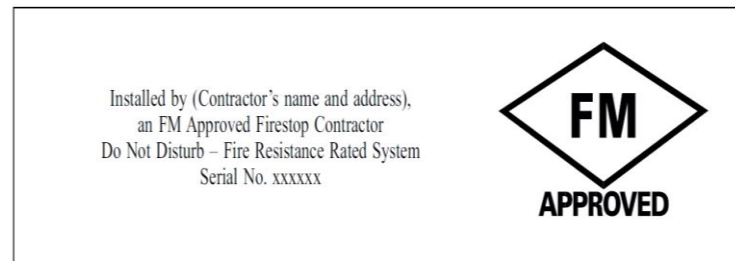


Affinity Firestop Photo



# Repairs Simplified with Labels...

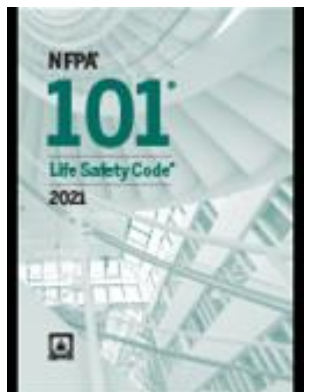
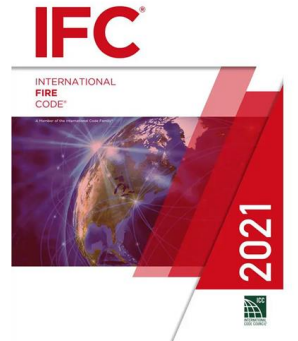
- Identification Systems (Labels)
  - Firestop Contractor Installed
  - Speeds System Evaluation



# Existing Buildings? Educate

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- **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



# **M–Barrier Management Systems**

## **Building Owner’s Policy Topics**

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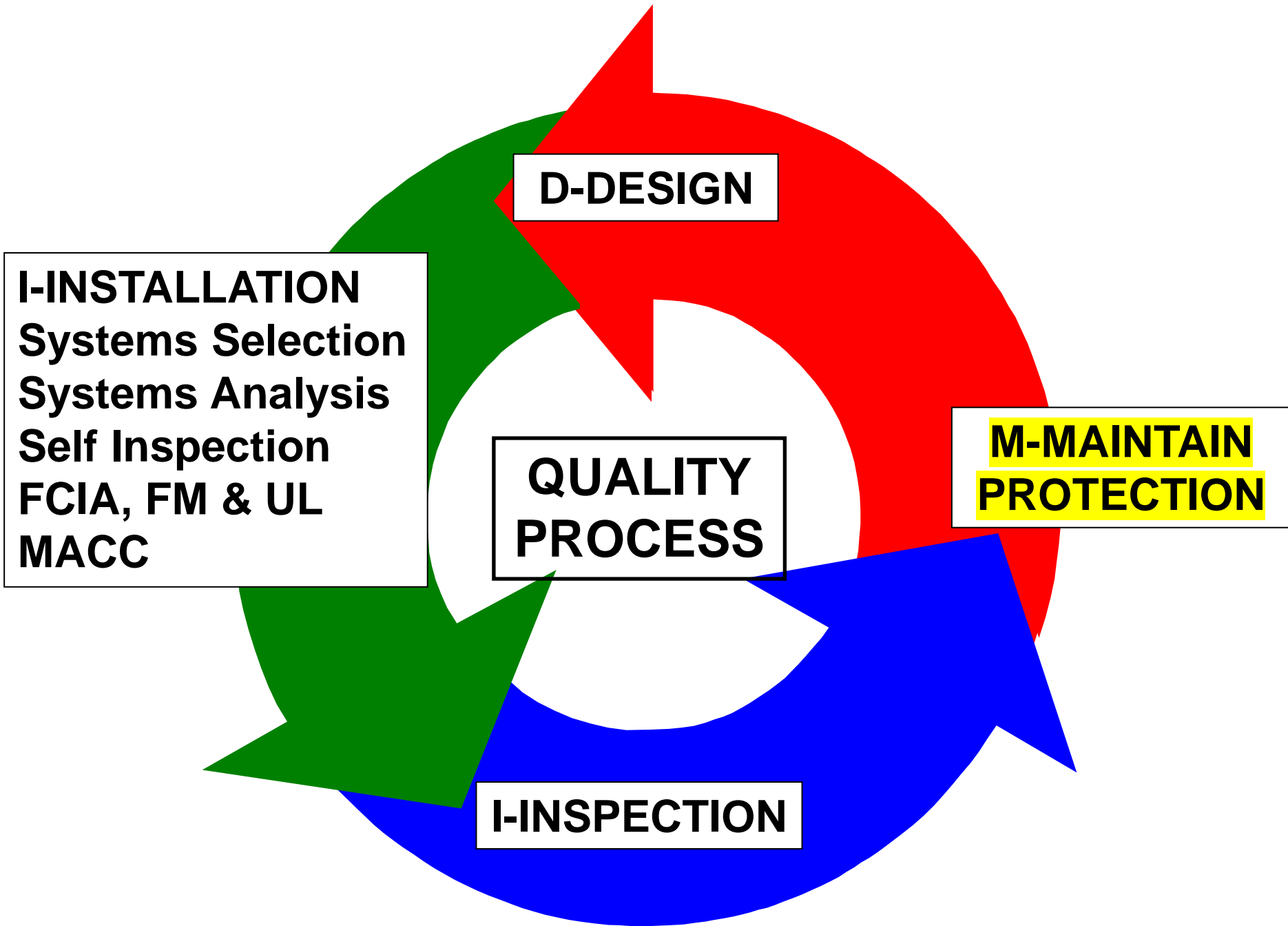
- **Create a Budget to Meet Code Requirements**
- **Inventory – What Info?**
  - Life Safety Drawings
  - Manufacturers Instructions
  - Tested and Listed Systems (Listings)
- **Implement Fire Resistance Management**
  - In House Policy
  - Outside Contractor Policy
- **Monitor Process**
- **Annual Visual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

