

DIIM & Firestopping

Firestopping Firestop Systems

Bill McHugh, FCIA

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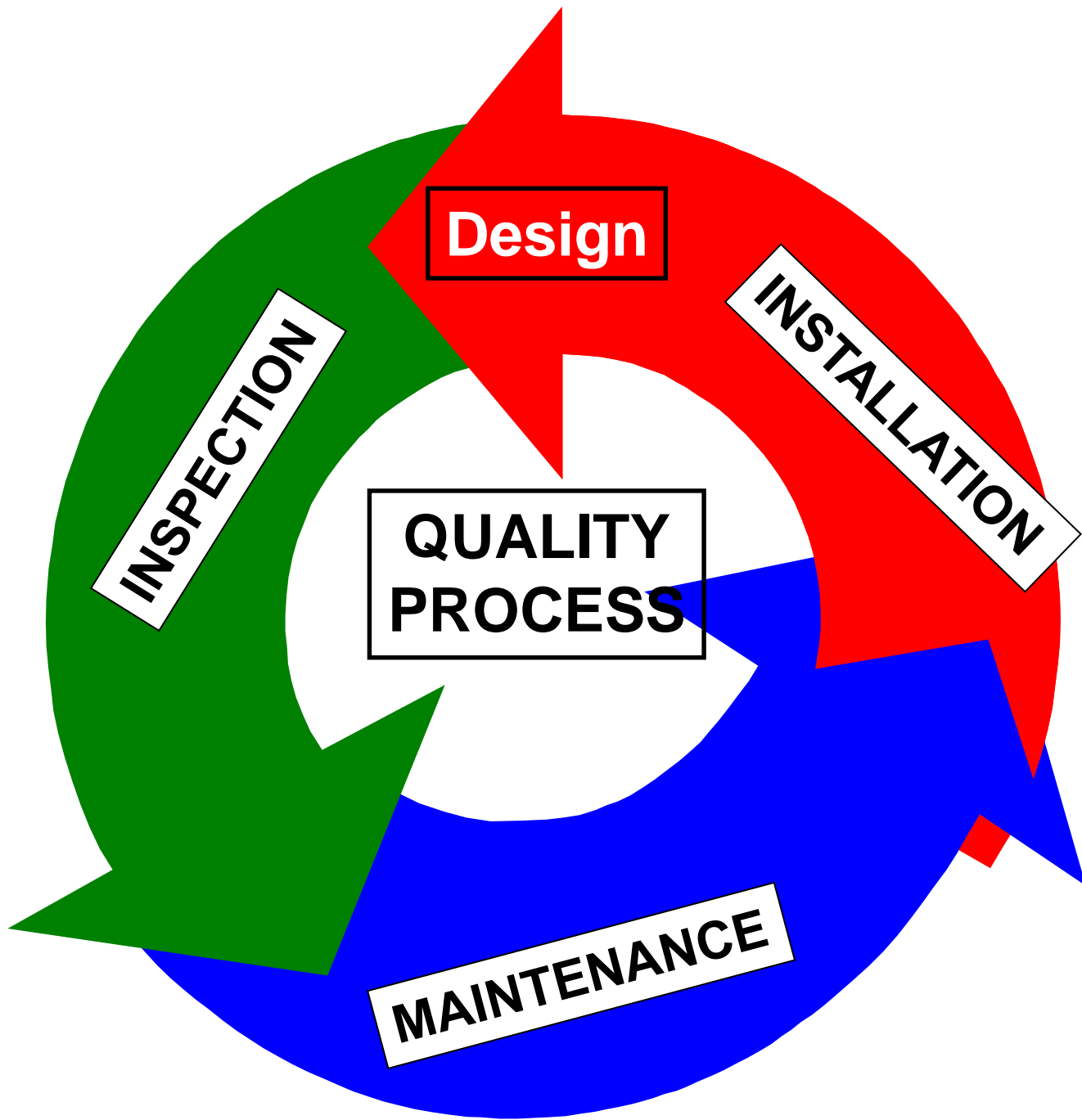
Outline

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



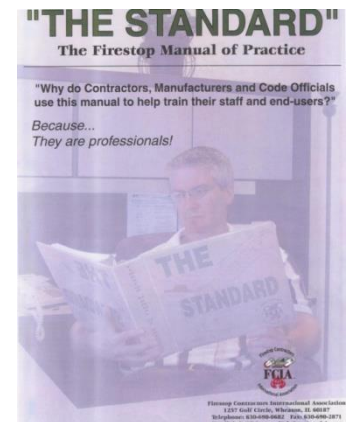
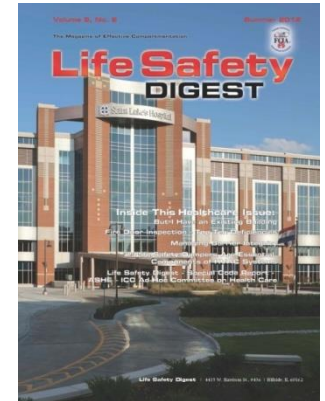
“DIIM”

- Firestopping for Safety – DIIM
 - Properly *Designed* and Specified Firestopping
FCIA - 07-84-00 - Specification
 - *Tested and Listed Systems* - ASTM E 814 / UL 1479 - UL 2079, FM 4990, ULC-S-115, ASTM E2837, E2307
 - Professional *Installation* – FCIA Member, FM 4991 Approved, UL/ULC Qualified Contractors
 - Properly *Inspected* - ASTM E 2174 / 2393
Protocol by IAS AC 291 Accreditation Criteria
for Inspection Agencies
 - *Maintained & Managed* (Annually - FCIA
Members – NFPA 101, International Fire Code



Firestop Contractors International Association

- FCIA – Worldwide Association
- Firestop Contractors, Manufacturers, Consultants, Reps, Distributors,
- Life Safety Digest
- FCIA Website Resources - FREE
- FCIA MOP on PDF FREE to Specifiers, Architects, Governmental Bldg./Fire Officials, worldwide..
– www.fcia.org



“TOTAL FIRE PROTECTION”

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



“DIIM”

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UL 1479 - UL 2079, ULC-S-115, ASTM E2307
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FM 4991 Approved, UL Qualified Contractors
 - Properly *Inspected* - ASTM E 2174 / 2393
Protocol by IAS AC 291 Accreditation Criteria
for Inspection Agencies; FM, UL Firestop Exam
 - *Maintained & Managed* - Annually - NFPA 101,
International Fire Code, UAE Fire & Life Safety,
National Fire Code of Canada

Building & Fire Code Requirements

- NFPA 5000 – 101- Chapter 8
- National Building Code – Canada
- UAE Fire and Life Safety Code – Chapter
- International Codes –
 - New and Existing Buildings International Building Code – Chapter 7
 - International Fire Code – Chapter 7
- *Minimum requirements - Construction*



Building & Fire Code Requirements

- 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, Ch 8. **ICC adds... “*Systems*”**

Building & Fire Code Requirements

- Compartmentation Codes – US –
 - *Continuity*
 - *Openings & Penetrations*
 - *Robustness*

Building & Fire Code Requirements

- Compartmentation Codes – US –
 - *Ch. 8 – NFPA – ASTM E 119, UL 263, NFPA 220*
 - **Ch. 7 – IBC - Fire Barrier** – Hourly Rated – IBC
 - **Ch. 7 IBC - Fire Wall** – Fire rating, structural independence
 - **Ch. 8 NFPA – NFPA 221 – High Challenge Fire Walls**
 - IBC – **Fire Partition** – Rated, not continuous.

Building & Fire Code Requirements

- Fire Barriers
 - Fire Area Separations
 - Mixed Use Occupancies
 - Incidental Uses
 - Hazardous Area Separations
 - Exit Enclosures
 - Shaft enclosures
 - Horizontal Exits
 - Corridor Walls - NFPA

Building & Fire Code Requirements

- Smoke Barriers
 - Healthcare
 - Other Occupancies
- NFPA 101 - no quantified L Rating for Firestops
- IBC – Quantified L Rating for Firestops

Building & Fire Code Requirements

- Compartmentation Codes – US
 - **Smoke Barrier – Firestopping for Continuity**
 - IBC – Hourly Rated, “L” Rating
 - <5cfm/sf (IBC 2006)
 - < 50 cfm, 100sf of Wall Area (IBC 2009)
 - **NFPA – ... ‘restricting the passage of smoke’ ...**
no quantified “L” Rating ... YET
 - Continuous, Barrier to Barrier, ... through concealed spaces,
 - Not always fire resistance rated.
 - **Smoke Partition**
 - IBC – Continuous barrier, not rated...’retard’.
 - NFPA – Continuous membrane that is designed to form a barrier to *limit the transfer of smoke*....

Building & Fire Code Requirements

- Compartmentation Codes – US –
 - *Exterior Walls*
 - *Fire Walls*
 - *Fire Barriers*
 - *Fire Partitions (Not NFPA)*
 - *Smoke Barriers*
 - *Smoke Partitions*

Building & Fire Code Requirements

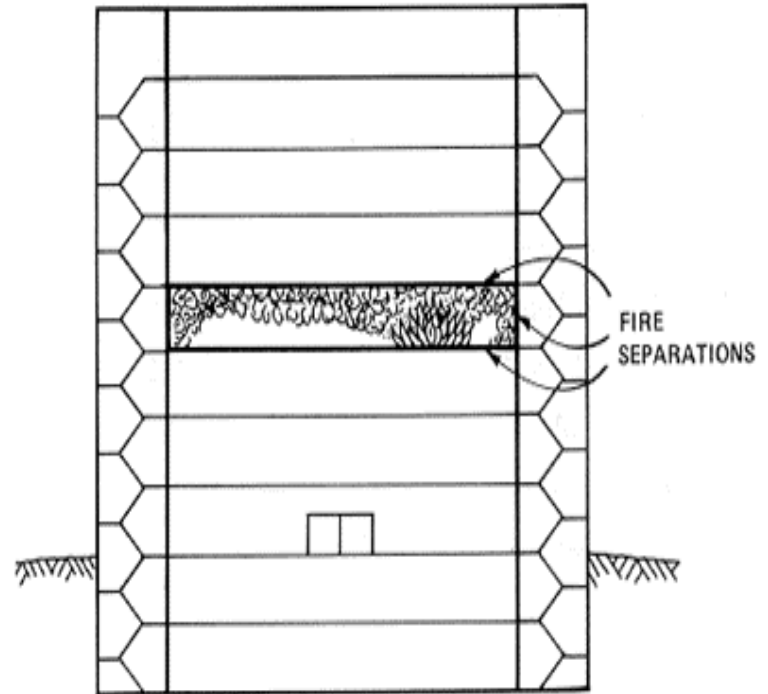
- *Continuous Fire Resistance*
 - **Walls / Horizontal Assemblies – Continuity**
 - Firestop Products Become Firestop Systems
 - Penetrations
 - Joints – Head /Bottom of Wall – Perimeter Joints
 - Fire & Smoke Damper Duct Systems
 - Fire Doors and Hardware Systems
 - Rolling & Swinging
 - Fire Rated Glazing

Building & Fire Code Requirements

- *Chemical, Biological, Radiation, Explosion, etc.*
 - **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**
 - **G – Germ – Check with manufacturer & industrial hygienist**
 - **How to Regulate for Unexpected Events?**
 - **Due Diligence - Review Required by code?**

Fire Resistance Continuity All Occupancies

- Effective Compartmentation
 - Education
 - Office
 - Mercantile
 - Multi Family Residential
 - Industrial – Insurance influences
 - Institutional – Healthcare



Buildings are Safe Because....

