



FCIA DIIM & Firestopping

September 20, 2012



Firestopping and Compartmentation

Fire & Life Safety 2012

Firestop Contractors International Association

Hillside, IL – 708-202-1108 - office

FCIA Info – info @ fcia.org

Bill McHugh – bill @ fcia.org

Learning Objectives

Upon completing this program, the participant should know how to:

- 1. Recognize Product Design/Testing, Installation & Inspection Standards for Firestopping.**
- 2. Understand Requirements for Firestopping for Safety in the US and Canada**
- 3. Know how to specify Section 07 84 00++**



Firestopping for Safety

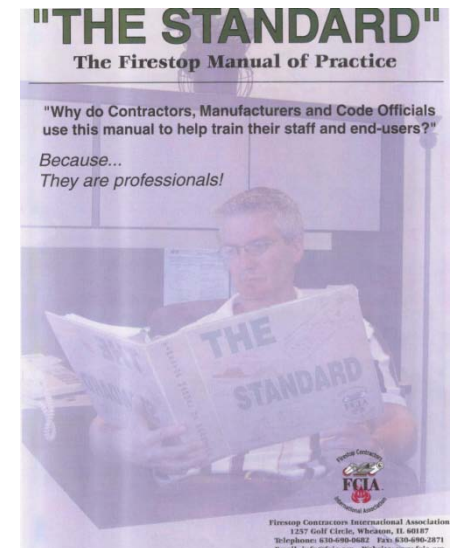
- Outline
 - FCIA – A Trade Association
 - Total Fire Protection & Effective Compartmentation
 - Codes, Testing, Products - Materials
 - Firestopping for Safety – A Quality Protocol
 - DIIM

Firestopping for Safety

- Outline
 - Firestopping for Safety – A DIIM Protocol
 - Properly **Designed** and Specified Firestopping – 07-84-00
 - **Tested and Listed Systems** - ASTM E 814 / UL 1479 - UL 2079, ASTM E2307
 - Professional **Installation** – FCIA Member, FM 4991 Approved, UL Qualified Contractors
 - Properly **Inspected** - ASTM E 2174 / 2393 Protocol - IAS AC 291 Accreditation Criteria for Inspection Agencies
 - **Maintained** (Inspected) Annually - FCIA Members – International Fire Code, NFPA 101

Firestopping for Safety

- FCIA – Worldwide Association
- Firestop Contractors, Manufacturers, Consultants, Reps, Distributors,
- FCIA Website Resources - FREE
- FCIA MOP on PDF FREE to Specifiers, Architects, Bldg./Fire Officials
 - [www . fcia . org](http://www.fcia.org)



Firestopping for Safety

FCIA Membership Means

- Industry Interest
 - FCIA Seminars
 - FCIA Publications
- Industry Investment
 - FCIA Manual of Practice
 - FCIA Conference Education
 - Committee Membership
 - Return to the industry
 - Scholarship – FPE Universities
- **“Specialty Firestop Contractors”**
 - **Knowledge, Value, Expertise**



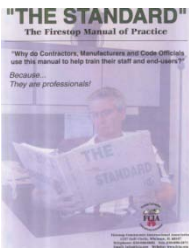
FCIA



- **Membership Reflects FCIA's Activity...**

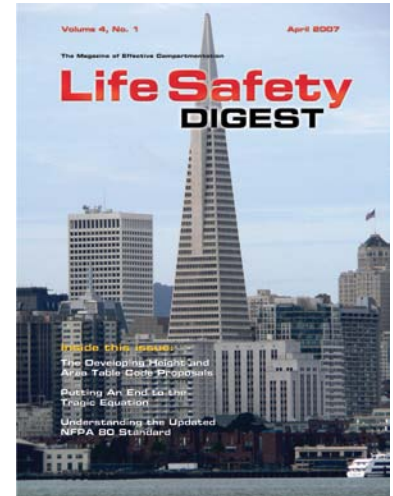
290 Members...US, Canada, Middle East, Far East

- Accreditation – FM, UL, ULC & IAS - Growth
- Apprenticeship – US Dept. of Labor; CAN Ministry
- Technical & Education – MOP, UL TFPSS
- Codes & Standards – ICC, NFPA, ASTM, IAPMO
UL STP's
- Marketing – Relationships, Shows
- Program – Committee work, Education
- Legislative – Track, Advocate



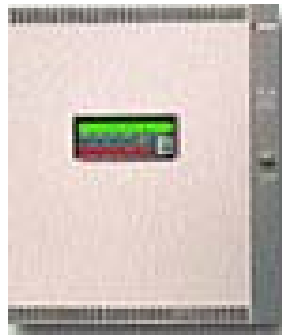
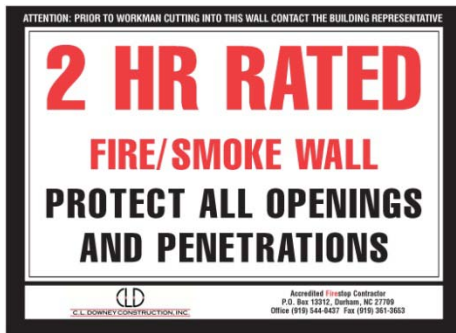
FCIA

- **FCIA Membership Benefits**
 - **FCIA Committee Participation**
 - **FCIA.org Website**
 - **Member Lists**
 - **FCIA FM, UL, IAS Member Lists**
 - **Members Only Access**
 - **Relationships ...**
 - **FCIA Life Safety Digest, Enews**
 - **Management System Manual Template**
 - **FCIA Manual of Practice Updates**



Firestopping for Safety

- “TOTAL FIRE PROTECTION”
- Effective Compartmentation
 - Fire Barriers, Walls/Floors, Smoke Barriers &
 - Firestopping, Fire Dampers, Swinging and Rolling Fire Doors, Fire Rated Glazing
- Detection & Alarm Systems
- Sprinkler Suppression Systems
- Education & Egress—
 - Building Managers, Occupants and Firefighters



Firestopping for Safety

Proper ***DIIM*** Effective Compartmentation
Means Reliable Systems...

- **Properly *Designed*** - A/E - Consultant
 - Tested and Listed Systems, FCIA Member Mfr's., Compartments per IBC, NFPA Codes, SUBMITTALS....*Specified (CCS, CDT)*
- **Properly *Installed***
 - FCIA Member, “FM 4991, or UL *Qualified Contractors*”
- **Properly *Inspected***
 - ASTM E 2174 & ASTM E 2393, by IAS *Qualified Inspectors at IAS AC 291 Accredited Inspection Firms*
- **Properly *Inspected and Maintained*** –
 - FCIA Member, FM 4991, or UL Qualified, IAS Accredited Firms

Firestopping for Safety

- **Code Requirements**

- International Building Code – Chapter 7
 - New Construction
- International Fire Code – Chapter 7
 - Existing Buildings
 - Enforced by Fire Marshal
- NFPA 5000 – 101- Chapter 8
- National Building Code – Canada
 - New and Existing Buildings
- *Minimum requirements for Construction & Maintenance*

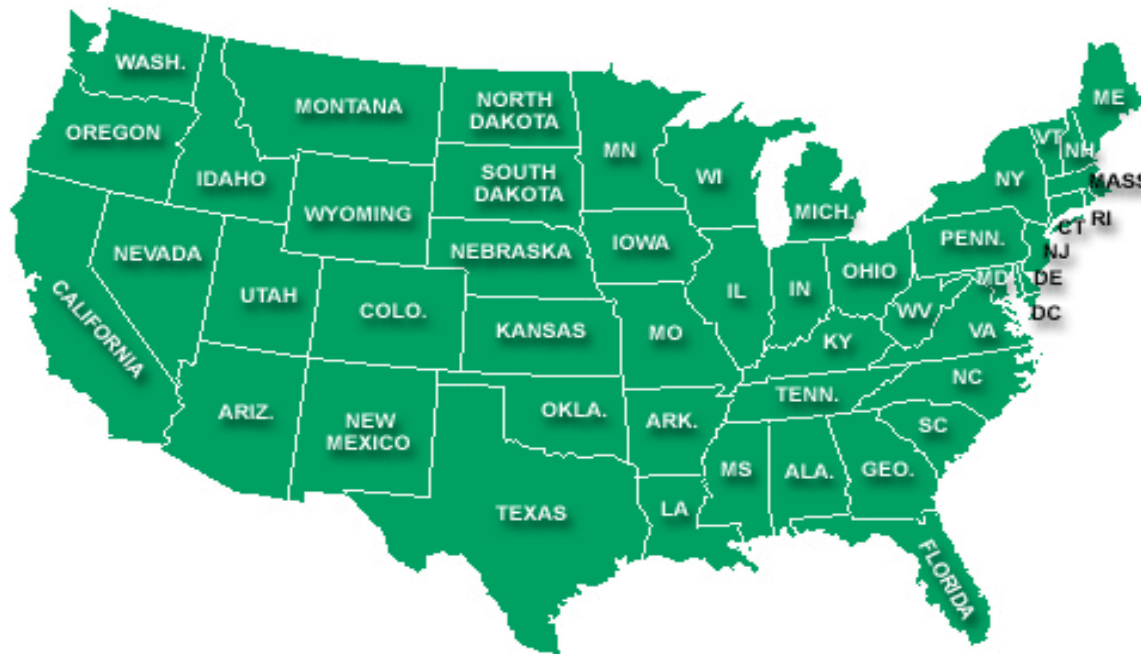
Firestopping for Safety

- **NFPA**
 - **NFPA 5000 – “Consensus Codes”**
 - **Other international locations...US, not much**
 - **NFPA 101 – Life Safety Code**
 - **Healthcare Industry**
 - **Overseas**

Firestopping for Safety

- **ICC=International Code Council**
 - **IBC – Building Code - New**
 - **IFC – Fire Code – Maintenance**
 - **Other “I-Codes”**
 - **IPC, IMC, IEBC, WUIC, IPMC**

US ICC Adoptions – ICCsafe.org



Alaska

Hawaii

U.S. Virgin Islands

Guam

**Northern Marianas
Islands**

Puerto Rico

Firestopping for Safety

- **ICC=International Code Council**
 - **USA**
 - **Middle East**

Firestopping for Safety

- Compartmentation Codes - US
 - **Fire Resistance** – Time, in minutes or hours that materials or assemblies have withstood a fire exposure as determined by tests, methods based on tests, or this code NFPA. **ICC adds... “Systems”**
 - **Ch. 7 – IBC - Fire Barrier** – Hourly Rated – IBC
 - **Ch. 7 IBC - Fire Wall** – Fire rating, structural independence
 - IBC – **Fire Partition** – Rated, not continuous.
 - IBC - NFPA - **Smoke Barrier – Hourly Rated**, continuous...

Firestopping for Safety

- **Compartmentation Codes – US**
 - **Smoke Barrier – Firestopping for Continuity**
 - IBC – Hourly Rated, “L” Rating
 - <5cfm/sf (IBC 2006)
 - < 100 cfm, 100sf of Wall Area (IBC 2009)
 - NFPA – Similar, no quantified “L” Rating
 - Healthcare Occupancies
 - Building Owner/Manager Preference
 - **Smoke Partition – “Common Materials”**
 - IBC – Continuous barrier, not rated...’retard’.
 - NFPA – Continuous membrane that is designed to form a barrier to limit the transfer of smoke....

Firestopping for Safety

- Compartmentation Codes – US & Canada
 - Firestopping Systems
 - Standards Exist
 - F - Hours
 - T - Temperature
 - L – Air Leakage / Smoke
 - W – Water
 - Standards means suitability for use
 - *“Anything less than a System.... Up to Judge” Karen Layng, Esq.*

Firestopping for Safety

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

- appointed by NRC
- members are volunteers
- represents regulators, construction industry and public interest
- 2009 Cycle Finished...publishes in 2010

Oversees the code development system

National Building Code of Canada (NBC)

Firestopping for Safety

- Compartmentation Codes – Canada - NBC
 - *Fire separation* means a construction assembly that acts as a barrier against the spread of fire.
 - (See Appendix A.)
 - Appendix A:
 - A *fire separation* may or may not have a fire-resistance rating.

Firestopping for Safety

- Compartmentation Codes
NBC - 3.1.8.1.(1)(b)

Although a fire separation is not always required to have a fire-resistance rating, the **fire separation** should act as a **barrier to the spread of smoke and fire** until some response is initiated. **If the fire-resistance rating of a fire separation is waived** on the basis of the presence of an automatic **sprinkler system**, it is intended that the *fire separation will be constructed so that it will remain in place and act as a barrier against the spread of smoke for a period of time* until the sprinklers have actuated and controlled the fire.

Firestopping for Safety

- Compartmentation Codes
- 3.1.8.3 - **Continuity**

Firestopping for Safety

- Compartmentation Codes
- **3.1.9.1.Fire Stopping of Service Penetrations**
- Except as required by Sentence (2), piping, tubing, ducts, chimneys, optical fibre cables, electrical wires and cables, totally enclosed noncombustible raceways, electrical outlet boxes and other similar building services that penetrate a fire separation or a membrane forming part of an assembly required to have a fire-resistance rating shall be
 - a) *sealed by a fire stop system* that, when subjected to the fire test method in **ULC-S115, “Fire Tests of Firestop Systems,”** has an F rating not less than the fire-protection rating required for closures in the fire separation in conformance with Table 3.1.8.4., or (50pa, plastics)
 - b) *cast in place* (see Appendix A).