# Building & Fire Code Requirements

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**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**...

**701.6 Owner's responsibility.** **The owner shall maintain** an inventory of all required...construction... Such construction shall be **visually inspected by the owner annually** and properly repaired, restored or replaced where damaged, altered, breached or penetrated.



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

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- **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**

# Systems & Materials....

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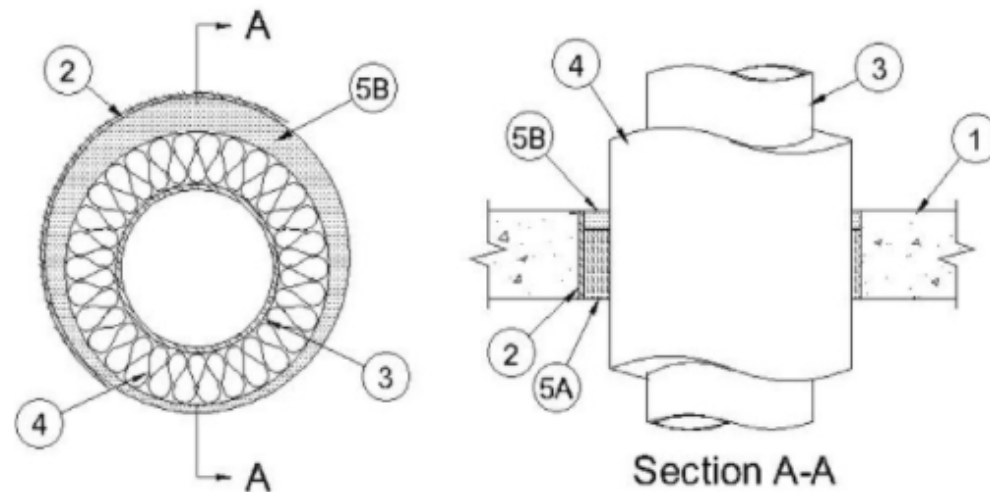
**Possible UL  
System Nos.:  
C-AJ-5138,  
C-AJ-5209,  
W-J-5091,  
Etc.**

Affinity Firestop Photo



**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<sup>3</sup>) concrete floors or min 3 in. (76 mm) thick reinforced lightweight or normal weight concrete walls. Wall may also be constructed of any UL Classified **Concrete Blocks\***. Max diam of opening 9 in. (229 mm).