- ***Total Fire Protection Stats -
North America High Rise***
- ***11,025 Tall Buildings - 20 + stories***
- ***70% in NY, SF, LA, CHI, HI, Toronto...***
 - ***2/3 Canada's high rise built before 1985***
- = ***Compartmentation Primary in Older Structures***
 - ***Chicago, NY, Toronto – Older stock of buildings***
 - ***SF, LA, HON – Earthquakes***

» *Source, Emporis.com*



Buildings are Safe Because....

- *Total Fire Protection*
= *Safer buildings...*
- *Compartmentation*
- *Sprinklers, Alarms,*
- *Egress Strategies*
- *NIST Reports...*



Continuity – Barriers, Walls & Horizontal Assemblies

- Fire Walls and Floors –

- *Continuous Fire Resistance Rated Assemblies*

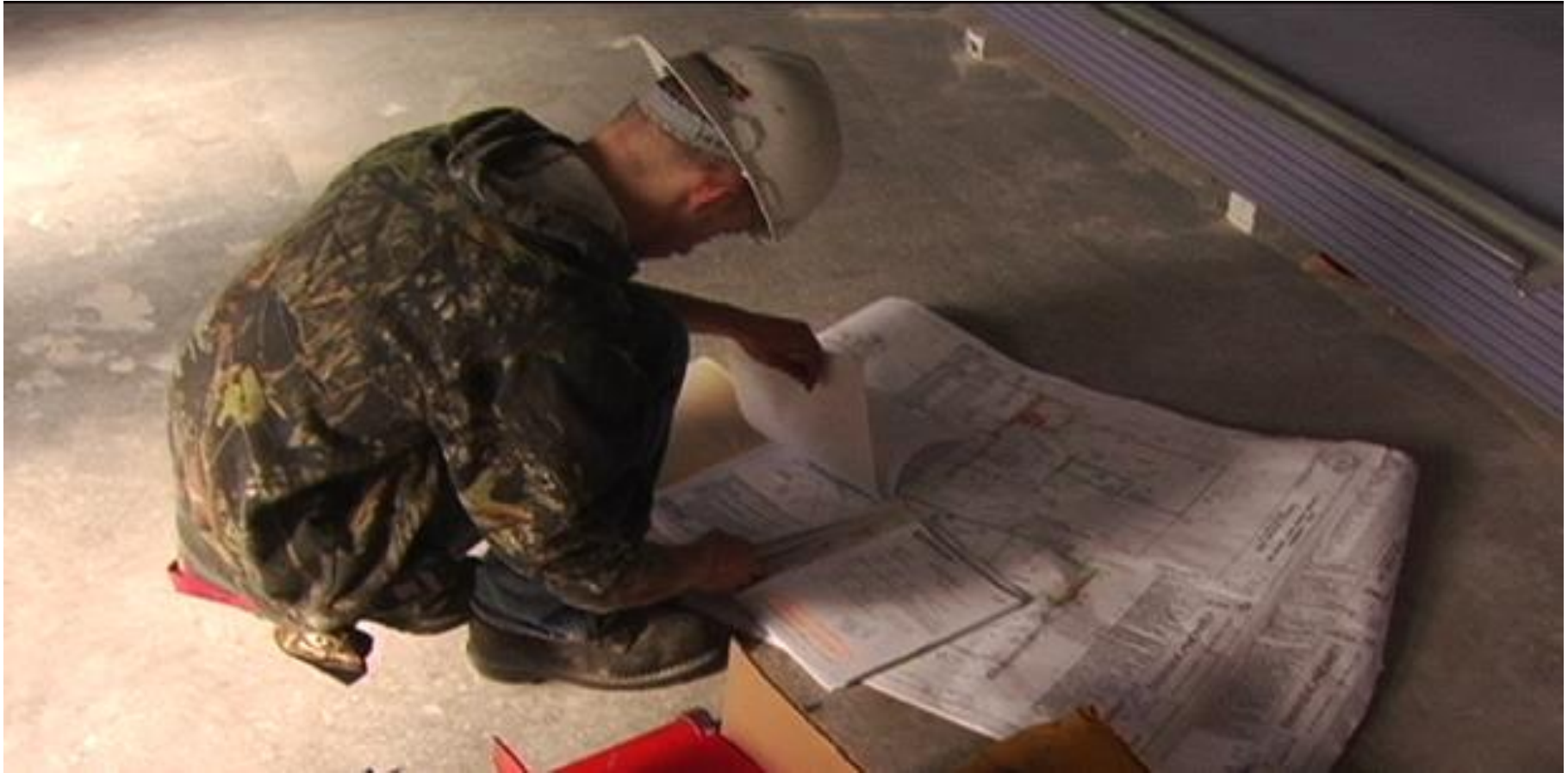
- Concrete
 - Concrete Block
 - Plaster
 - Gypsum Block
 - Gypsum Board / ‘Drywall’
 - Floor/Ceiling Assemblies
 - Firestop Systems

“Tested & Listed Wall/Floor Systems”



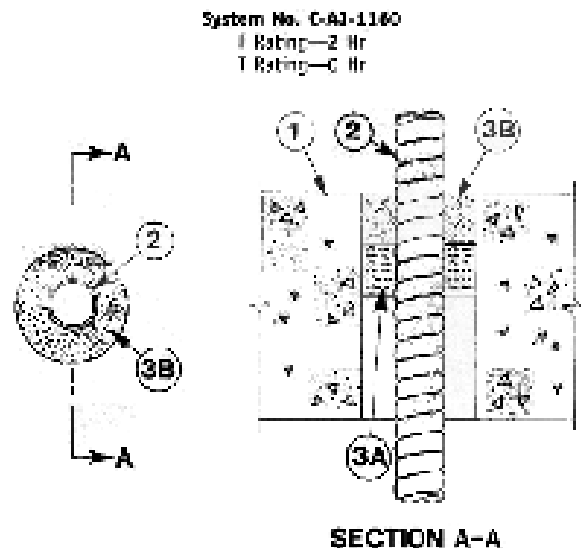
Firestopping for Continuity

I – Listed Systems



Firestopping for Continuity

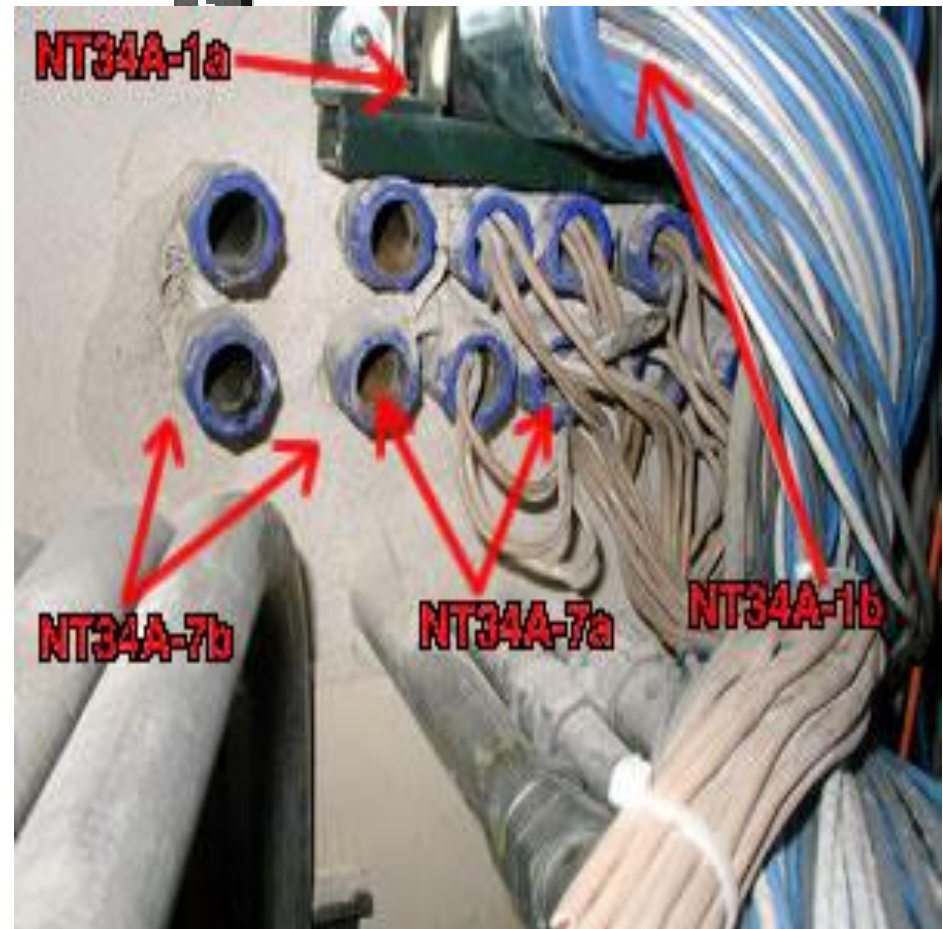
I – Classified Systems



- 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. 2 in. air through opening in floor or wall assembly to be 1/8 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 (AAC) category in the Fire Resistance Directory for names of manufacturers.
- Through Penetrating Product**—Max. 4 in. diam. (or smaller) pipe, or max. 3/8 in. diam. (or smaller) aluminum Flexible Metal Conduit. Also 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.
- Packing Material**—Nom. 1 in. thickness of organic (plumtree silica) fiber Matkaf or mineral wool batt insulation firmly pushed into opening as a permanent form. Packing material to be recessed min. 1 in. from top surface of floor or from both surfaces of wall.
- FIL, Void or Cavity Material**—Caulk—Applied to fill the annular space around the flexible metal conduit. In floors, a min. 1/2 in. depth of fill material to be installed flush with top surface of floor. In walls, a min. 1/2 in. depth of fill material to be installed flush with wall surface on both sides of wall assembly.