Firestopping for Safety

- Fire Resistance Rated Compartmentation
 - *Continuous Walls / Floors*
 - Interior and Exterior Walls
 - Firestop Systems
 - » Penetrations
 - » Joints – Walltops – Perimeter Joints
 - Fire Damper Duct Systems
 - Fire Doors and Hardware Systems
 - Rolling & Swinging
 - Fire Glass

Firestopping for Safety

- Effective Compartmentation for Safety
 - *Chemical, Biological, Radiation, Explosion*
 - Standards?
 - R - Nuclear Power Plant Standards
 - E – Blast Strength? Check with manufacturer – 2psf
 - C – Which Chemicals? Check with manufacturer
 - B – Which Agents? Check with manufacturer
 - How to Regulate for Terrorism?
 - Due Diligence
 - Review Required by code?

Firestopping for Safety

- Fire Walls and Floors –

- *Continuous Fire Resistance Rated Assemblies*

- Concrete
 - Concrete Block
 - Plaster
 - Gypsum Block
 - Drywall
 - Floor/Ceiling Assemblies
 - Firestop Systems

“Tested & Listed Wall/Floor Systems”



Firestopping for Safety

Effective Compartmentation Features



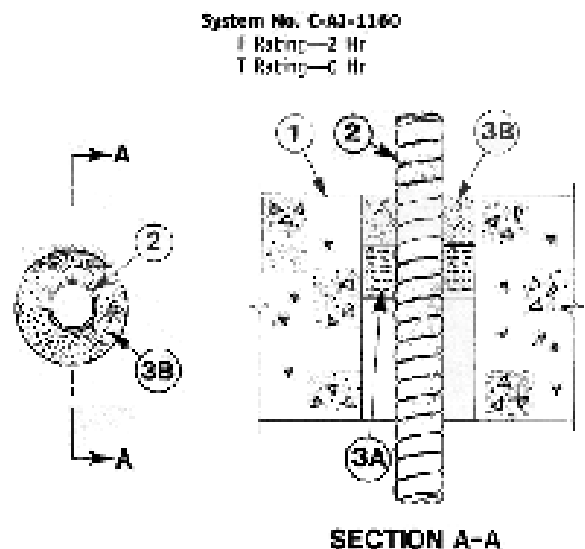
Firestopping for Safety

- FCIA Members Understand Effective Compartmentation & Firestop Quality Process...
 - Firestop *Systems* Tested to ASTM E 814, UL 1479/2079, CAN S-115, ASTM E 2307
 - Specified by Professionals
 - Installed by FCIA Member
 - Inspected to ASTM E2174 & ASTM E2393
Inspection Process by Qualified Firms/Individuals
 - Maintained by FCIA Member Firestopping Contractors



Firestopping for Safety

I – Classified Systems

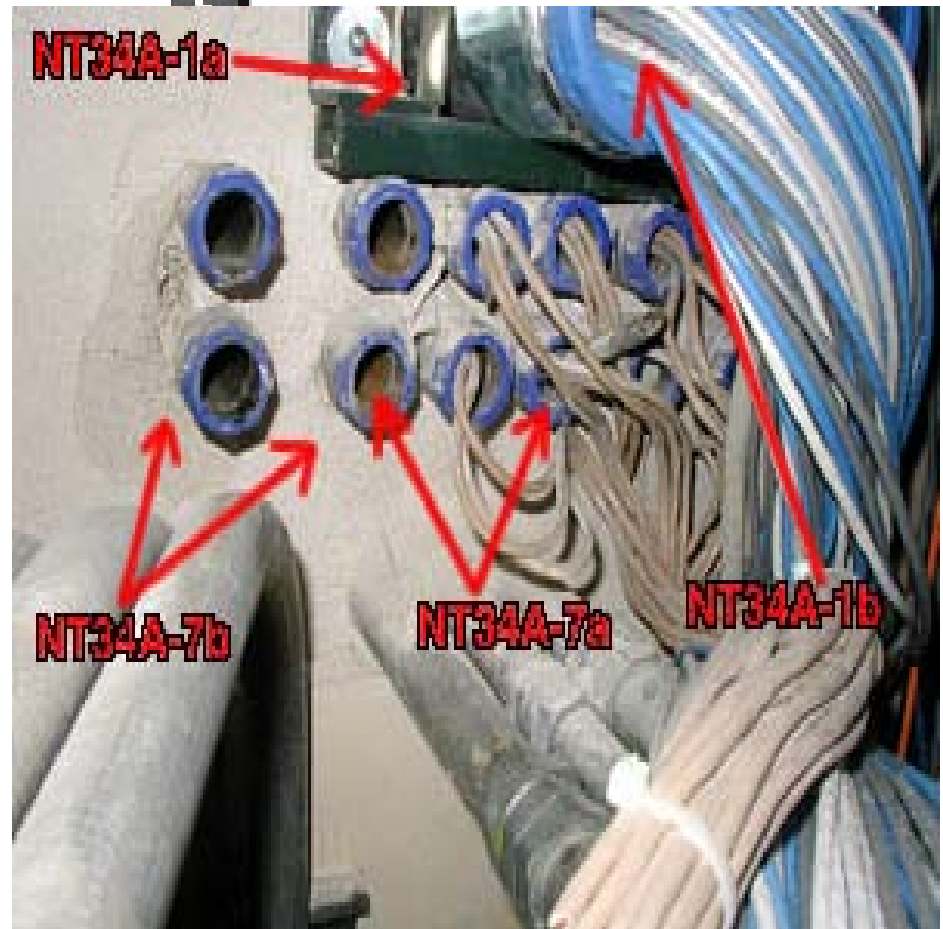


1. Floor or Wall Assembly—Min. 4-1/2 in. thick lightweight or normal weight (100 to 150 pcf) concrete. Will may also be constructed of any UL Classified Concrete Block*. Min. 8 in. diam. through opening in floor or wall assembly to be 1-1/2 in. to 1-1/2 in. larger than diam. of flexible metal conduit (item 2) installed in through opening. Max diam. of opening is 6 in. See Concrete Block (CAB) category in the Fire Resistance Directory for names of manufacturers.
2. Through Penetrating Product**—Max. 4 in. diam. (or smaller) steel or non 3/4 in. diam. (or smaller) aluminum Flexible Metal Conduits. Max one flexible metal conduit to be installed near center of circular through opening in floor or wall assembly. Flexible metal conduit to be rigidly supported on both sides of floor or wall assembly.
3. Packing Material—Min. 1 in. thickness of organic (polyurea slugs) fiber Market or mineral wool batt insulation. Insulation to be secured into 1 in. from top surface of floor or from both surfaces of wall.
4. FILL, Void or Cavity Material**—Gauze—Applied to fill the annular space around the flexible metal conduit. In floors, a min. 2 in. depth of fill material to be installed flush with top surface of floor. In walls, a min. 1 in. depth of fill material to be installed flush with wall surface on both sides of wall assembly.

Minnesota Mining & Mfg. Co.—TF 25WAB

*Bearing the UL Classification Marking

*Bearing the UL Listing Mark



Firestopping for Safety

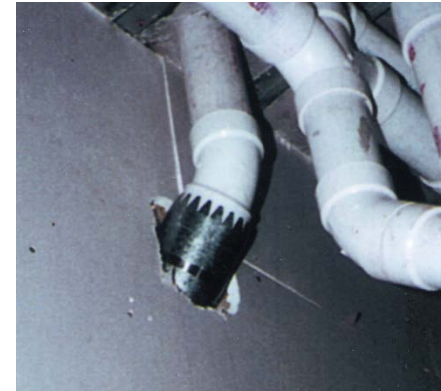
- **Sealants**
 - Silicone, Latex, Intumescent
- **Wrap Strips**
 - “Thick, Thin, Wide, Less Wide”
- **Putties**
- **Pillows**
- **Composite Sheets**
- **Bricks / Plugs**
- **Pre Fabricated Kits**
- **Mortar**
- **Spray Products**



Graphics, STI, 3M, AD, HILTI, Nelson

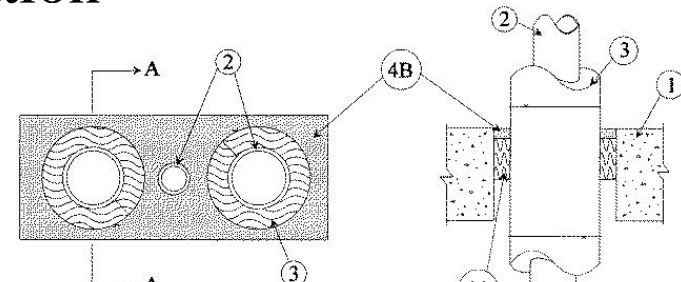
Firestopping for Safety

- **Firestop Systems Materials**
- Pipes – Cables
 - Sealants, Wrap strips, Putties, Prefabricated Kits
- Gaps/Joints/Walltops/Perimeter Joints
 - Sealants – Sprays – Track Systems
- “Backing Material”
 - Mineral Wool, Ceramic Fiber,
 - Backer Rod, Others



Firestopping for Safety

- Firestop Products Become Firestop Systems --
 - “A Specific field erected construction, consisting of an assemblage of materials to prevent the spread of fire through openings in fire rated walls and floors using ASTM E 814 / UL 1479, S-115, UL 2079, E 2307 as the test method...”
 - *S-115 – Incorporated all of UL 2079 in 2004*
 - **Testing** = Suitability statement for use of a firestop product in a specific system application



Firestopping for Safety

- What are Firestop *Systems*?
 - ASTM E814/UL 1479–UL S115 Tested Systems
 - **F Rating - Flame**
 - T Rating – Temperature
 - H Rating – Hose (CAN-Optional)
 - **L Rating – Smoke (UL)**
 - **W Rating – Water (ULus)**



Firestopping for Safety

Hose Stream & “W” Rating



Firestopping for Safety

- **Firestop Systems Directories – ULc, ULus[®],**
Systems Selection...Not as easy as it looks...



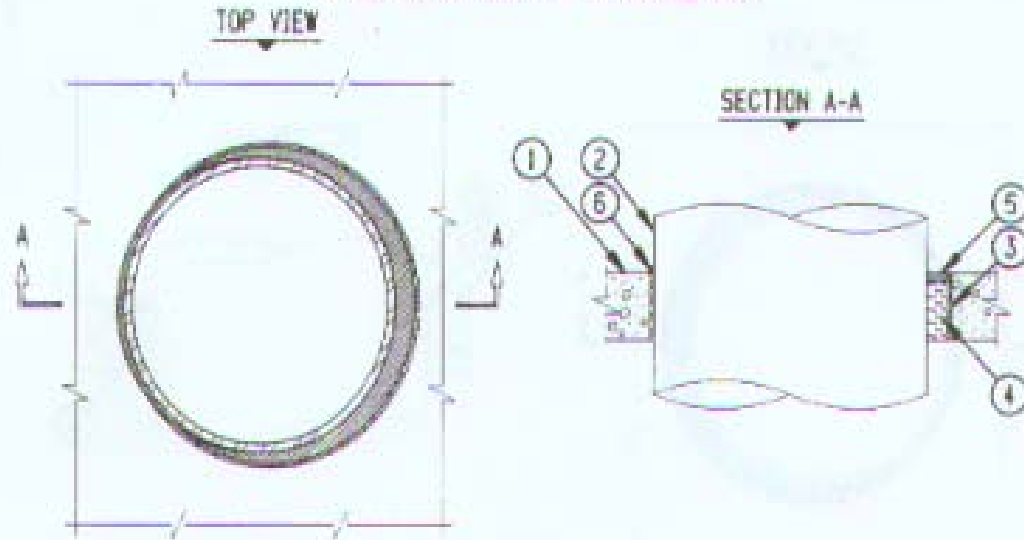
U.L. SYSTEM NO. CAJ1155
METAL PIPE THROUGH A SLEEVE IN CONCRETE FLOOR OR WALL

F RATING = 3-HR.

T RATING = 0-HR.

L RATING AT AMBIENT = LESS THAN 1 CFM/SQ. FT.

L RATING AT 400°F = 4 CFM/SQ. FT.