See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Steel Sleeve** — (Optional) - Nom 9 in. (229 mm) diam (or smaller) Schedule 10 (or heavier) steel sleeve cast or grouted into floor or wall assembly. Steel sleeve may be installed flush or may project max 2 in. (51mm) beyond the floor or wall surfaces. As an alternate, nom 9 in. (229 mm) diam (or smaller) sleeve fabricated from nom 0.019 in. (0.48 mm) thick galv steel cast or grouted into floor or wall assembly flush with floor or wall surfaces.

3. **Through Penetrants** — One metallic pipe to be installed concentrically or eccentrically within opening. Penetrant to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes may be used:

A. **Steel Pipe** — Nom 4 in. (102 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.

B. **Iron Pipe** — Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.

C. **Copper Tubing** — Nom 2 in. (51 mm) diam (or smaller) Type L (or heavier) copper tubing.

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

**F Rating is 2 Hr for Penetrants A and B. F Rating is 1 Hr for Penetrants C and D.**

4. **Pipe Covering\*** — Nom 1-1/2 in. (38 mm) thick (or less) hollow cylindrical heavy density glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with product. Annular space between the pipe covering and periphery of opening or sleeve shall be min 1/2 in. to max 1 in. (13 mm to 25 mm).

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

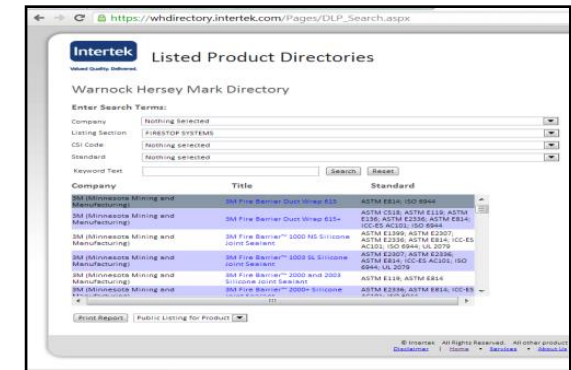
**T Rating is 3/4 Hr for nom 1-1/2 in. (38 mm) thick pipe covering for penetrants A and B. T Rating is 1 Hr for nom 1-1/2 in. (38 mm) thick pipe covering for Penetrants C and D. T Rating is 0 Hr for all Penetrants when pipe coverings less than nom 1-1/2 in. (38 mm) thick.**