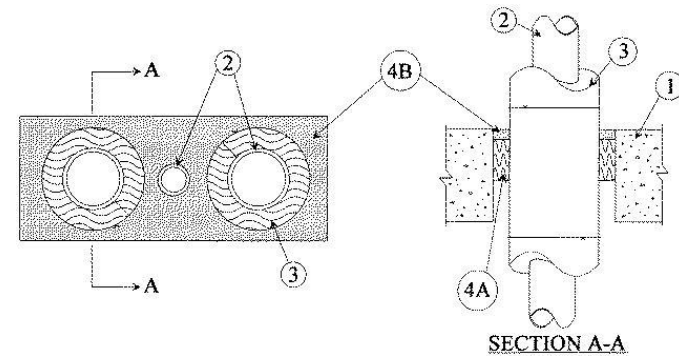
Minnesota Mining & Mfg. Co.—TF 257016

*Bearing the UL Classification Marking
 (Bearing the UL Listing Mark)



Firestopping for Continuity

- **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 / **FM 4990**, ULC-S-115, UL 2079, **E-2307 E-2837**, as the test method...”
 - **Testing = Suitability statement for use of a firestop product in a specific system application**



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**



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" H
- SYSTEM...AHJ

- Greenheck Graphic

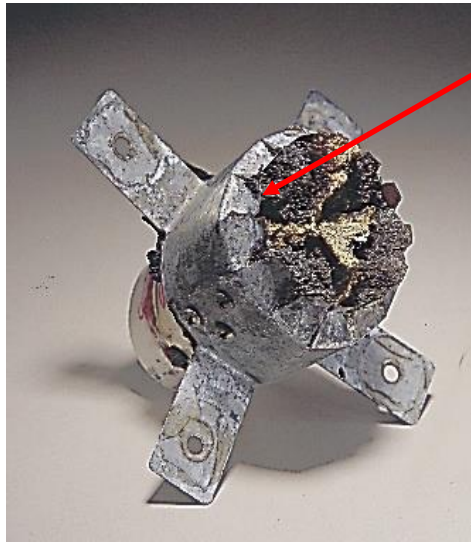


Firestop Materials, Systems & Physical Properties

- **Serve Building Needs**
 - Smoke
 - Germs
 - Chemical Resistance – Cleaning?
 - Chemical, Biological, Radiation?
- **Product Types**
 - Intumescent, Latex, Silicone
 - Ablative
 - Endothermic

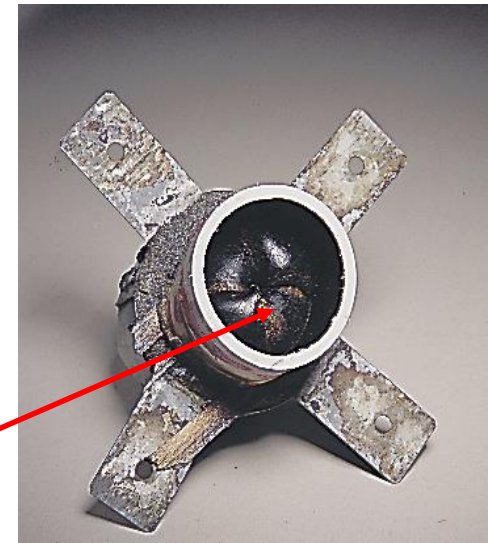


Intumescent



Charred Pipe

Knot formed from
Collapsing pipe



Cold-Side View

Hot-Side View

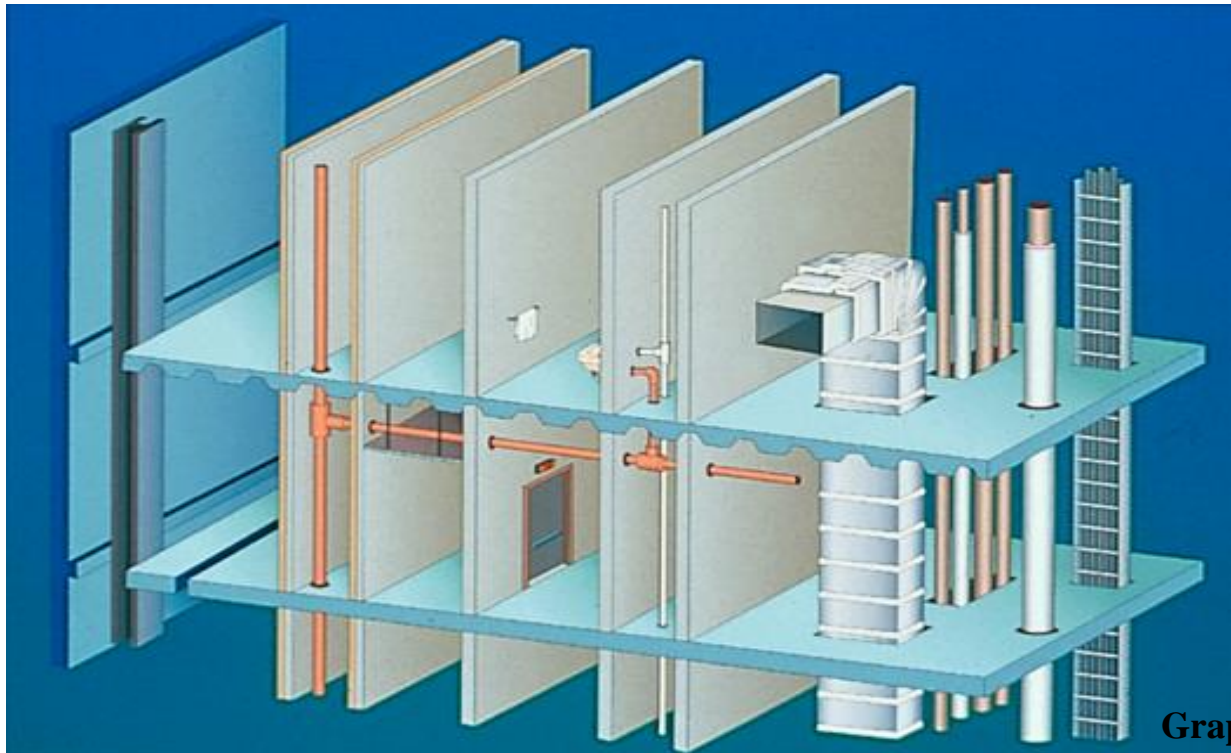
- Intumescent sealant expands and fills the void that opens as the combustibles burn away
- Collar expands to crush the pipe

D- Design

SYSTEMS SELECTION

SYSTEMS ANALYSIS

Who's Responsible, How to Choose???



Graphics – STI

Firestopping for Continuity

Products become **SYSTEMS**

- After Installation...
- **‘Field Erected Construction...Tested to...’**
 - Standards - ASTM E814/UL 1479–UL 2079, ASTM E 1966, ASTM E 2307, ULC S-115, FM 4990
 - **F Rating - Flame**
 - T Rating – Temperature
 - H Rating – Hose
 - **L Rating – Smoke**
 - **W Rating – Water**



Graphics – 3M



Products become Systems

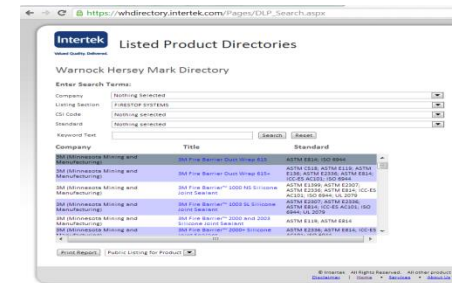
Hose Stream = Shock Test



Firestopping for Continuity Products become Systems

- **Firestop Systems Directories –**
 - UL
 - Intertek
 - FM Approvals

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



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

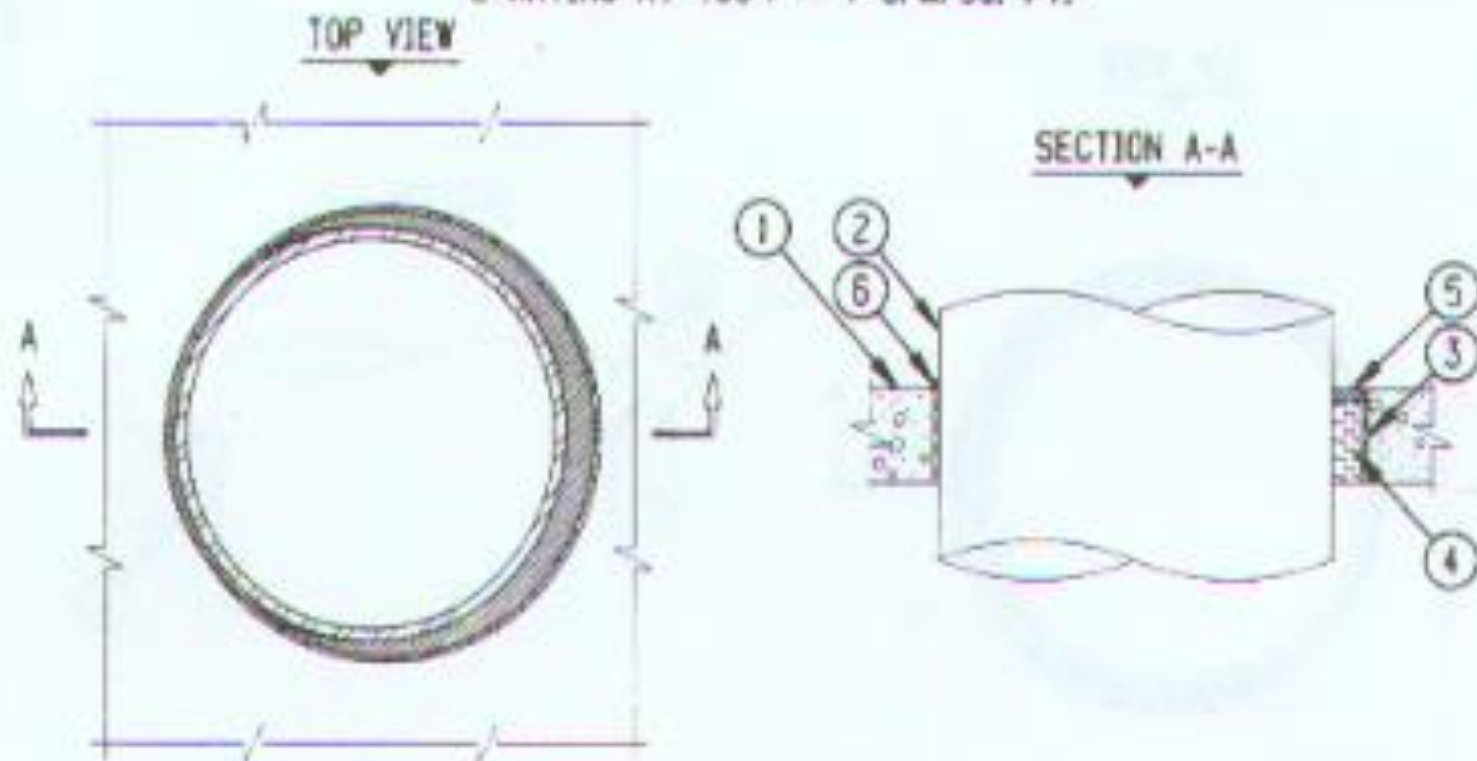
F RATING = 3-HR.

T RATING = 0-HR.

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

L RATING AT 400°F = 4 CFM/SQ. FT.