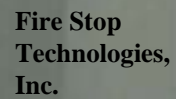


1. FLOOR OR WALL ASSEMBLY :
 - A. MINIMUM 4-1/2" THICK LIGHTWEIGHT OR NORMAL WEIGHT CONCRETE FLOOR.
 - B. U.L. CLASSIFIED CONCRETE BLOCK WALL (MINIMUM 8" BLOCK).
2. PENETRATING ITEM TO BE ONE OF THE FOLLOWING :
 - A. MAXIMUM 20" DIAMETER STEEL PIPE.
 - B. MAXIMUM 6" DIAMETER COPPER PIPE.
 - C. MAXIMUM 6" DIAMETER STEEL CONDUIT.
 - D. MAXIMUM 4" DIAMETER EMT.
3. OPTIONAL : MAXIMUM 22" DIAMETER STEEL PIPE SLEEVE (SCHEDULE 10 OR HEAVIER).
4. MINIMUM 4" THICKNESS MINERAL WOOL (MIN. 4 PCF DENSITY) RECESSED 1/2" FROM TOP OF SLEEVE.
5. MINIMUM 1/2" DEPTH HILTI FS-ONE FIRESTOP SEALANT.
6. A GENEROUS BEAD OF HILTI FS-ONE FIRESTOP SEALANT AROUND OUTER PERIMETER OF STEEL SLEEVE.

Graphics - HILTI

NOTES : 1. MAXIMUM DIAMETER OF OPENING = 22".

2. ANNULAR SPACE = MINIMUM 0", MAXIMUM 1-1/2".



Firestopping for Safety

- **Firestop Systems Directories - UL[®]**

Alpha: The first letter is either “F” for floors, “W” for walls or “C” for a combination of walls and floors.

Alpha: The second letter or combination of letters, signify the following.

A	Concrete floors < 5”
B	Concrete floors > 5”
C	Frame floors
D	Deck construction
E – I	Reserved for future use
J	Concrete or Masonry walls < 8”
K	Concrete or Masonry walls > 8”
L	Framed Walls
M	Bulkheads
N – Z	Reserved for future use

Firestopping for Safety

- **Firestop Systems Directories - UL[®]**

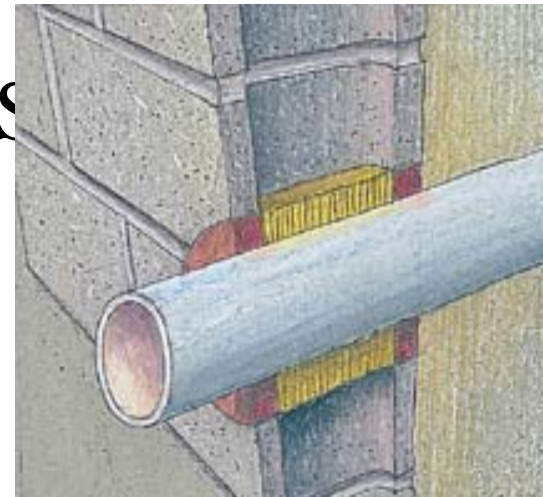
- | | | | |
|---------|--|---|----------------------------|
| – F | – Floors | } | First letter of the system |
| – W | – Walls | | |
| – C | – Combination | | |
| – A | – Concrete floors < 5 inches | | |
| – B | – Concrete floors > 5 inches | | |
| – C | – Frame floors | | |
| – D | – Deck construction | | |
| – E - I | – Reserved for future use | | |
| – J | – Concrete or Masonry walls < 8 inches | | |
| – K | – Concrete or Masonry walls > 8 inches | | |
| – L | – Framed Walls | | |
| – M | – Bulkheads | | |
| – N - Z | – Reserved for future use | | |

Firestopping for Safety

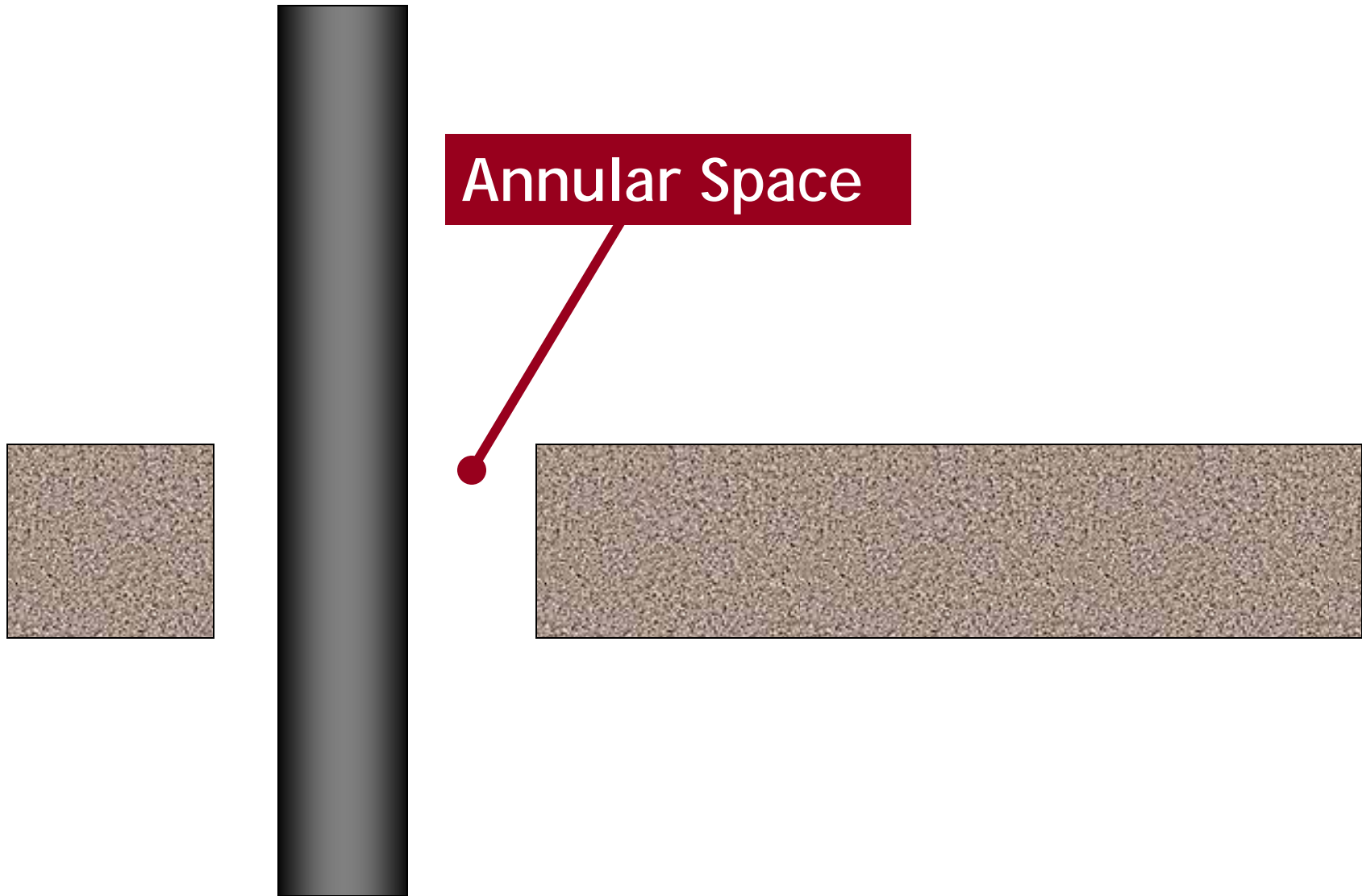
- **Numeric:** The first digit of the four digit number, identifies the type of penetrant in accordance with the following list. The next three digits will be assigned sequentially to successfully tested systems.
 - 0000 – 0999 No Penetrant
 - 1000 – 1999 Metallic Pipe, Conduit or Tube
 - 2000 – 2999 Non Metallic Pipe, Conduit or Tube
 - 3000 – 3999 Cables
 - 4000 – 4999 Cables in a Tray
 - 5000 – 5999 Insulated Pipes
 - 6000 – 6999 Misc. Electrical Penetrates
 - 7000 – 7999 Misc. Mechanical Penetrates
 - 8000 – 8999 Mixed multiple penetrates
 - 9000 – 9999

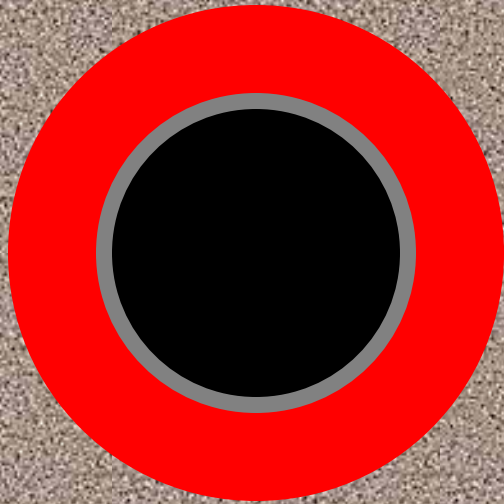
How Installers Select UL Systems

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

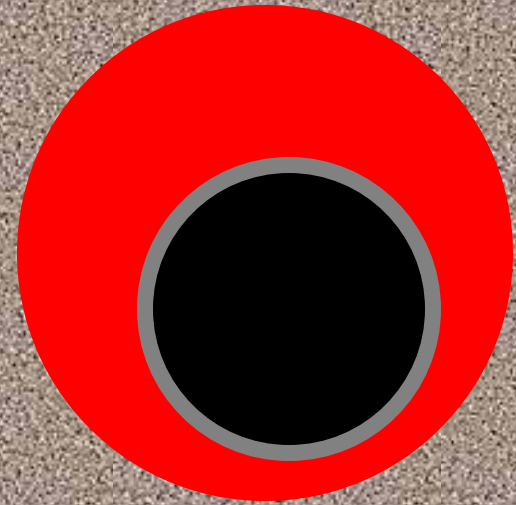


Min/Max Hole Size

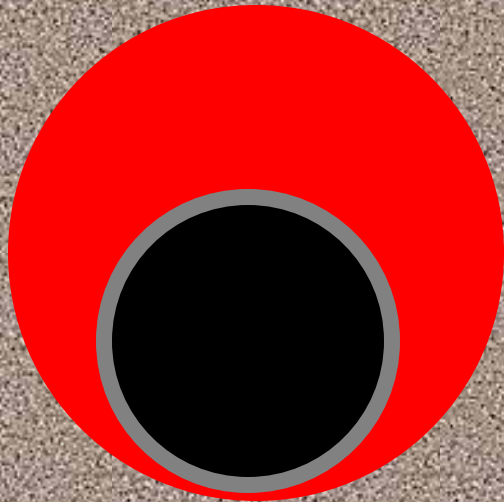




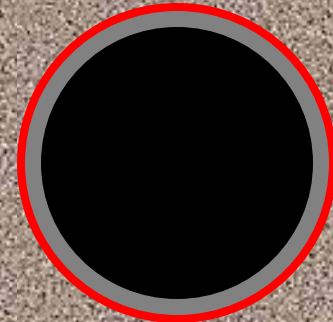
1. Centered



2. Off-Centered



3. Point Contact



4. Continuous
Point Contact

Firestopping for Safety

- Field or other Variances to Tested and Listed Systems?
 - Annular Space / Gap too large / small
 - Something in the way
 - Oversized penetrating item
 - Oversized Insulation
 - Tolerances??



Fire Stop
Technologies,
Inc.

Firestopping for Safety

- Variances to Systems? – Now What...
 - First Action in Process
 - **Find another system** – Same Manufacturer
 - Find another system – Different Manufacturer
 - **If no system exists in either case....**
 - *Engineering Judgment* – “EJ”
 - *Equivalent Fire Resistance Rated Assembly* – “EFRRRA”
 - *Based on sound engineering IFC Protocol*
- ***SPECIFY THE RULES FOR THIS...***

Firestop sealant must be well bonded to
penetrating item and surrounding wall or floor