# Firestopping for Continuity Products Become Systems

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



***Systems Selection & Analysis...Not as easy as it looks...***



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

---

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

**= *Rated Firestop System***



STI Graphic

# Firestopping for Continuity

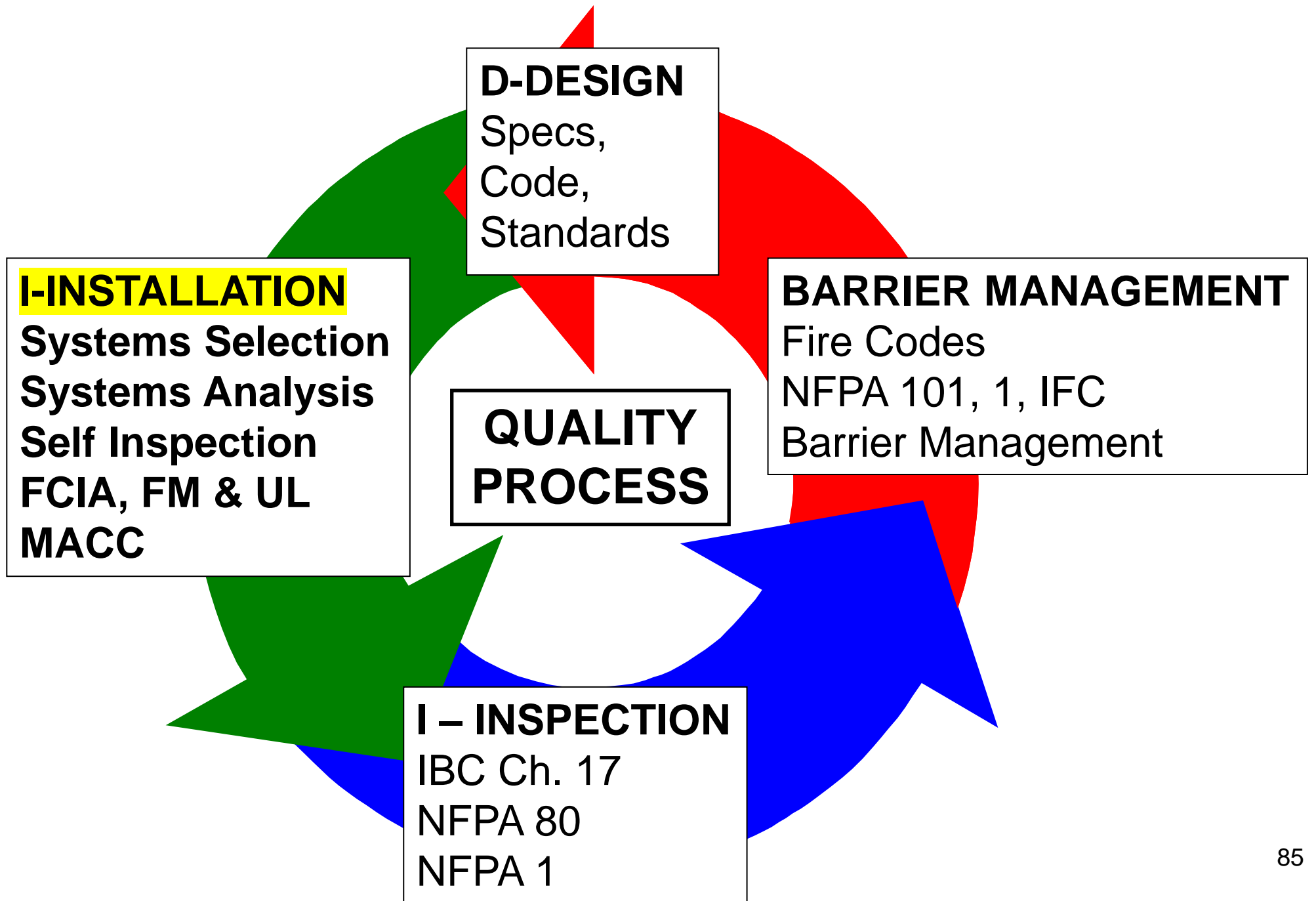
## Products become **SYSTEMS** Based on Testing