CAJ-558 (01/74)



I. 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).

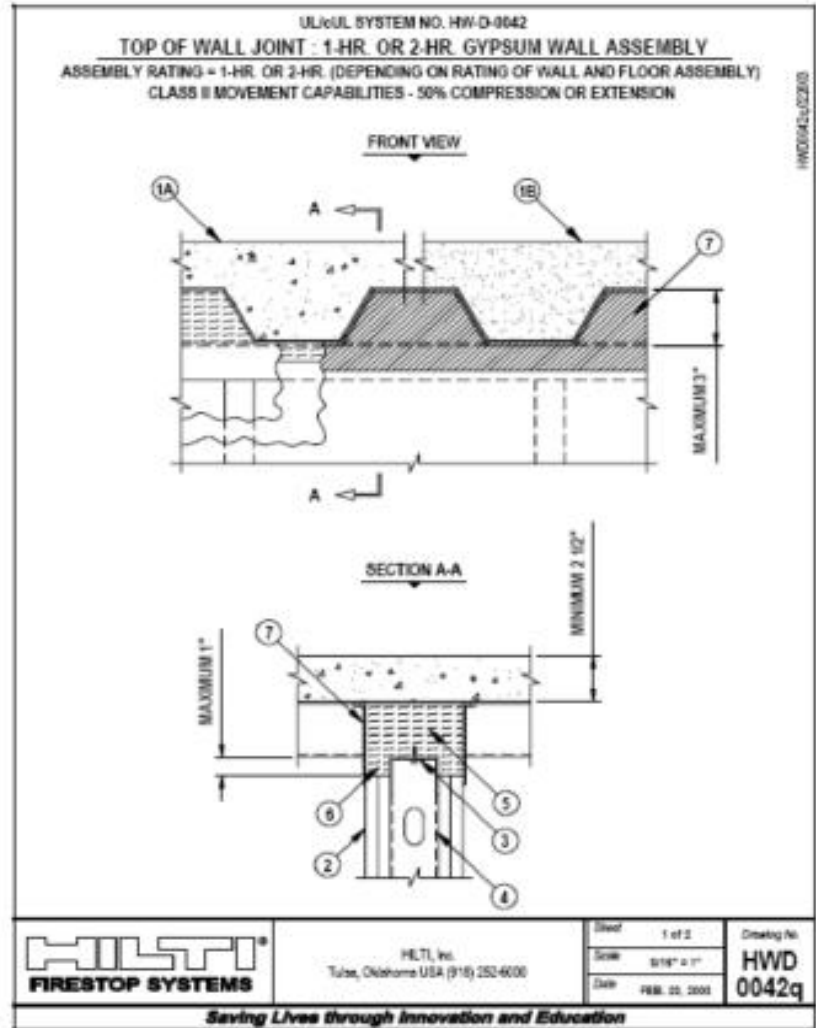


Fire Stop Technologies, Inc.



Fire Stop Technologies, Inc.

Gypsum Wall assembly running up to concrete over metal deck

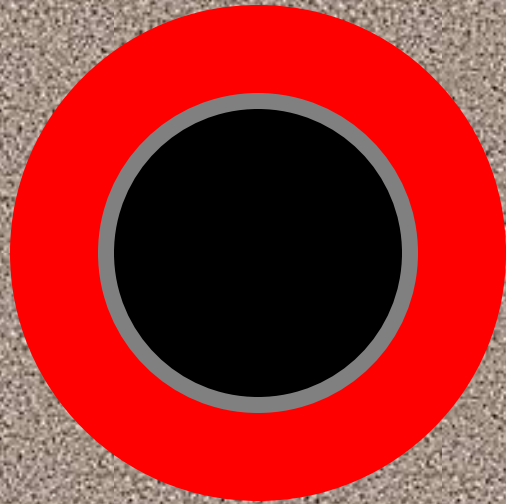


How do Contractors Select Systems & Inspection Agencies Analyze?

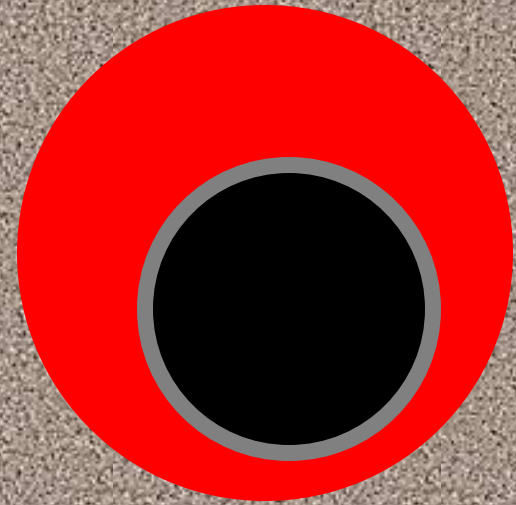
- Wall or Floor Construction Type, Rating
- Wall or Floor Thickness
- Penetrating Item, Coverings
- Size, Type, Thickness
- Annular Space Sizes
- Joint / Gap Sizes
- Backing Materials
- Fill Material(s)

= Rated Firestop System

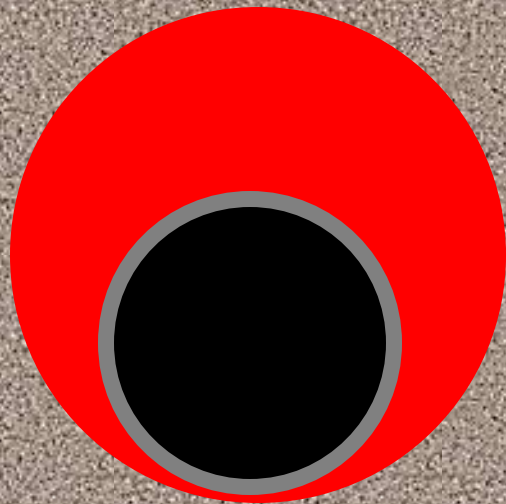




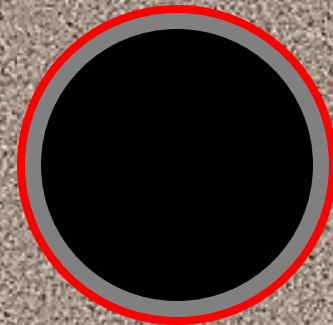
1. Centered



2. Off-Centered



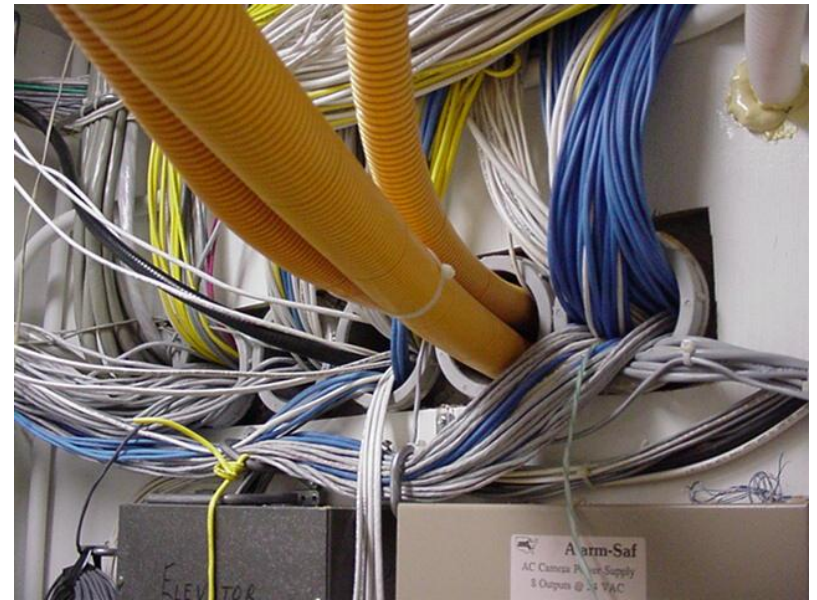
3. Point Contact



4. Continuous Point Contact

Engineering Judgments/EFRRRA

- Field or other Variances to Tested and Listed Systems?
 - Impractical
 - Annular Space / Gap too large / small
 - No System Exists
- Why???
 - Lack of Planning
 - Unique Conditions



Engineering Judgments/EFRRRA

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

**IFC Guidelines for Evaluating Engineering Judgment
Guidelines**

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

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

IFC EJ Guidelines - Engineering Judgments for firestop systems should:

- 1. Not be used in lieu of tested systems when available;**
- 2. Be issued only by a firestop manufacturer's qualified technical personnel or in concert with the manufacturer by a knowledgeable registered Professional Engineer, Fire Protection Engineer, or an independent testing agency that provides listing services for firestop systems;**
- 3. Be based upon interpolation of previously tested firestop systems that are either sufficiently similar in nature or clearly bracket the conditions upon which the judgment is to be given. Additional knowledge and technical interpretations based upon accepted engineering principles, fire science and fire testing guidelines (e.g. ASTM E 2032 – Standard Guide for Extension of Data from Fire Endurance Tests, ULC Subject C263E – Criteria for Use in Extension of Data from Fire Endurance Tests, or ASTM E2750 – Standard Guide for Extensions of Data for Penetration Seals) may also be used as further support data;**

IFC EJ Guidelines

Engineering Judgments for firestop systems should:

- 4. Be based upon full knowledge of the elements of the construction to be protected, the understanding of the probable behavior of that construction and the recommended firestop system protecting it were they to be subjected to the appropriate Firestop Standard Fire Test method for the rating indicated on the Engineering Judgment;**
- 5. Be limited only to specific conditions and configurations upon which the engineering judgment was rendered and should be based upon reasonable performance expectations for the recommended firestop system under those conditions;**
- 6. Be accepted only for a single, specific job and project location and should not be transferred to any other job or project location without thorough and appropriate review of all aspects of the next job or location's circumstances.**

IFC EJ Guidelines - Basic Presentation Requirements

Proper EJ's should:

- 1. Be presented in appropriately descriptive written form with or without detail drawings where appropriate;**
- 2. Clearly indicate that the recommended firestop system is an EJ;**
- 3. Include clear directions for the installation of the recommended firestop system;**
- 4. Include dates of issue and authorization signature as well as the issuer's name, address and telephone number;**
- 5. Reference tested system(s) upon which design (EJ) is based on;**
- 6. Identify the job name, project location and firm EJ is issued to along with the non-standard conditions and rating supported by the EJ;**

IFC EJ Presentation Guidelines – What’s Seen?

7. Have proper justification (i.e. UL, Intertek or other independent laboratory system(s) and or opinions);

8. Provide complete descriptions of critical elements for the firestop configuration. These should include, but not be limited to the following:

a. Basic, Common

- **Type(s) of assembly used or being penetrated;**
- **Rating supported by the EJ.**

b. Through Penetrations

- **Penetrating item(s) (type, size, etc.);**
- **Annular space requirements, (minimum, maximum, actual, nominal, etc.)**
- **Opening size;**
- **Firestop product(s) to be used, type and amount (thickness if applicable);**
- **Accessory items(s) (i.e. anchors, backing material, etc.)**

c. Joints

- **Joint Width (installed width, nominal)**
- **Movement Capability;**
- **Movement Class (thermal wind sway, seismic);**
- **Accessory item(s) (i.e. insulation type, thickness and compression, etc.)**

IFC EJ Presentation Guidelines – What’s Seen?

d•Duct Enclosure Systems – SEE www.Firestop.org

e• Firestop System – annular space dimensions, floor/wall construction, design number, components, installed thickness.

f. Perimeter Fire Barrier Systems –

- Type(s) of assembly used or being penetrated;**
- Hourly Rating required**
- Closest Listed System upon which the EJ is based**
- Joint Width**
- Static or Dynamic**
- Safing Insulation Types), thickness and compression, etc.**
- Five Basic Principles**
 - 1. Mechanical Attachment of the Spandrel Insulation**
 - 2. Protection of the Mullions**
 - 3. Compression Fitting and Orientation of the Safing Insulation**
 - 4. Installation of a Reinforcement Member(s), stiffener, at the safe-off area behind the spandrel insulation.**
 - 5. Firestop Coating, type, thickness,**

IFC EJ Presentation Guidelines – What's Seen?

f• Continuity Head-of-Wall Joints

- Joint Width, (installed width, nominal)*
- Movement Capability*
- Movement Class – (thermal, wind sway, seismic)*
- Accessory Item(s) (i.e. insulation type, thickness, compression, etc.)*

IFC recommends that these guidelines be considered when evaluating whether any firestop system engineering judgment meets minimal requirements. Questions concerning the EJ request should be addressed to the initiator of the judgment.