Pack

1



Caulk

2

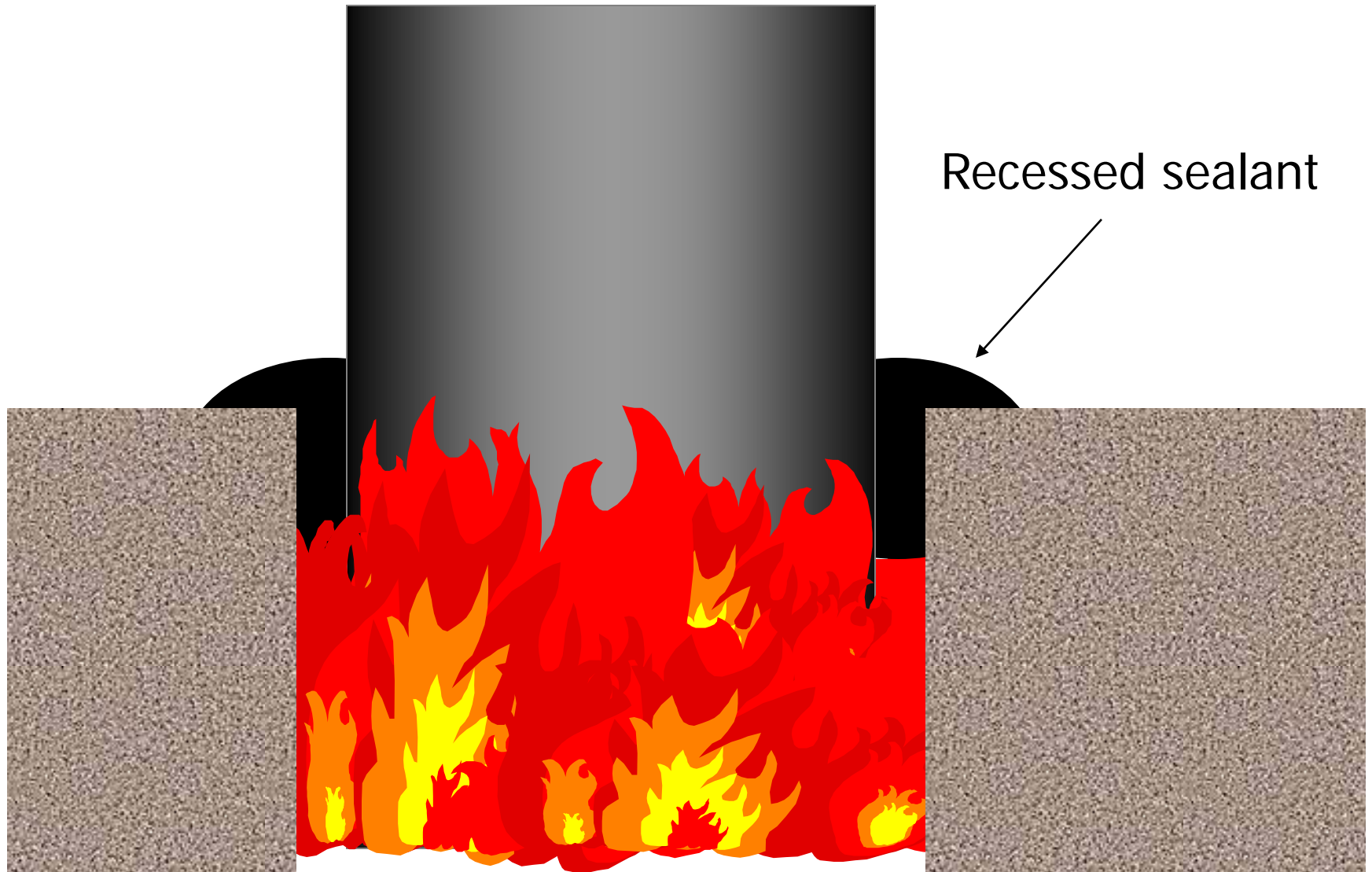


Tool

3

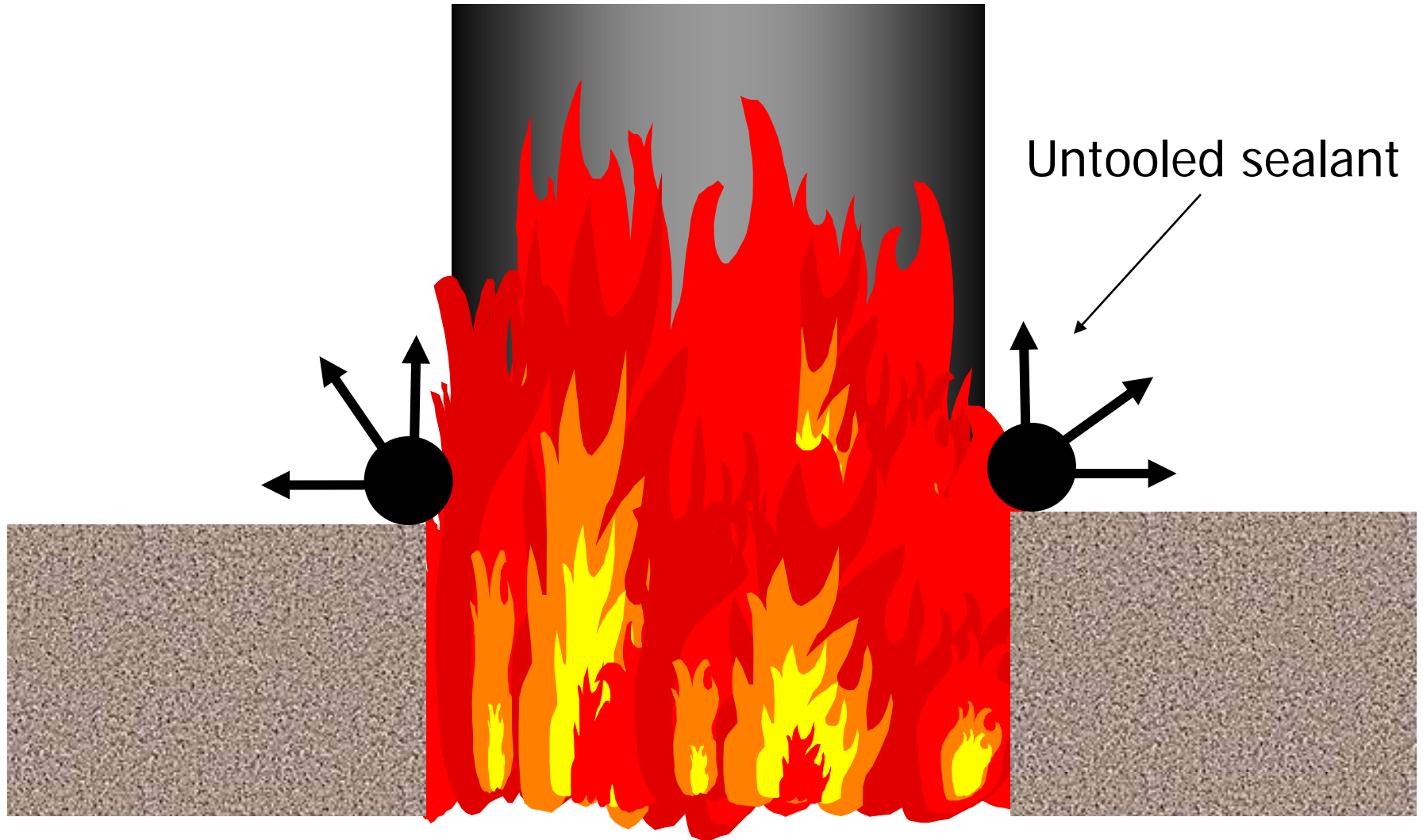
Always Check BOTH SIDES

When the sealant is properly recessed, it will expand inward and work the way it was designed



Recessed sealant

Left untooled, the sealant will expand outward during a fire, and likely fail



Properly Tooled/Smoothed Penetrations



Large Insulated Pipes



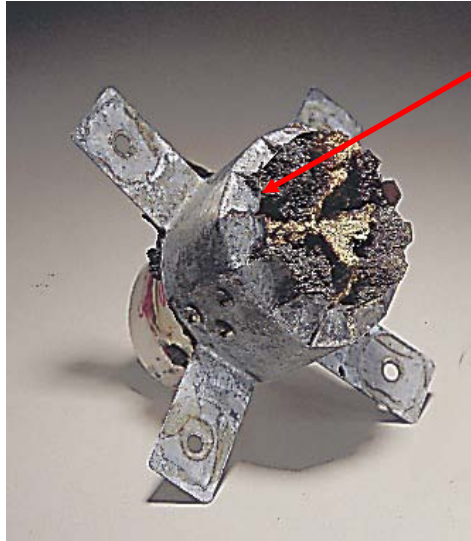
Multiple Insulated Pipes



Sleeved Pipes



Correct Collar or Sealant Must Be Selected for Combustible Penetrations



Hot-Side View

Charred Pipe

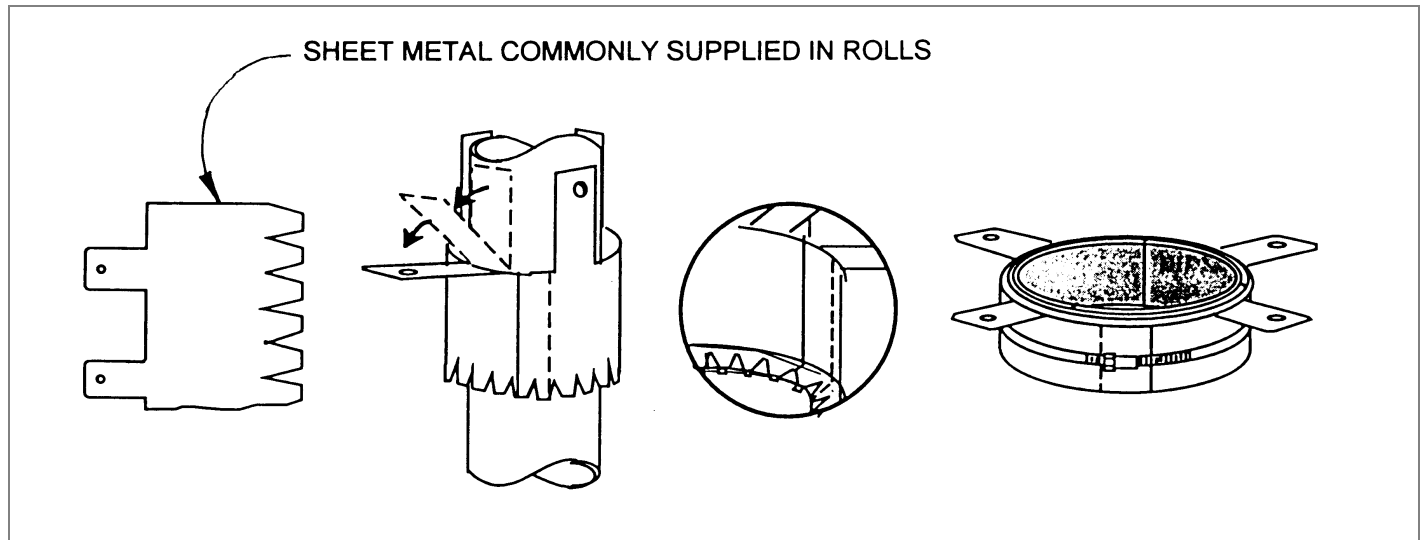
Knot formed from
Collapsing pipe

Cold-Side View

- Intumescent sealant expands and fills the void that opens as the combustibles burn away
- Collar expands to crush the pipe

Intumescent Wrap Strips and Steel Collars

- **Key Points - Restricting Collars**
 - Fastening Tabs – 90 degree bends for expansion
 - Directional Tabs
 - Bands