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



3M Photo



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

---

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



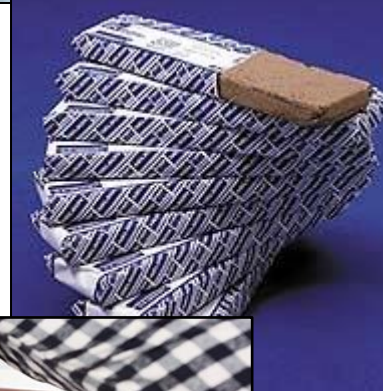
STI Graphic

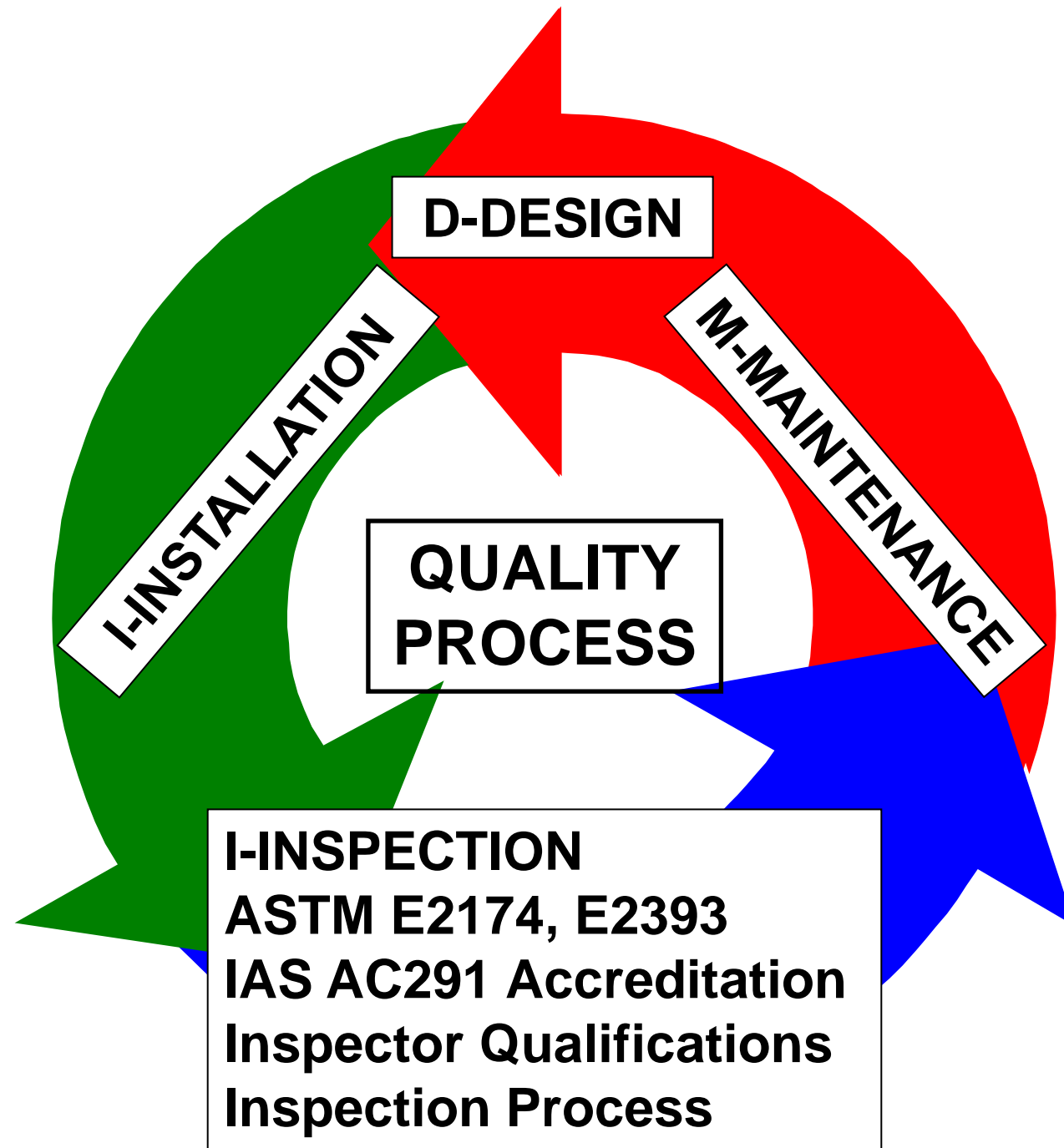
***= Rated Firestop System***

***Manufacturers Instructions, Tested and Listed Designs***

# Firestopping for Continuity – Firestop Products

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







# Inspection in Codes

## ASTM E2174 – ASTM E2393

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