INSTALL FIRESTOP SYSTEM

Firestop Sealant, MW installation to Tested and Listed System Limits = Firestop System



Pack

1



Apply Sealant

2



Tool/Smooth

3

Walls - BOTH SIDES

Properly Tooled/Smoothed Firestop Sealants

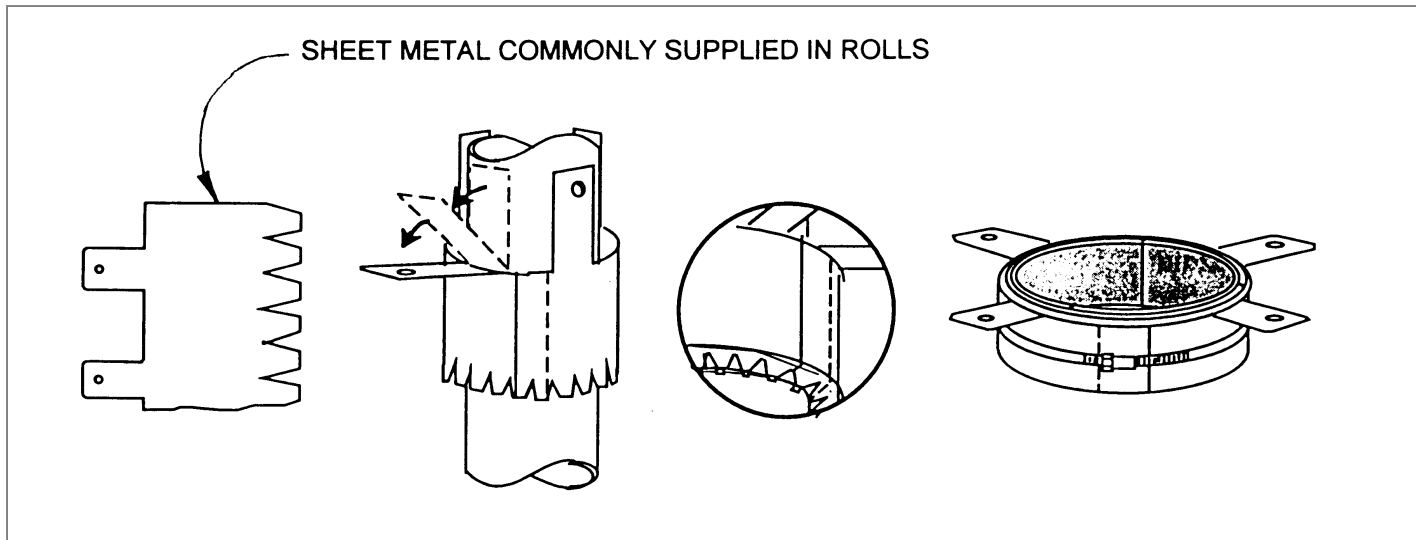


Sleeved Pipes

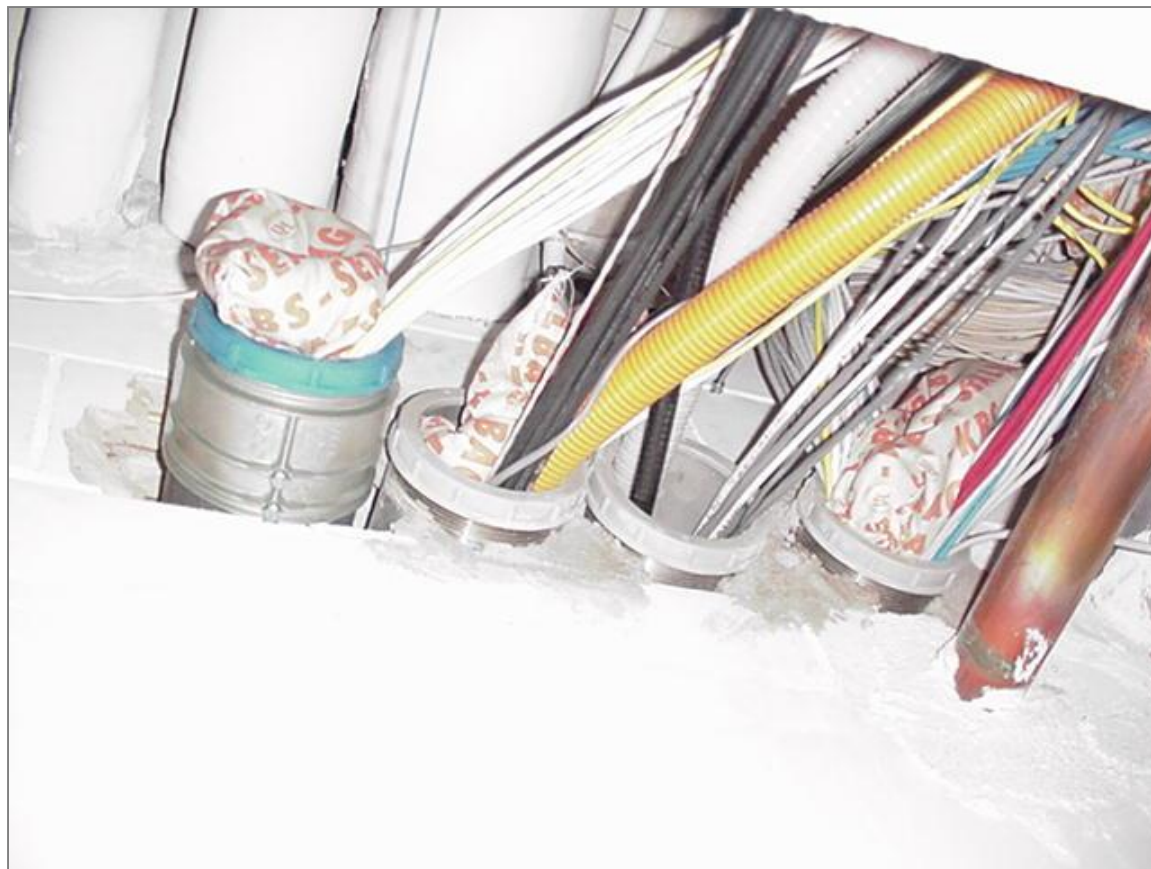


Intumescent Wrap Strips and Steel Collars

- **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



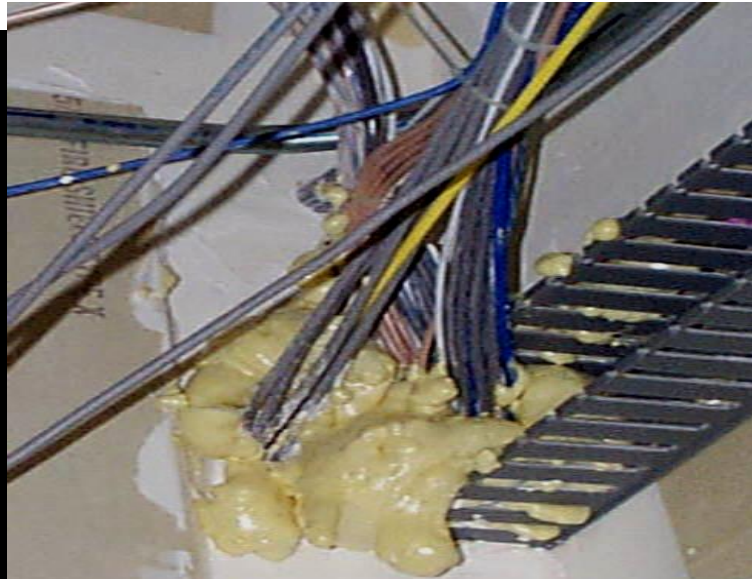
Joint Compound



Incomplete is ineffective



Great Stuff



Graphics – Firestop Solutions

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" H
- SYSTEM...AHJ

- Greenheck Graphic



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



Firestop Joint Systems Definition

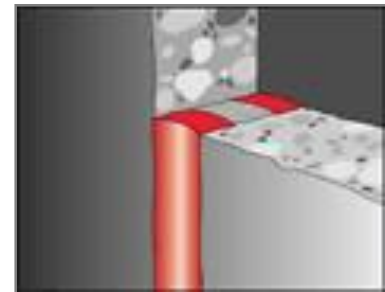
- UL 2079, ASTM E 1966, ULC-S-115
 - “A joint system is a **specific construction** consisting of adjacent **wall and floor assemblies**, *and* the materials designed to prevent the spread of fire through a linear opening between the wall and / or floor assemblies”
 - Definition
 - Joint?
 - Breach?
 - Opening?



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

HILTI Graphic

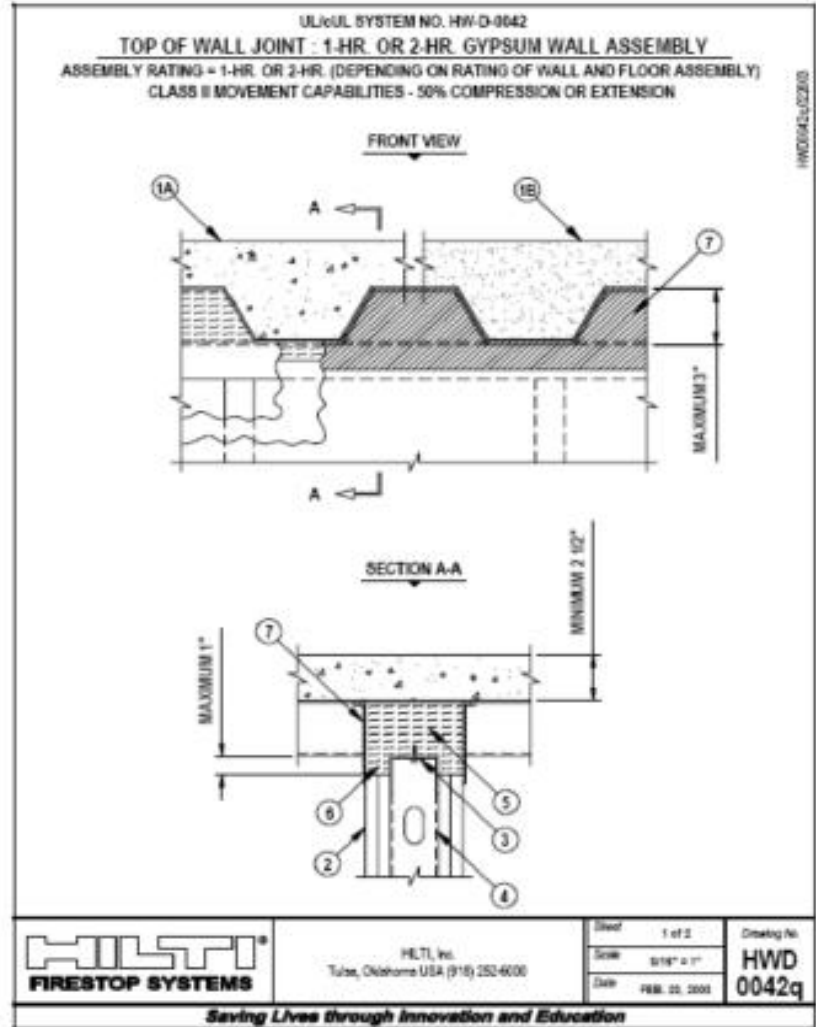




Fire Stop Technologies, Inc.