Unlisted, Untested Firestop Systems

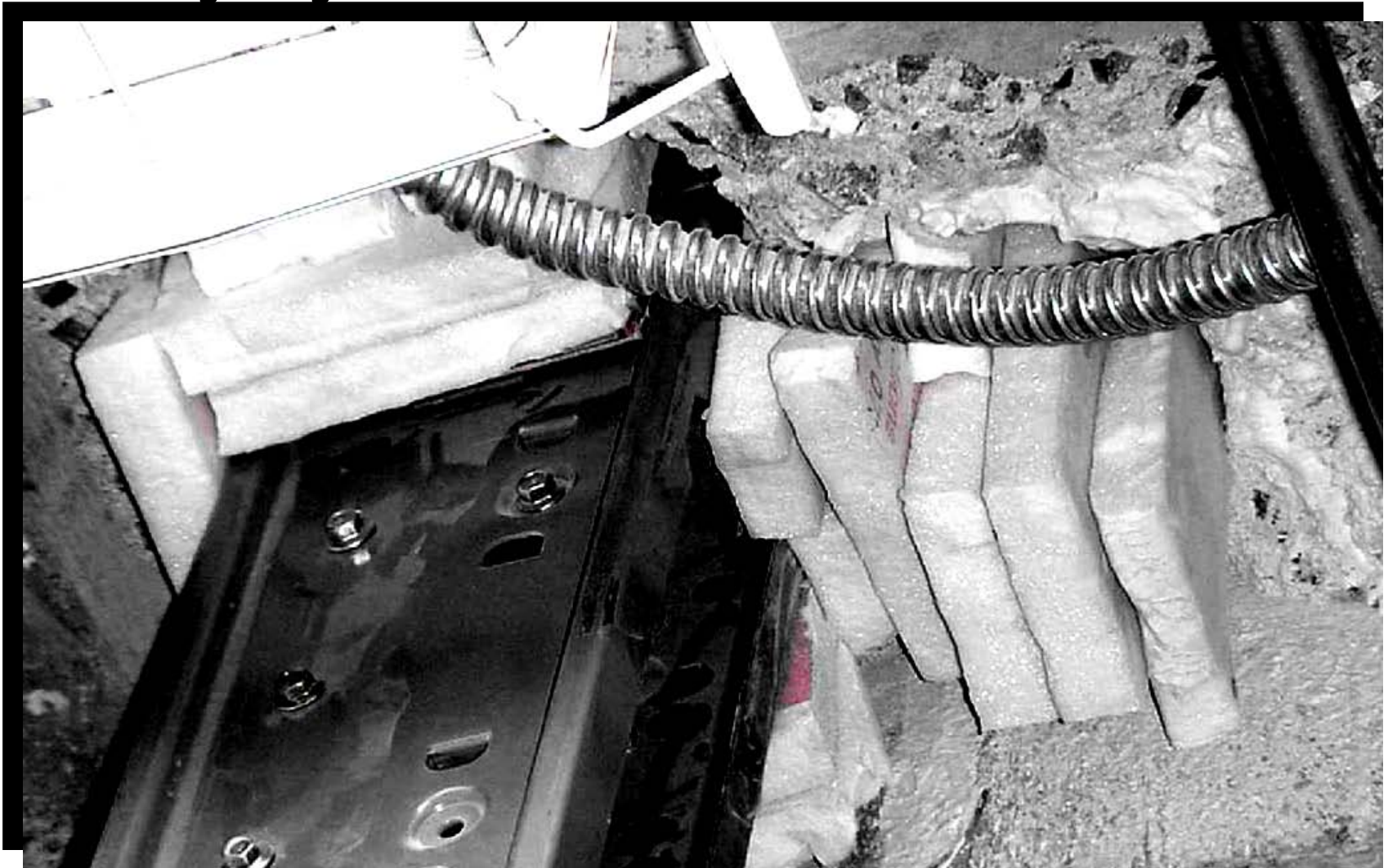


Firestopping for Safety

Unlisted, Untested Firestop Systems



Polystyrene Block in CMU Slab



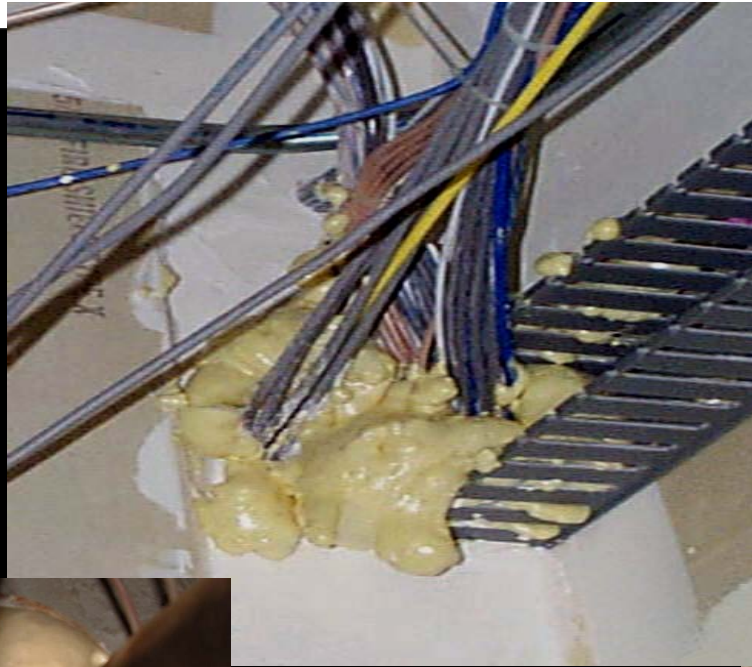
Joint Compound



Incomplete is ineffective

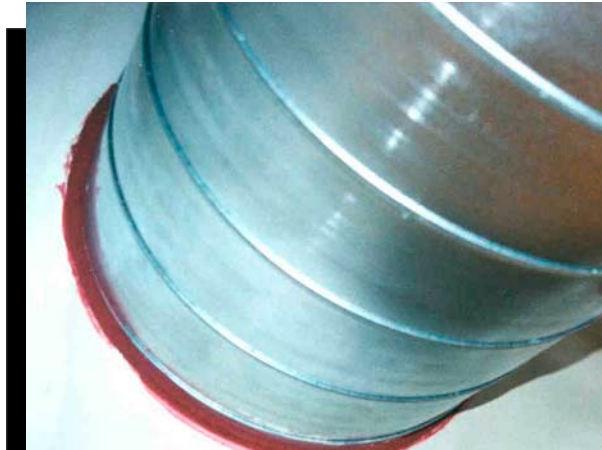


Great Stuff



Graphics – Firestop Solutions

Sealant must be applied **BEFORE** sheet metal flanges in Duct Applications



Fire/Smoke Dampers & Firestops

- Dampers are UL 555, 555S Listed *Systems*
 - Installed to manufacturer's written instructions (Systems
 - Angles...no sealants)
- Firestop sealants – UL 1479 –
 - Improper hole sizing or poor installation...

**Consult the Damper
Manufacturer & the
Authority Having
Jurisdiction**

Graphics - Greenheck



Fire/Smoke Dampers Firestop Installation

- Combination Fire Smoke Dampers
- Multi-blade Fire Dampers
- Underfloor applications
- Max. size 72" W x 96"

- Greenheck Graphic



Fire/Smoke Dampers

- Dampers with sealant provide smoke protection

**Consult the Damper
Manufacturer & the
Authority Having
Jurisdiction**



Installing an Incorrect System May Void the Fire / Smoke Damper Manufacturer's Warranty



Barriers With Combustible Penetrants

- Plastic Pipe
- Plastic-Jacketed cables
- Certain pipe insulation



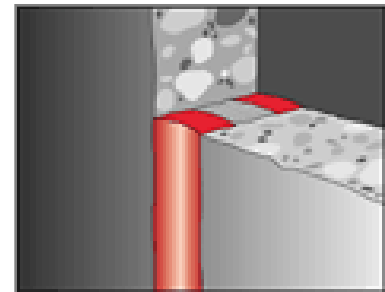
Firestopping for Safety

- Firestop Joint Systems Definition – UL 2079
 - “A joint system is a specific construction consisting of adjacent wall and floor assemblies, and the materials designed to prevent the spread of fire through a linear opening between the wall and / or floor assemblies”
 - “ANSI / UL 2079 ” – Qualified Joint System



Firestopping for Safety

- Firestop Joint Systems Definition – UL 2079
 - Min. Positive Pressure – .01 Water, 12” below assy.
 - Movement Cycling
 - Class I – min. 500 cycles, min. 1 cycle / minute
 - Class II- min. 500 cycles, min. 10 cycles / minute
 - Class III-min 100 cycles, min. 30 cycles / minute
 - Fire Tested at Maximum Joint Width
 - No Load Bearing Characteristics, unless noted
 - Assembly, L or W Ratings



Good Firestop Applications

Floor to Wall



**Fire Stop
Technologies,
Inc.**



Top of Wall

Graphics – Firestop Solutions

Joints and Seams

Top of Wall



Joints and Seams

I-Beam to Fluted Deck



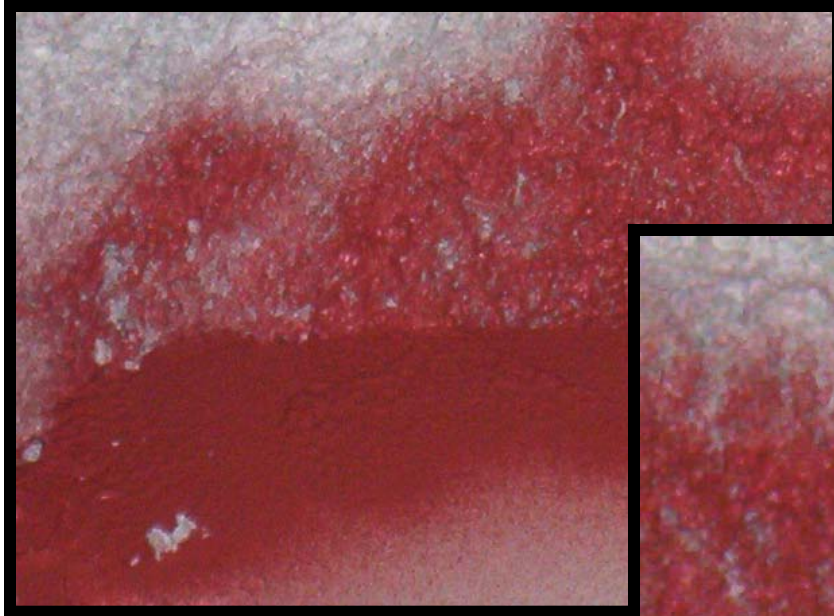
Penetrations with Top of Wall



Unacceptable Substitutes



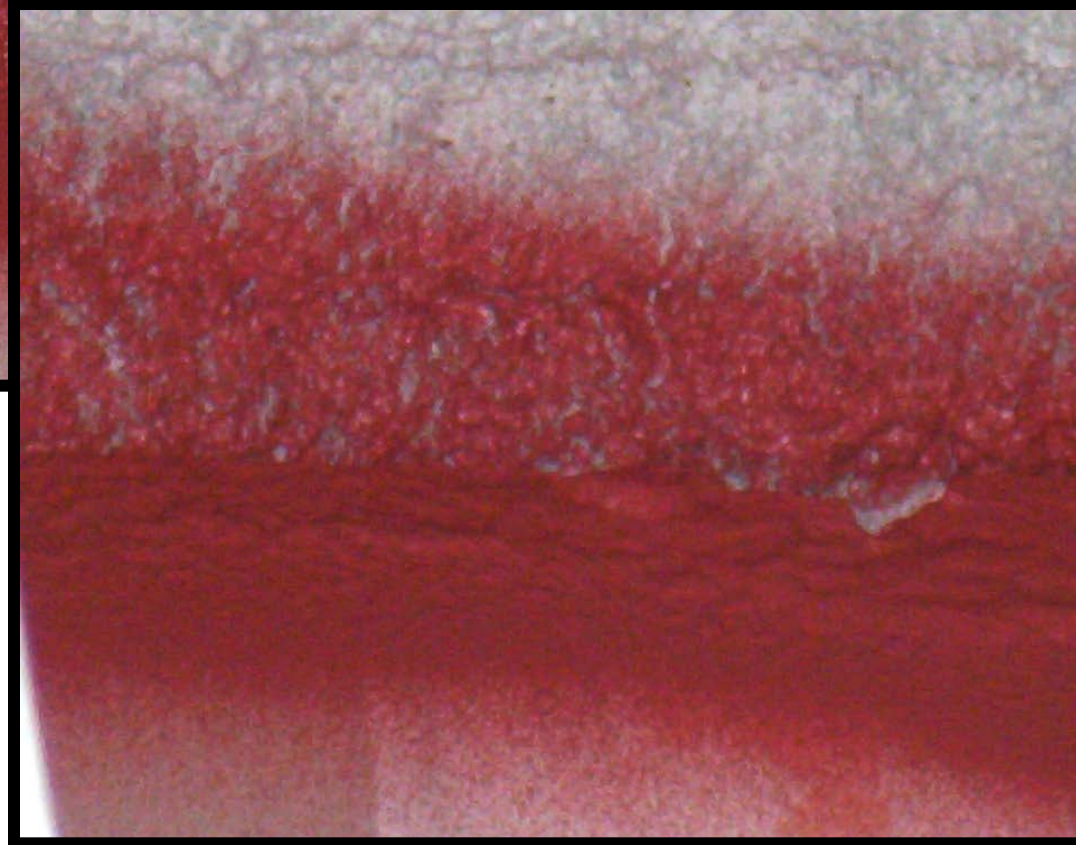
Unacceptable Substitutes



Insufficient Material?

Non Code
Compliant!