# Firestop Systems Inspection

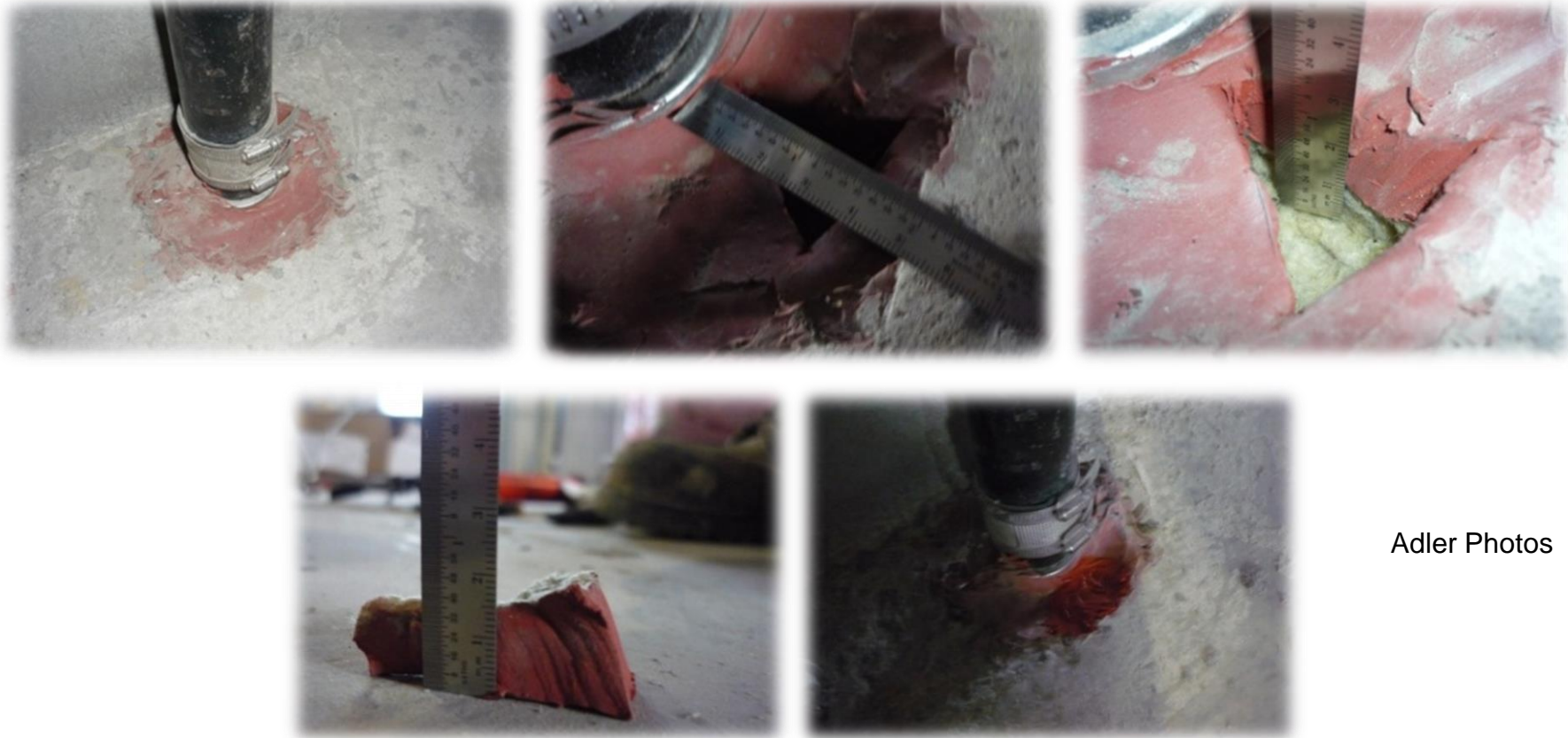
## ASTM E2174 – ASTM E2393

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

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

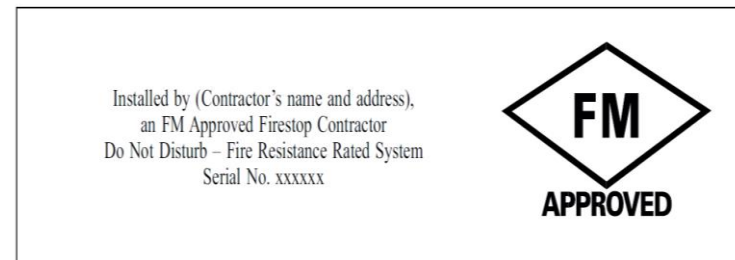
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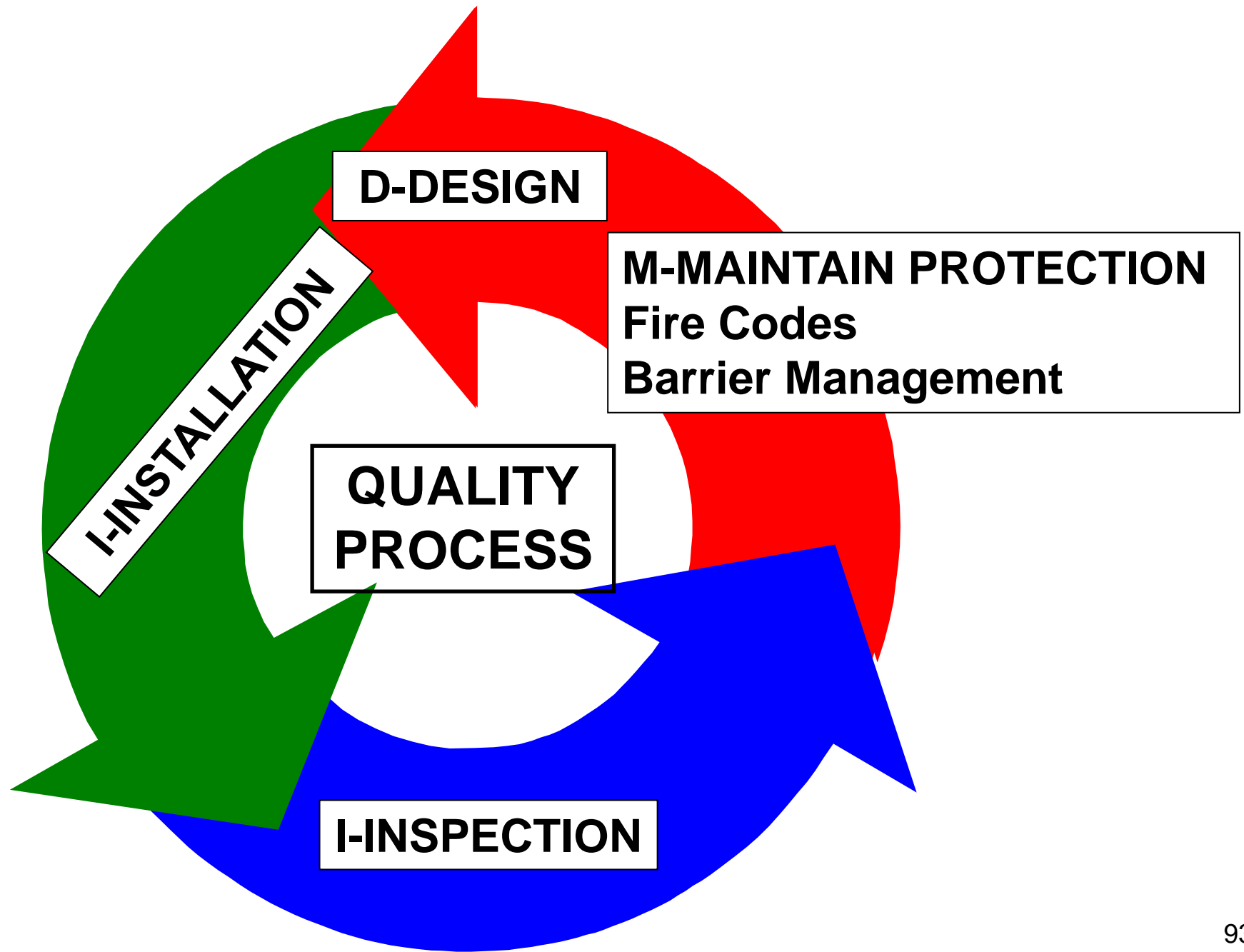


Adler Photos

# Inspection Faster with Labels...

- Identification Systems (Labels)
  - Firestop Contractor Installed
  - Speeds System Evaluation







**Thanks for Attending!**

**Firestop Contractors International Association**  
**Hillside, IL – +1-708-202-1108 – office**  
**[Bill@FCIA.org](mailto:Bill@FCIA.org) – [Info@FCIA.org](mailto:Info@FCIA.org)**



**Bill McHugh, FCIA**  
**Rich Walke, CTI for FCIA**

# Thanks, From FCIA.....

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Members & Specifiers with Design Firms or  
Independent Practice**

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Maintain Protection  
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Existing Buildings &  
more...**

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