Gypsum Wall assembly running up to concrete over metal deck



Firestop Applications

Floor to Wall



Top of Wall



Fire Stop
Technologies,
Inc.

Graphics – Firestop Solutions

Joints and Seams

Head of Wall



Joints and Seams

I-Beam to Fluted Deck



Penetrations in Head of Wall



Unacceptable



Results of Improperly Installed Mineral Wool



Firestop Perimeter Fire Containment Systems

- 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.”



Tamweel Towers, Dubai

Perimeter Fire Protection

Gulf News: A discarded cigarette ???



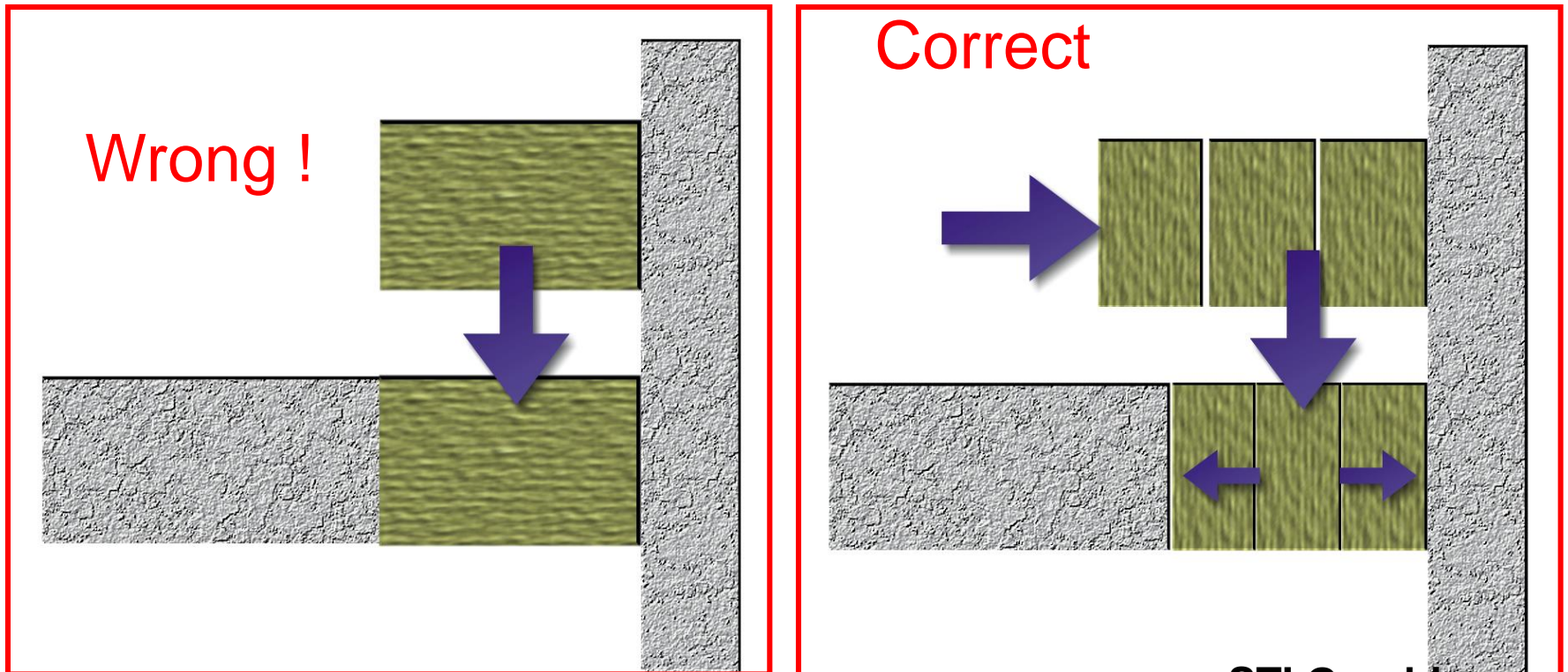
Firestop Perimeter Fire Containment Systems



Graphic – Intertek

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

Firestop Installed at Perimeter of Floors at Curtainwall



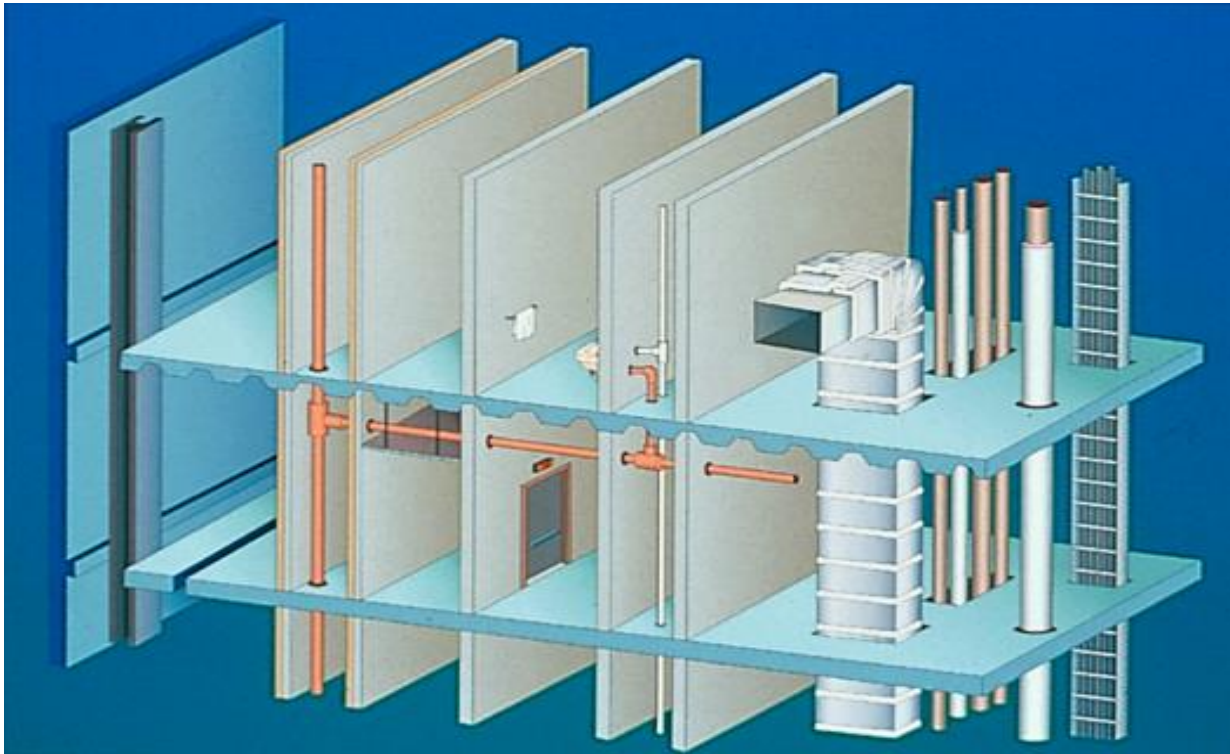
Firestop Products Become Systems when Installed to SYSTEM



Graphics – OPL, 3M

I- Installation

Who's Responsible, How to Choose???



Graphics – STI

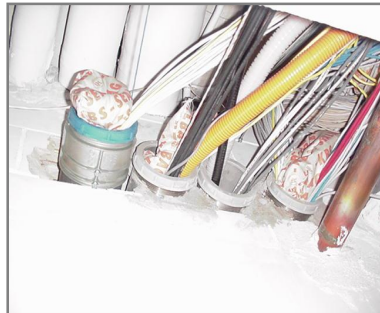
Installation – Who?

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

Conclusion –

Without Single Firestopping Trade....

fire & life safety risks



Adler Photo

3 Firestop Installation Methods

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

Why Contractor Qualifications?

- **Firestopping** Ratings - F, T, H, L W
- **Zero Tolerances?**
 - Annular Space Sizes, Gap Sizes
- **Product Properties**
 - Movement
 - Compatibility
 - Storage, Application, Curing Temps
- **SYSTEMS DOCUMENTATION**

Firestop Contractor Qualifications

1. Bought at Hardware Store, etc.

- Contractor or Individual?

2. Manufacturer Trained Individuals

- 1 hour program
- 1/2 day program
- 2 day education

3. ULC Qualified, FM 4991 Approved Companies

- 3rd Party Verified *Company* Management System
- *Individuals* Pass 3rd Party Exam
- *Individual* Knowledge – FCIA MOP
- All Manufacturers Products Covered
- *Company gets Approved or Qualified, not Individual*

Firestop Contractor Qualifications?

- **Manufacturer Educated**
 - **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

Firestop Contractor Qualifications

- **Association Member**
- Insurance – Classification?
 - Specialty Firestop Contractor?
 - Plumber, other trade??
- Workforce – Educated as Firestop/Containment Workers
- Bonding Capability
- Project References & Experience
- **Management System reviewed by....**
 - **FM 4991, UL or ULC ?**

Firestop Contractor Qualifications

FM & UL/ULC – 4 Components

1. Office Facility Quality Management System Audit
2. Field – Jobsite Audit
3. Employ a person
 - UL/FM Firestop Exam @ 80% or better
 - DRI if employed by Approved/Qualified Firm,
 - *Designated Responsible Individual (DRI)*
4. Annual Audit

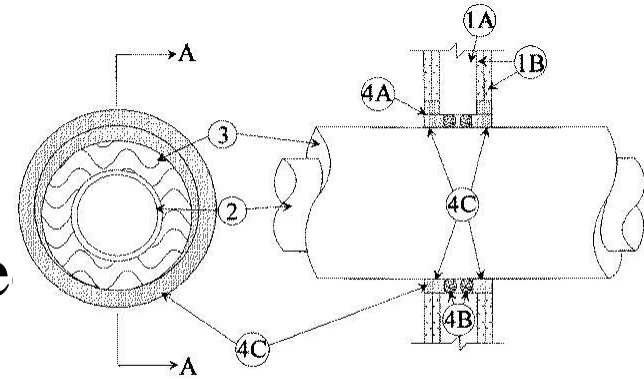


1. Office Audit of Company Management System Manual

- Controlled Management Processes
- Project Successful Proven Contractor
- Education, Training, Accountability

1. FM, UL/ULC Company Audit of Management System (MS)

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



CONFIGURATION A

2. *Company MS Jobsite Audit* by **ULC, FM or UL**

- Verification of firestop systems Processes
- Verify Management System Works
- Verify Company “communication”
 - Office to field, field to office
- “Culture of Quality...”