Graphics – Firestop Solutions



Unacceptable Substitutes



Results of Improperly Installed Mineral Wool



Firestopping for Safety

- Firestop Perimeter Systems

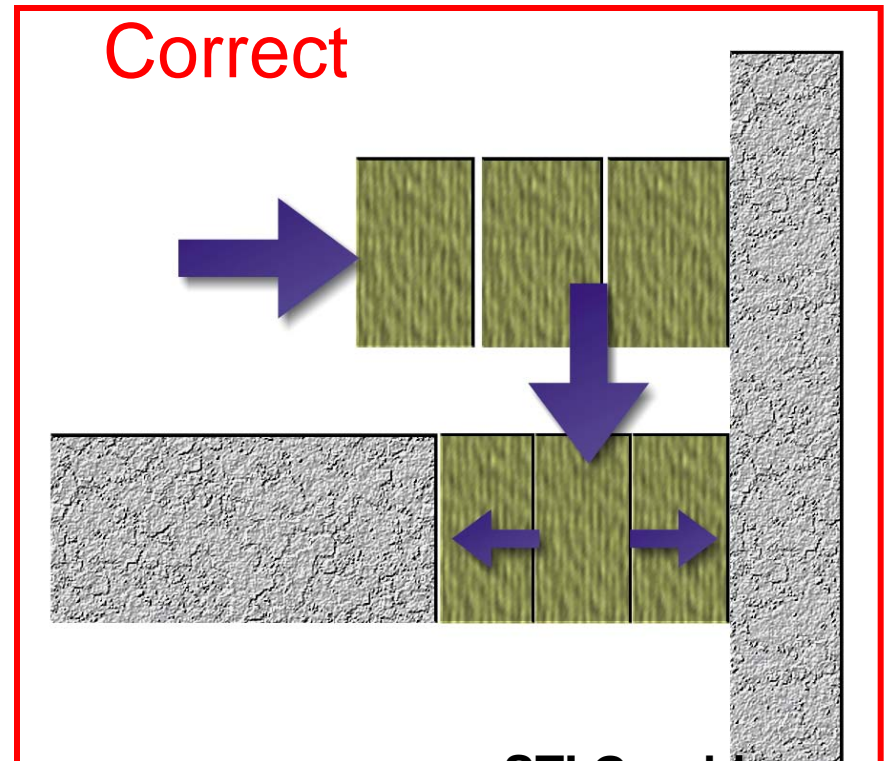
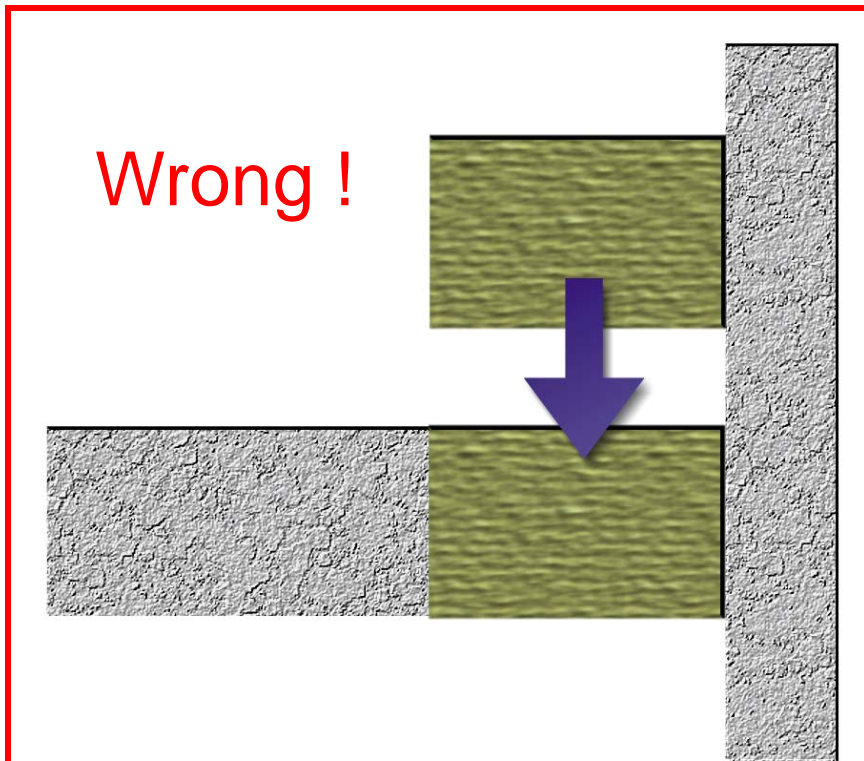
Definition – ASTM E 2307

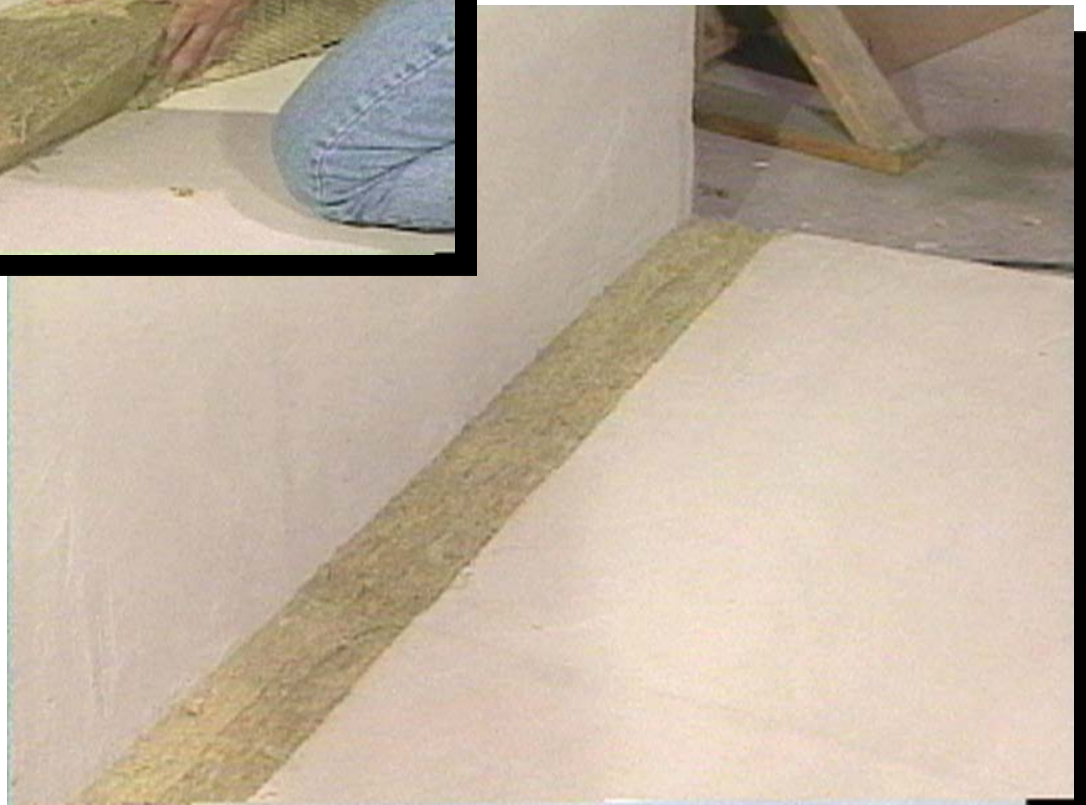
- “A Perimeter Fire Containment System is a specific field erected construction consisting of a floor with a fire resistance rating, and an exterior curtainwall with no hourly resistance rating, and the fill material installed between the floor and the curtain wall to prevent the vertical spread of fire in a building.”



Proper Installation of Mineral Wool

- Compressed mineral wool must be inserted perpendicular to the joint to allow for movement between the slab and wall.





STI Graphic

Properly Installed and Ready to Spray



Joints and Seams

Edge of Slab



Wall to Wall / Wall to Floor

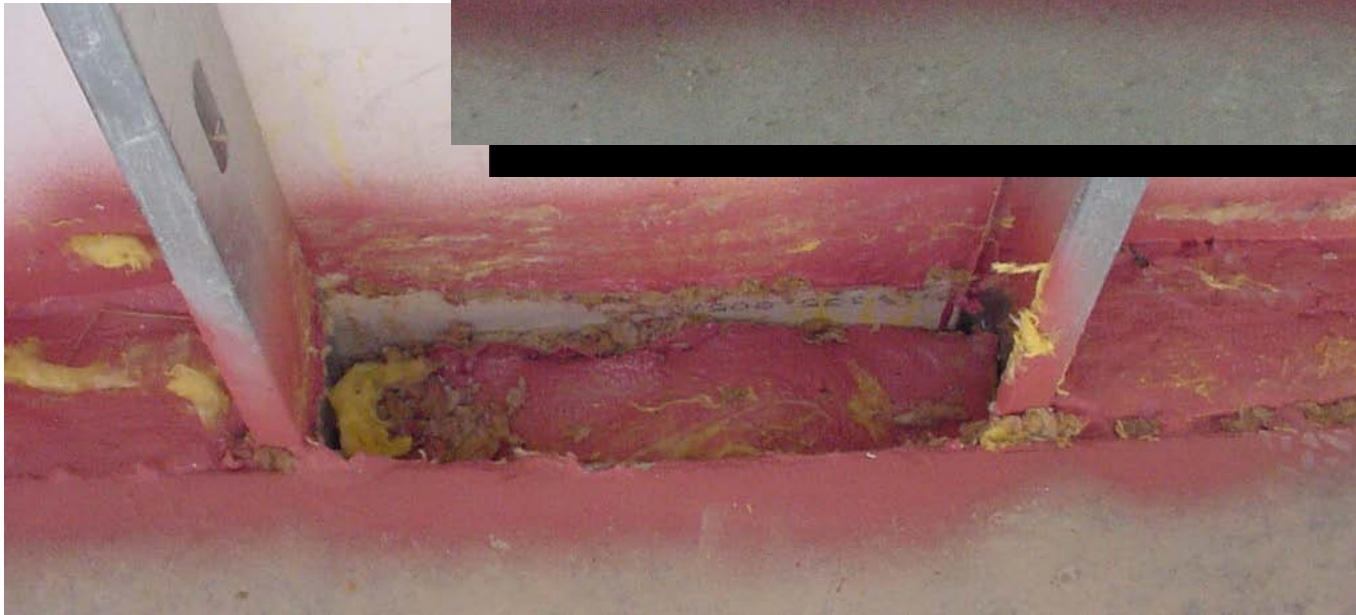
Caulk and Self Leveling



Floor to Wall: Concrete floor assembly to pre-cast concrete wall assembly



Poor Firestop Installation of Perimeter Barriers



Firestopping for Safety



Graphics – OPL, 3M

Firestopping for Safety

- ***“Construction Quality Stinks”***

John R. Butler, Jr., Director, Construction Division of the Georgia State Financing and Investment Commission, *ENR's Viewpoint...*

- ***“Where are the certified firestoppers”*** Ken Hercenberg, ‘*The Construction Specifier Magazine*’

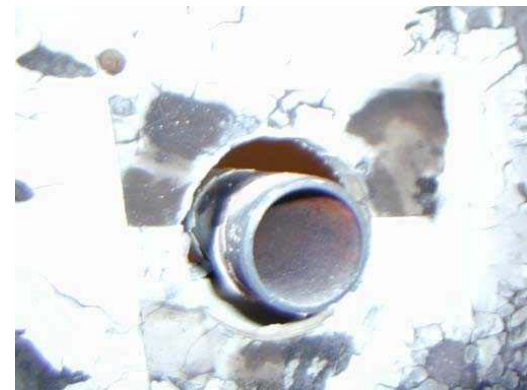
Firestopping for Safety

- Results of Non-Qualified Contractor
 - Firestopping wrong, missing
 - Systems Documentation?
 - As Built Documentation??

Conclusion – No Single
Firestopping Trade means
fire & life safety risk...



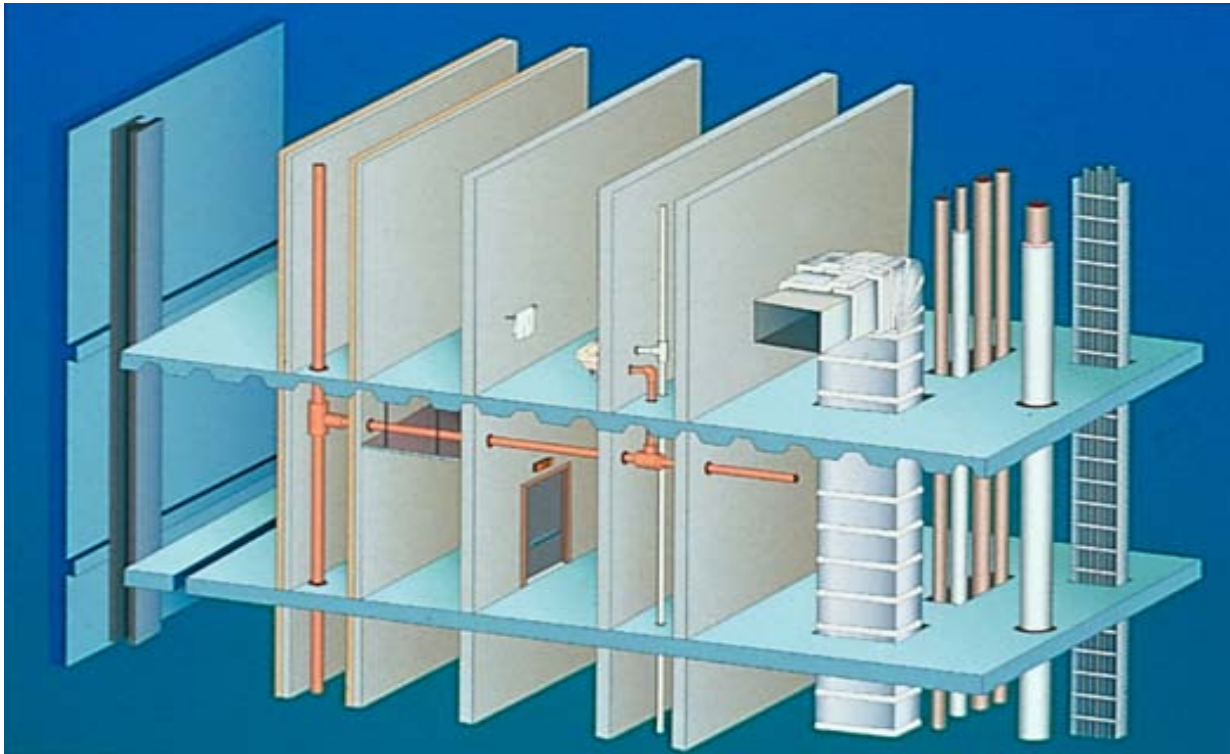
Fire Stop
Technologies,
Inc.



Firestopping for Safety

II Installation

Who's Responsible, How do I Choose???



Graphics – STI

Firestopping for Safety

Firestop Contractors & Installation

- Firestopping Industry Installation Methods
- *3 Types*
 - **All Trades** -“He/She who pokes hole, fills hole”
 - **Multiple Contracts** to Firestop Contractors, Subs,GC/O
 - GC/O - Sub to **Single Source Specialty Firestopping Contractor**
- *Qualifications??*

Firestopping for Safety

Firestop Contractors & Installation

- Firestopping Industry Qualifications
 - Installation Protocol – See FCIA Manual of Practice
 - Manufacturer Warranties – N/A in Firestopping
 - Material only, ‘x’ year from date of shipment.
 - Labor – Contractor only
 - Manufacturer Inspection?

Firestopping for Safety

Firestop Contractors & Installation

- How do I select a specialty firestop contractor ?
 - FCIA Member
 - FCIA Firestop Manual of Practice
 - Manufacturer Educated
 - 25 minutes anywhere
 - 1-2 hours anywhere
 - 1-2 Day @ HQ
 - FCIA Member, FM 4991, UL Qualified

Firestopping for Safety

Firestop Contractors & Installation

- Firestopping Industry *Qualifications?* **Education**
 - **Short Class – 25 - 60 minutes**
 - Some Training
 - Worker educated
 - Short test
 - Administered by salesperson
 - **Worker Education at Shop**
 - **Manufacturer HQ Education**
 - 1-2 Days Education
 - Test – Teach to the Test?
 - Not 3rd Party

Firestopping for Safety

Firestop Contractors & Installation

- Firestopping Industry *Qualifications*
 - **Manufacturer Contractor Programs**
 - ‘Certified Trained?’
 - ‘Accredited?’
 - ‘Approved?’
 - ‘other name’
 - **FCIA Contractor Member**
 - **FM 4991 Standard for Approval of Firestop Contractors – Education, FM Firestop Exam**
 - **UL Qualified Firestop Contractor - Education, UL Firestop Exam**

Firestopping for Safety

**Qualified – Does the Firestop Contractor understand the
ZERO TOLERANCE INSTALLATION PROCESS**

- **“F” Fire & “T” Temperature, “H” Hose**
 - **“L” Smoke**
 - **“W” Water**
 - **Insulation/Integrity**
 - **Movement Capability**
 - **Annular Space Sizes, Gap Sizes**
 - **SYSTEMS DOCUMENTATION**
 - **FM 4991 Approved or UL / ULC**
- Qualified Firestop Contractor**

Firestopping for Safety

Firestop Contractors & Installation

- How do I select a specialty firestop contractor ?
 - FCIA Member
 - Insurance – Classification?
 - Specialty Firestop Contractor?
 - Plumber
 - Workforce – Educated as Firestop/Containment Workers
 - Licensed – Not yet...
 - Bonding Capability
 - Project References & Experience
 - Management System reviewed by?
 - FM 4991 and / or UL Qualified?
 - Manufacturer?

Firestopping for Safety

FM & UL Management System Components

- Office Facility Procedures Audit
- Field Procedures Audit
- Employ a person who passed the UL/FM Firestop Exam, 80% or better
 - If employed by Approved, Qualified Firm,
 - *Designated Responsible Individual (DRI)*



Firestopping for Safety

FCIA Members - FM 4991 Approved and / or
UL Qualified Firestop Contractor Firms

Management Systems Manual

- Investment in Education
- Investment in FCIA Firestop Manual of Practice
 - Project Successful Proven Contractor
 - Education, Training, Accountability
 - = Reduced Risk – Life, Property, Business

www . fcia. org

Firestopping for Safety

FM 4991 & UL QFC Requirements

FM 4991 & UL DRI Personnel

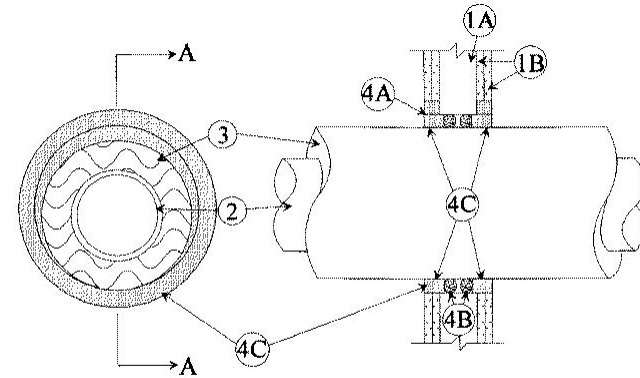
- Pass Rigorous Firestop Examination
 - FCIA Firestop Manual of Practice
 - Firestop Systems Selection & Protocol
 - Management System Knowledge
- Retested every 3 years (FM Only)
- CEU Requirement – 6 ea. 3 yrs.
- One DRI per Approved Contractor Location
 - Installation & Maintenance

Firestopping for Safety

FM/UL Office Facility Procedures Audit

– *Firestop Contractor Management System Manual Procedures*

- Employee Training & Education
- Systems Selection
- Communicate systems to Field
- Material Controls
- Systems installation “protocol”
- Labeling
- Record keeping - Variance Procedures
- Non-Conformances
- Documentation
- Project closeout



CONFIGURATION A

Firestopping for Safety

Initial Firestop *Firm* Jobsite Audit by
FM, UL Personnel

- Verification of firestop systems installation
- Verify Quality Procedures
- Verify “communication”
 - Office to field, field to office
- “Culture of Quality...”

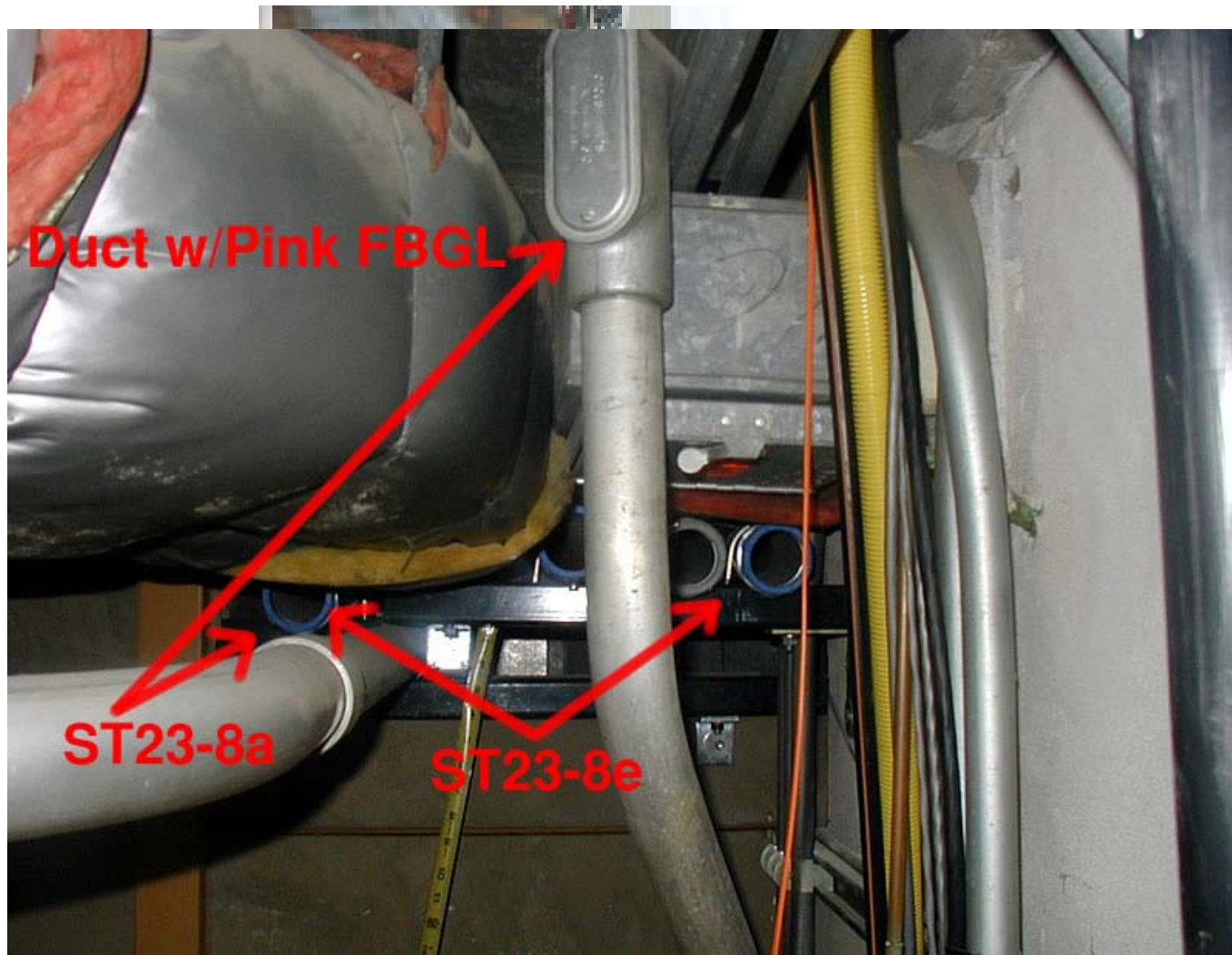
Firestopping for Safety

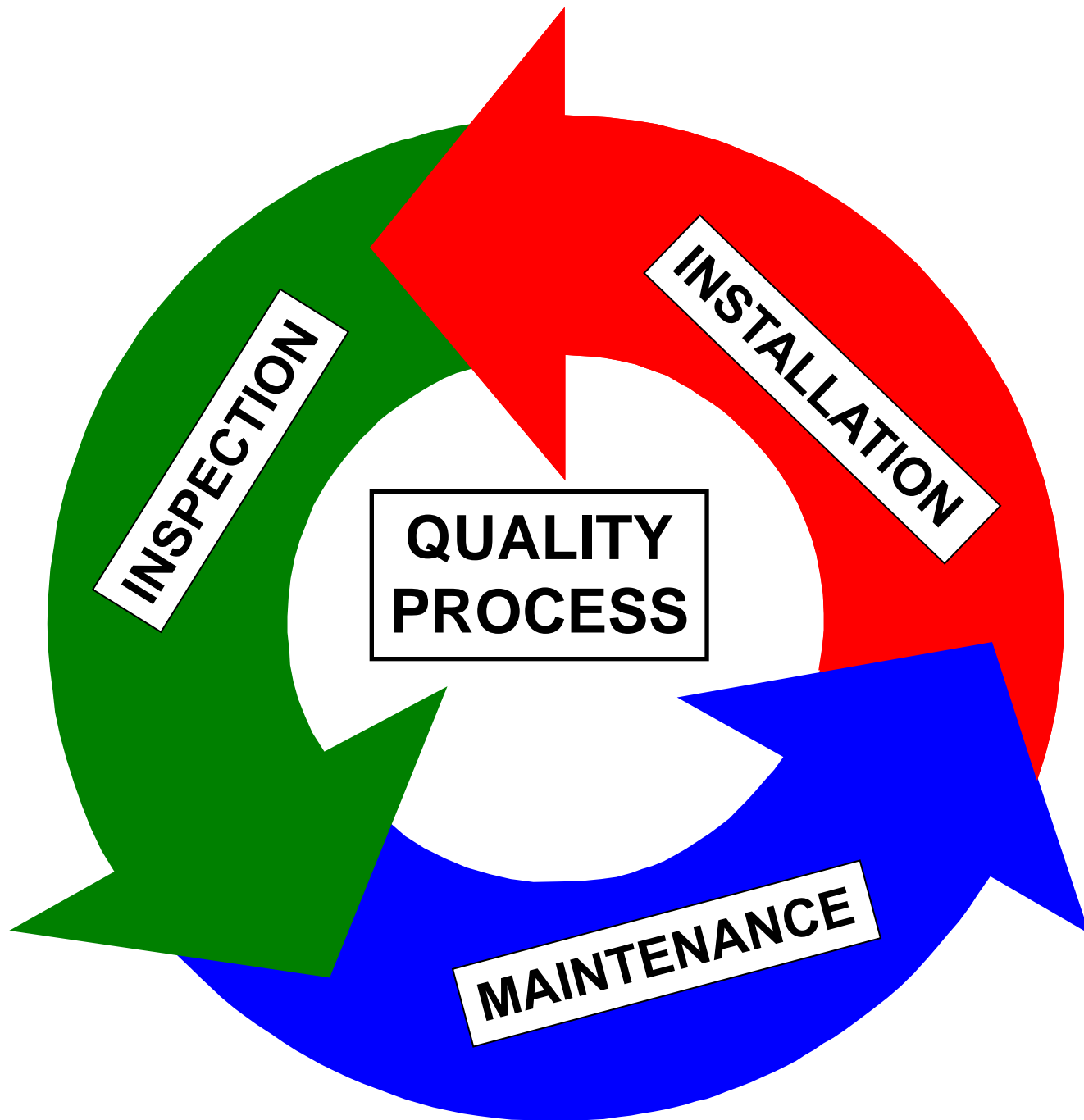
Annual FM 4991/ UL QFC Audit

- Continued satisfactory performance
 - Quality Manual Implementation
- Documented - Archived record keeping
- Employee Training Documentation
- Jobsite Visit
- DRI CEU Verification

Firestopping for Safety

III - Inspection





Firestopping for Safety

- ASTM E 2174 & ASTM E 2393 -
“Standard Practice for On-Site Inspection of
Installed Fire Stops – Pen’s - Joints”
- “Standard Inspection Procedure”
 - Fire Marshals & Code Officials
 - Inspection Firms
 - Architects
 - Other Qualified Firms
- PASSED at ICC Committee Hearings...