»

Adler Photo



3. **DRI** – Company Appoints DRI if

- **Pass Rigorous Firestop Examination**
 - FCIA Firestop Manual of Practice
 - Firestop Systems Selection & Protocol
 - Management System Knowledge
- Keep CEU's – 6 FM, 10 UL, ea. 3 yrs.
- Retested every 3 years (FM Only)
- One DRI per Approved Contractor Location



4. Annual Audit

FM 4991 UL / ULC

Contractor Company Personnel

- Continued satisfactory performance
 - Quality Manual Implementation
- Documented - Archived record keeping
- Employee Training Documentation
- Jobsite Visit
- DRI CEU Verification
- **Find @ www.fcia.org**

UL-ULC/FM 4991 Contractor Company Benefits

Quantified Differentiation ...

- **Focus on the Company & Individual**
- Investment in Company Procedures
- Investment in People Education
- Investment in FCIA Manual of Practice
 - Project Successful Proven Contractor
 - Education, Training, Accountability
 - = Reduced Risk – Life, Property, Business



Specified Technologies Inc.
THE FIRESTOP AUTHORITY

3530 33rd Way NW
 Olympia, WA 98502-3223
 p | 360.864.2722
 f | 360.864.8184
 m | 360.791.2915
 email info@stitec.com
 website www.stitec.com

Wednesday, February 10, 2010

Mr. Randy Perry
 Adler Firestopping Ltd.
 #23, 53016 Hwy 60
 Acheson, AB T5T 1M9
 Canada

Re: Qualified Firestop Applicator

As the firestop manufacturer with more UL and ULC Classified Firestop System Coverage than any other, we are intimately familiar with UL and ULC's QFC Program. We recognize the program as one of two best-in-class, third-party, quality assurance methods available to building project decision-makers to help ensure applicator quality. As such, we fully endorse the program and those applicators that have invested heavily to earn their way to become a member in this elite group of professionals.

It is our understanding that Adler Firestopping Ltd. is a ULC (Underwriters Laboratories of Canada) Qualified Firestop Contractor (QFC) in good standing. This can be verified at the bottom of the page at the following link:

<http://www.ul.com/global/eng/pages/offering/industries/buildingmaterials/qualifiedcontractorprogram/qualified/firestop/>

Moreover, Randy Perry has successfully attended our intensive, two-day FIT Level II program, taken the exam, earned a passing score and is within the two-year expiry period before renewal will be required. A copy of his certificate can be made available upon request.

Regards,

John Hurley
 Regional Manager, Western US and Canada



Certificate Number: 1016

QUALIFIED FIRESTOP CONTRACTOR CERTIFICATE

Company Name: Adler Firestopping Ltd. File number: NC10757 Issued: 2/1/2010
 Address: Edmonton Office, #23, 53016 Hwy 60, Acheson, AB, T7X 5A7, CANADA Expires: 2/1/2011
 Telephone #: (780)-962-9495 Fax #: (780)-962-9794 Email Address: randy@adlerfirestopping.com

This company has demonstrated that it complies with UL's Qualified Firestop Contractor Program Requirements for Canada. Under this programme, the Contractor has demonstrated knowledge of selection and installation of firestop systems as evidenced by the successful performance in a written examination by a "Designated Responsible Individual" (DRI). The Contractor has also established a Management System specifically focused on the proper selection and installation of ULC Listed Firestop Systems.

This certificate is not transferable and expires one (1) year after the issue date. This certificate may be displayed, copied and shared with others but must be used in its entirety. Only those companies listed in ULC's Online Certifications Directory for the Qualified Firestop Contractor Program at www.ul.ca/contractor are considered eligible for this program and to use this Certificate and the ULC marking (shown here) in its advertising and promotional material in accordance with the marking guidelines provided with this Certificate.



Underwriters Laboratories of Canada® reserves the right to void this certificate at any point. This certificate does not indicate compliance with any ULC Product Certification Program. For additional information regarding the Qualified Firestop Contractor Program, please visit www.ul.ca/contractor.

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FIRESTOP CONTRACTORS INTERNATIONAL ASSOCIATION
Membership Certificate

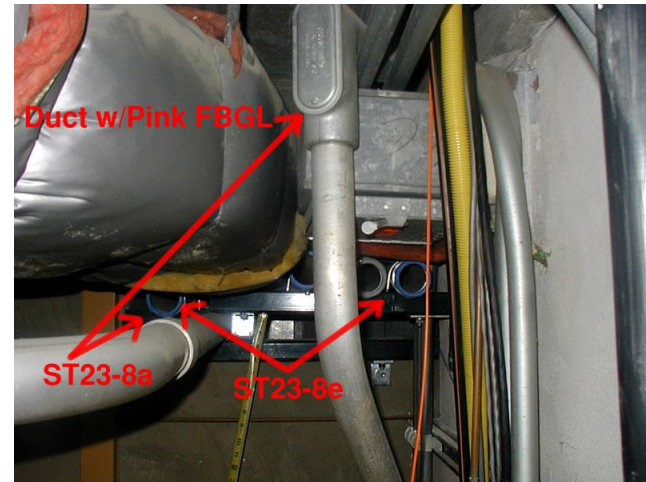
This certifies that
Adler Firestopping, Ltd.
 Edmonton, Alberta

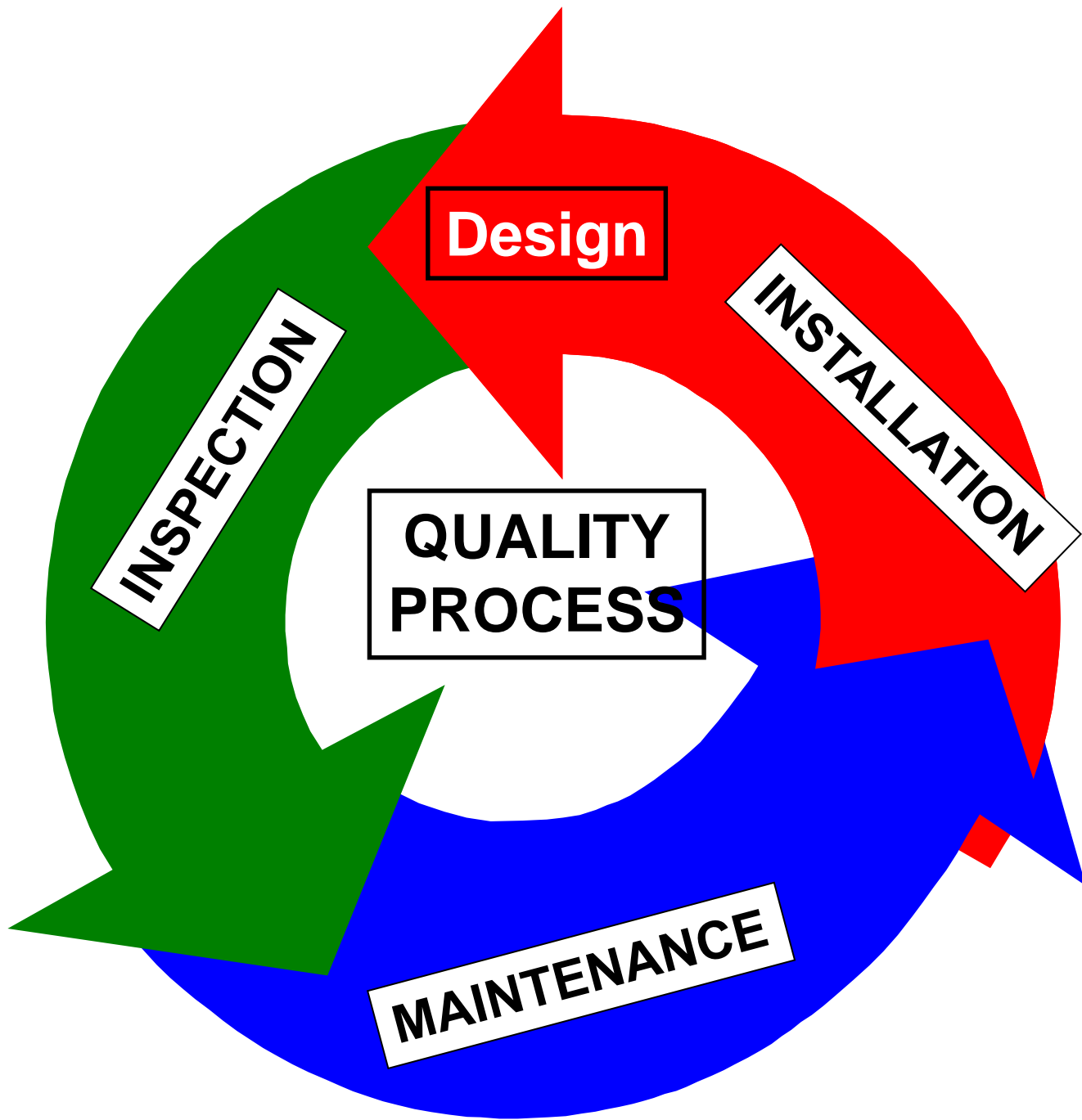
is a Firestop Contractor Voting Member of the
 Firestop Contractors International Association
 and pledges to further the mission of FCIA.