Firestopping for Safety

- ASTM E 2174 & ASTM E 2393 -
“Standard Practice for On-Site Inspection of
Installed Fire Stops – Pen’s - Joints”
 - PASSED at ICC Committee Hearings...
 - Buildings 75’ and higher above Fire Department
Access
 - Occupancy Type III & IV, Chapter 16 Table 1604.5

Firestopping for Safety

- ASTM E 2174/ASTM E 2393 -
“Inspector & Firm Requirements”
 - Inspector firm NOT Related to Installing firm
 - Distributor, Manufacturer, Competitor, Supplier
 - Inspector Personnel meet at least one criteria.....
 - 2 years experience (Construction, Field), education, and credentials acceptable to AHJ
 - Accredited by AHJ
 - Meet ASTM E699
 - **NEW Inspector Personnel / Firm Qualification**
 - International Accreditation Services IAS AC 291

Firestopping for Safety

- ASTM E 2174/ASTM E 2393 -
“NEW Inspector & Firm Credentials”
 - IAS Accreditation Criteria AC-291
 - PASS UL/FM Firestop Exam
 - 1 year Quality Assurance
 - Or...*
 - PASS UL/FM Firestop Exam, *and* PE, FPE, Registered Architect, or
 - PASS UL/FM Firestop Exam, *and* Education by Certified Agency
 - Must Specify IAS, not part of ASTM Standards

Firestopping for Safety

- ASTM E 2174/ ASTM E 2393 –
“Inspection Process”
 - Pre Construction Meeting
 - Review Documents – Identify Conflicts
 - Materials - ASTM E 814 or UL 1479-S115 Systems
 - “exactly as Identified on inspection documents”

Firestopping for Safety

- ASTM E 2174/ ASTM E 2393 –
“Inspection Process”
- Pre Construction Meeting
 - Mock Ups
 - Destructive Testing
 - Installation Measurements
 - Discuss Inspection Method
- Required for During/Post Insp. Methods

Firestopping for Safety

- ASTM E 2174/ ASTM E 2393 –
“Inspection Process”
- During Construction Inspection Method
 - Firestop Installation Start
 - Random witness 10%, each type of Firestop
 - No Less than one

Firestopping for Safety

- ASTM E 2174/ ASTM E 2393 –
“Inspection Process”
- Post Construction Method –
 - Destructive Testing
 - Minimum 2% , no less than 1, each type
per 10,000 SF of floor area
 - If 10% variance per firestop type
 - Inspection stops
 - Installer inspects, repairs
 - Inspector reinspects

Firestopping for Safety

- ASTM E 2174/ ASTM E 2393
“Inspection Process”
- Inspection Forms
 - One for each type of firestop
 - Submit 1 day after inspection to Authorizing Agency
 - Numbered – Controlled
- Required – During/Post Construction Methods

Firestopping for Safety

- ASTM E 2174/ ASTM E 2393 –
“Inspection Process”
- - Final Report – During/Post Inspection Method
 - Name, address, location –
project, installer, inspector
 - Type and quantity of firestops inspected
 - Verification method
 - Percentage Deviation
 - Copies of all documents sent
to Authorizing Agency

Firestopping for Safety

- ASTM E 2174/ ASTM E 2393 –
“Inspection Process”
- Why Specify ASTM E 2174 / E 2393
 - Quality Process – Install, Inspect
 - Verify Field Installations
 - “Service & Testing”....Demming
 - **Qualifications of Inspectors**
 - IAS AC 291 – Accreditation Criteria for
Special Inspection Agencies

Firestopping for Safety

- Types of ‘Inspection’
 - ASTM E 2174 & ASTM E 2393 –
 - Destructive, Non Destructive
 - Specified Frequency
 - Independent 3rd Party
 - Contractor Self Inspection
 - Verify Management System validity
 - May or may not be destructive
 - Manufacturer Inspection
 - May not exist
 - Contractor Approval/Qualification Personnel

Firestopping for Safety

Quality Assurance

Specifications— MF 04 - 07 84 00 ... was 07270

- 07 84 00 – Both Pens & Joints
- 07 84 10 – Through Penetration Firestop Systems
 - Pipes, cables, ducts, cable trays, MEP&C Systems
- 07 84 20 – Fire Resistive Joint Systems
 - Top of Wall
 - Fire Resistance Rated Joints – Soft, Metals & Fire Inserts
 - Perimeter Joints (Floor Slab edge/Exterior Wall)
- *Systems Spec, and product properties spec...*

Firestopping for Safety

- Specifications– Systems Testing – Part 1 – Systems – DIIM References
 - ASTM E 814 & UL 1479, UL S-115 - Penetrations
 - ASTM E 1966, UL 2079, S115 - Joints
 - ASTM E 2307 – Perimeter
 - FM 4991 Standard for the Approval of Firestop Contractors
 - UL or ULC Qualified Firestop Contractor Program
 - ASTM E 2174 & ASTM E 2393 - Inspections

Firestopping for Safety

- Specifications– Systems Testing – Part 1 - Systems
 - “F” Ratings - Fire Resistance Rated Assy.
 - “T” Ratings - = F & T??
 - “H” Ratings – Hose Stream – (Canada, Europe, UK)
 - “L” Ratings = Fire & Smoke Resistance Rated Construction
 - “W” Ratings – Floors; Functional when? Floor Loading Capabilities?
- Match Physical Properties of Environment
 - Chemicals, Movement, Exposure
 - FCIA UL STP - Movement

Firestopping for Safety

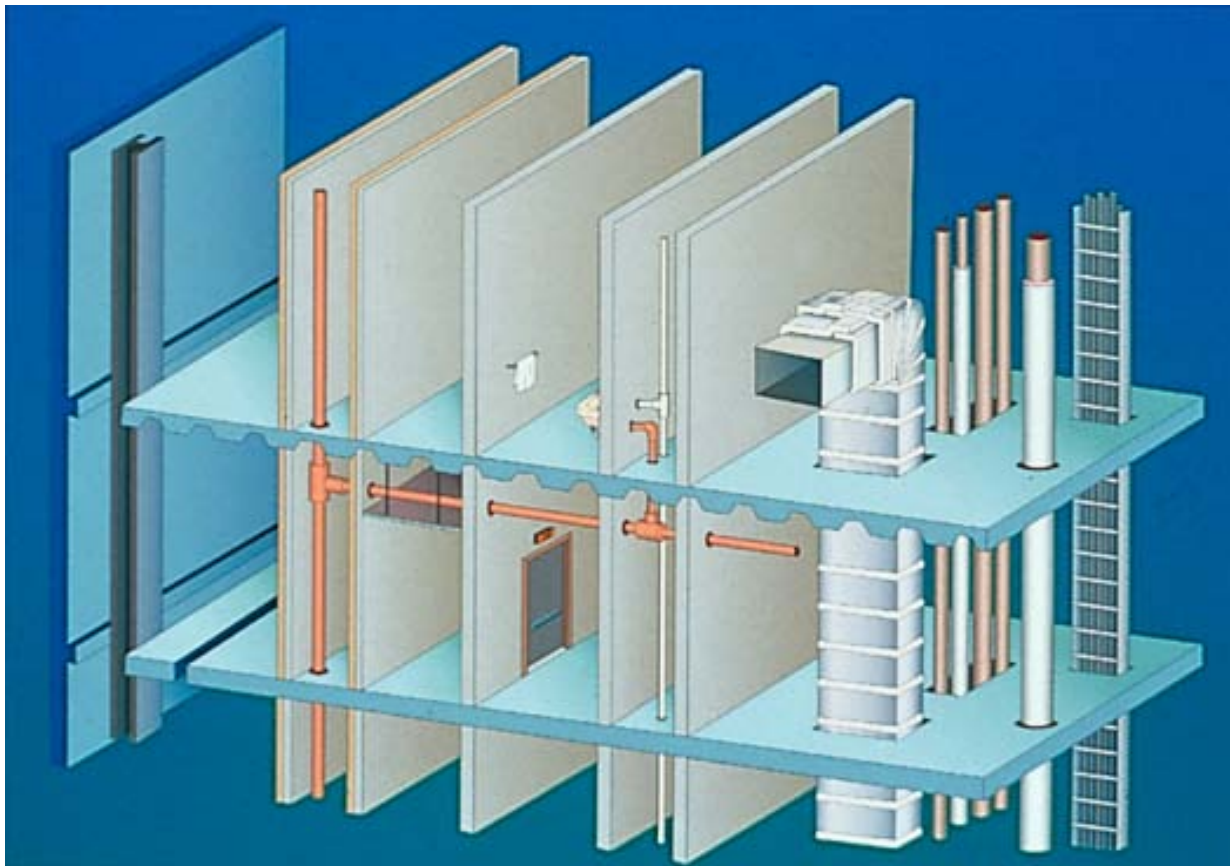
- Specifications– References
 - FCIA Manual of Practice
 - FREE TO SPECIFIERS
 - Manufacturers Instructions

Firestopping for Safety

- Firestopping Quality Process -
 - Contractor Qualifications – ICC – LOST 8-7
 - FCIA Member Specialty Firestop Contractors
 - FM 4991 & UL Qualified Firestop Contractors
 - Execution – ICC PASSED, 12-4
 - ASTM E 2174 & ASTM E 2393 Inspection
 - Qualifications? AC 291 = Solution
 - FCIA Member Firestop Inspectors
 - Materials – Suitable physical properties for applications and needs of the building occupants

Firestopping for Safety

IV Maintenance



National Fire Protection Association - NFPA 101

- **SECTION 4.5.8 Maintenance, Inspection, and Testing.**
- **4.5.8.1** **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. [101:4.6.12.1]

National Fire Protection Association - NFPA 101

- **4.5.8.2 No existing life safety feature shall be removed or reduced** where such feature is a requirement for new construction. [101:4.6.12.2]
- **4.5.8.3* Existing life safety features obvious to the public, if not required by the Code, shall be either maintained or removed**. [101:4.6.12.3]
- **4.5.8.4 Any device**, equipment, system, condition, arrangement, level of protection, fire-resistive construction, or any other feature **requiring periodic testing, inspection, or operation** to ensure its maintenance **shall be tested, inspected, or operated** as specified elsewhere in this Code or as directed by the AHJ. [101:4.6.12.4]
- **4.5.8.5 Maintenance, inspection, and testing shall be performed under the supervision of a responsible person who shall ensure** that testing, inspection, and maintenance **are made at specified intervals** in accordance with applicable NFPA standards or as directed by the AHJ. [101:4.6.12.5]

International Fire Code – Maintenance

SECTION 703

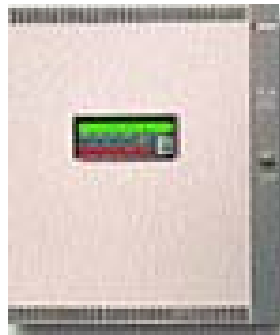
FIRE-RESISTANCE-RATED CONSTRUCTION

703.1 Maintenance. The required fire resistance rating of fire-resistance rated construction (including walls, fire stops, shaft enclosures, partitions, smoke barriers, floors, fire resistive coatings and sprayed fire resistant materials applied to structural members and fire resistive joint systems) shall be maintained. Such elements shall be visually inspected by the owner annually and properly repaired, restored or replaced when damaged, altered, breached or penetrated.

Openings made therein for the passage of pipes, electrical conduit, wires, ducts, air transfer openings, **and holes** made for any reason shall be protected with approved methods capable of resisting the passage of smoke and fire.

Firestopping for Safety

- “TOTAL FIRE PROTECTION”
 - Effective Compartmentation -Fire Walls/Floors & Firestopping
 - Fire Dampers, Fire Glass
 - Detection & Alarm Systems
 - Sprinkler Suppression Systems
 - Building Personnel, Occupant and Firefighter Education



Firestopping for Safety

Proper ***DIIM*** Effective Compartmentation
Means Reliable Systems...

- ***Designed*** - A/E, Firestop Consultant
 - Tested and Listed Systems, FCIA Member Mfr's.
 - Systems Selected / Analyzed / Submitted
- Properly ***Installed***
 - FCIA Member, “FM 4991, or UL QFC Contractors Standards”
- Properly ***Inspected***
 - ASTM E 2174 & ASTM E 2393 Inspection Standards
By AC 291 Accredited Inspection Agencies
- Properly ***Maintained*** –
 - FCIA Members...

Firestopping for Safety

Freebie for CSC/CSI-SFPE Member

Specifiers, Architects, Building Officials,
Building Owners, Government

- *Free Life Safety Digest, the Magazine of Effective Compartmentation Subscription*



Firestopping and Compartmentation

Fire & Life Safety 2011

Firestop Contractors International Association

Hillside, IL – 708-202-1108 - office

FCIA Info – info @ fcia.org

Bill McHugh – bill @ fcia.org



FCIA DIIM & Firestopping

September 20, 2012