Robert N. LeClair, Jr., *President, FCIA*

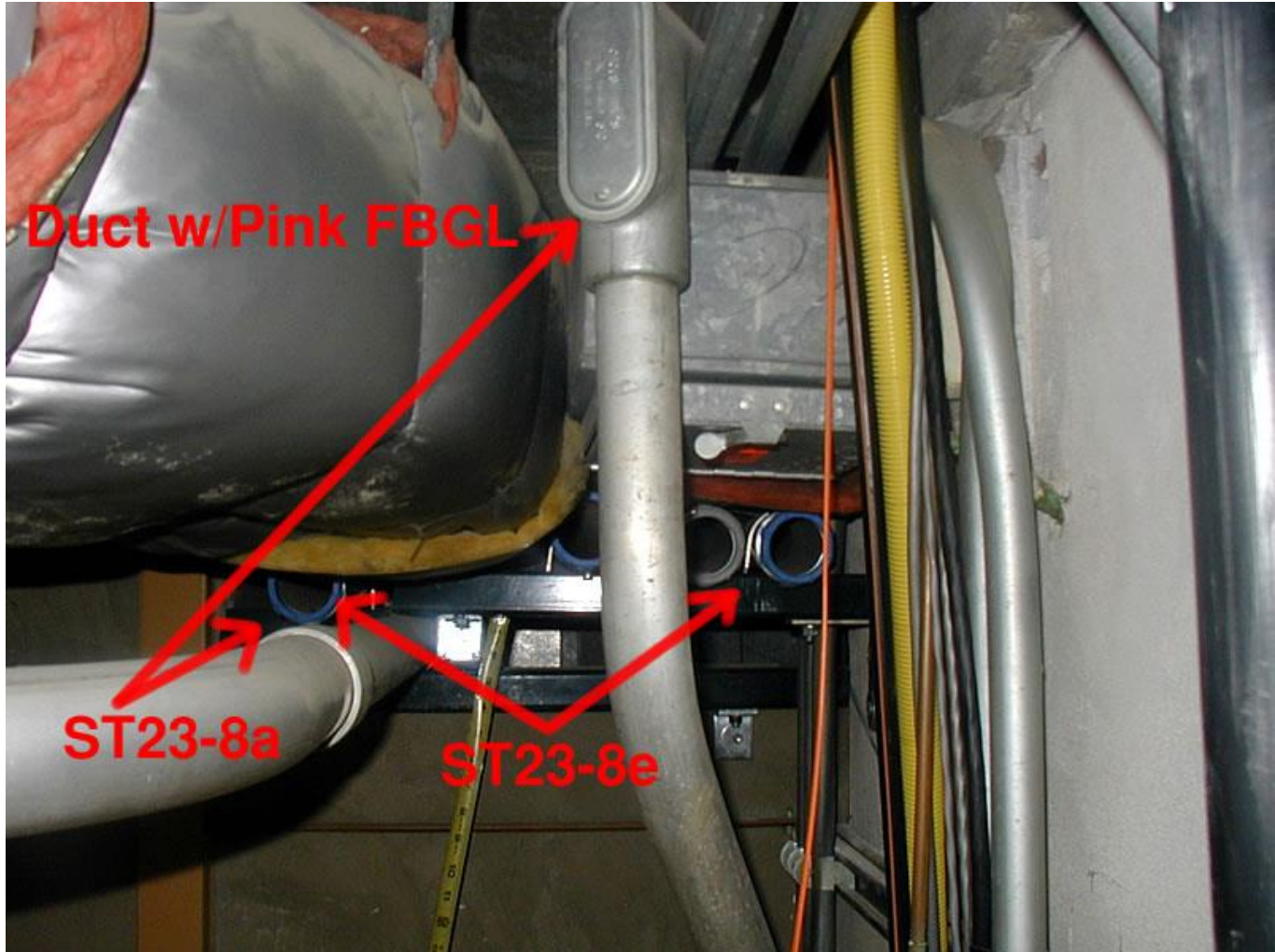
Don Murphy, *Vice President*
 Don Sabrsula, *Secretary*
 Scott Rankin, *Treasurer*
 Randall Bosscawen, *Director*
 Mike Dominguez, *Director*
 Aedan Gleeson, *Director*
 Bob Hastings, *Director*

I – Inspection Systems Analysis





Firestop Installation & Inspection



Firestop Installation & Inspection

- ASTM E 2174/ ASTM E 2393 –



I – Inspection – Options

- **Contractor Self Inspection**
 - Verify Management System validity
 - Not 2%, 10%
 - Required for FM & UL, ULC Contractors
- **Manufacturer Inspection**
 - Does not exist ... Survey, maybe
- **ASTM E 2174 & ASTM E 2393 –**
 - Independent 3rd Party
 - Destructive, Non Destructive
 - Specified Frequency

I – Inspection – Code Requirements

[A] 110.3 Required inspections. The *building official*, upon notification, shall make the inspections set forth in Sections 110.3.1 through 110.3.10.

[A] 110.3.6 Fire- and smoke-resistant penetrations. Protection of joints and penetrations in fire-resistance rated assemblies, *smoke barriers* and smoke partitions shall not be concealed from view until inspected and *approved*.

I – Inspection – Code Requirements

Definitions

[A] **APPROVED AGENCY**. An **established and recognized agency** regularly engaged in conducting tests or furnishing inspection services, when such agency has been *approved*. [IBC 202. Definitions]

[A] **APPROVED**. Acceptable to the *building official* or authority having jurisdiction.

[IBC 202 Definitions]

I – Inspection – Code Requirements

SPECIAL INSPECTOR. A qualified person *employed or retained by an approved agency* and *approved* by the *building official* as having the competence necessary to inspect a particular type of construction requiring *special inspection*. [IBC 202. Definitions]

I – Inspection – Code Requirements

1705.16 Fire-resistant penetrations and joints. In high-rise buildings or in buildings assigned to Risk Category III or IV in accordance with Section 1604.5, special inspections for through-penetrations, membrane penetration firestops, fire resistant joint systems, and perimeter fire barrier systems that are tested and listed in accordance with Sections 714.3.1.2, 714.4.1.2, 715.3 and 715.4 shall be in accordance with Section 1705.16.1 or 1705.16.2.

I – Inspection – Code Requirements

1705.16.1 Penetration firestops. Inspections of penetration firestop systems that are tested and listed in accordance with Sections 714.3.1.2 and 714.4.1.2 shall be conducted by an approved inspection agency in accordance with ASTM E 2174.

1705.16.2 Fire-resistant joint systems. Inspection of fire resistant joint systems that are tested and listed in accordance with Sections 715.3 and 715.4 shall be conducted by an approved inspection agency in accordance with ASTM E 2393.

Firestop Systems Inspection

ASTM E 2174 - ASTM E 2393

- “Standard Practice for On-Site Inspection of Installed Fire Stops – Penetrations - Joints”
 - Standard Inspection Procedure
 - Special Inspection Agency Companies
 - Other Qualified Firms
 - Report to Building Owner, Fire Marshals & Code Officials

Inspection in Codes

ASTM E 2174 - ASTM E 2393

- NFPA 101 / 5000 - Chapter 8 - Annex
- 2012 International Building Code
 - CH 17 – Special Inspections
 - Buildings 75' & higher above Fire Department Access
 - Occupancy Type III, IV, Chapter 16 Table 1604.5
- Abu Dhabi International Building Code

Inspection Firm & Individual Qualifications

ASTM E 2174 - ASTM E 2393

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

Inspection Firm & Individual Qualifications

ASTM E 2174 - ASTM E 2393

- 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 Inspection Agency Company Qualification**
 - **IAS AC 291 – W/Individual Certs.**

Firm and Individual Qualifications IAS AC 291

- Inspector Firm shall have at least one staff..
 - PASS UL or 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

Firm and Individual Qualifications IAS AC 291

- **Specify IAS AC 291 –**
 - Quantified Qualifications
 - Helps AHJ with “Approved Agency”
 - Not in ASTM Standards, Code
- **Specify Individual Certifications**
 - 3rd Party, Independent Exams verify Knowledge
 - FM Firestop Exam
 - UL Firestop Exam

Inspection Process

ASTM E 2174 - ASTM E 2393

- Pre Construction Meeting
 - Review Documents – Identify Conflicts
 - Review Materials – SYSTEMS
 - **ASTM E 814 or UL 1479, FM 4990, ASTM E 1966, UL 2079, ASTM E 2307 Systems, ULC S-115**
- Inspection Documents
 - Manufacturer Product Data Sheets
 - Tested and Listed Systems & EJ's
 - Safety Data Sheets

Inspection Process

ASTM E 2174 - ASTM E 2393

- Pre-Construction Meeting
 - Mock Ups
 - Destructive Testing
 - Installation Measurements
 - Discuss Inspection Method
- Meeting Required
 - During/Post Inspection Methods

Inspection Methods

ASTM E 2174 - ASTM E 2393

- During Construction
 - Random witness, Each Floor
 - **10%, each type** of Penetration Firestop,
 - **5% of Total Lineal Feet** of Fire Resistance Rated Joint System, each type



Adler Photo

Inspection Methods

ASTM E 2174 - ASTM E 2393

- Post Construction - Destructive Testing
 - **Minimum 2%** , no less than 1, each type per 10,000 SF of floor area
 - **Minimum 1 / 500 LF** of Joint Area, mandatory
 - If 10% variance per firestop type
 - Inspection stops
 - Installer inspects, repairs
 - Inspector reinspects



Inspection Methods

ASTM E 2174 - ASTM E 2393

- Variances....
 - ASTM E 2174 & ASTM E 2393
 - One Day Notice after discovery to Contractor
 - International Building Code 1704.2.4
 - ‘Brought to IMMEDIATE attention of contractor’
 - ‘If not corrected, Building Official AND RDP... prior to completion of that phase’



Inspection Methods

ASTM E 2174 - ASTM E 2393

- Both Methods...
 - If 10% variance per firestop type
 - Inspection stops
 - Installer inspects, repairs
 - Inspector reinspects
 - Inspector Shall not Supervise Workers...
 - Inspect @ Firestop Installation Start

Inspection Forms

ASTM E 2174 - ASTM E 2393

- One for each type of firestop
- Submit 1 day after Inspection to
Authorizing Agency
- Numbered – Controlled
- Required – During/Post Construction
Methods

Inspection Final Report

ASTM E 2174 - ASTM E 2393

- Name, address, location – project, installer, inspector
- Type and quantity of firestops inspected
- Verification method
- Percentage Deviation
- Copies of all documents sent to Authorizing Agency

cUL SYSTEM NO. C-AJ-2022
PLASTIC PIPE THROUGH CONCRETE FLOOR/WALL OR BLOCK WALL ASSEMBLY
 F-RATING = 2-HR.
 FT, FH AND FTH-RATING = 0-HR.
 NOTE: TESTED WITH A 50 P.S.I. PRESSURE DIFFERENTIAL

1. CONCRETE FLOOR OR WALL ASSEMBLY (2-HR. FIRE-RATING):
 A. LIGHTWEIGHT OR NORMAL WEIGHT CONCRETE FLOOR OR WALL (MIN. 2-1/2" THICK).
 B. ANY UL/CUL CLASSIFIED CONCRETE BLOCK WALL.

2. PENETRATING ITEM TO BE ONE OF THE FOLLOWING:
 A. MAXIMUM 4" NOMINAL DIAMETER PVC PLASTIC PIPE (CELLULAR OR SOLID CORE),
 B. MAXIMUM 4" NOMINAL DIAMETER ABS PLASTIC PIPE (CELLULAR OR SOLID CORE),
 C. MAXIMUM 4" NOMINAL DIAMETER FRPP PLASTIC PIPE,
 D. MAXIMUM 4" NOMINAL DIAMETER CPVC PLASTIC PIPE (SDR 13.5) (CLOSED PIPING SYSTEM ONLY),
 E. MAXIMUM 3" NOMINAL DIAMETER AQUARISE CPVC PLASTIC PIPE (SDR 11) MANUFACTURED BY IPEX, INC. (CLOSED PIPING SYSTEM ONLY),
 F. MAXIMUM 4" NOMINAL DIAMETER RIGID NONMETALLIC CONDUIT (SCH 40 PVC).

3. HILTI CP 648E WRAP STRIP (NOMINAL 3/16" THICK x 1-3/4" WIDE) WRAPPED CONTINUOUSLY AROUND THE OUTER CIRCUMFERENCE OF PIPE, AS SPECIFIED IN THE TABLE BELOW, WITH ENDS BUTTED AND HELD IN PLACE WITH TAPE. WRAP STRIP TO BE INSERTED INTO ANNULAR SPACE AND POSITIONED 1/4" FROM BOTTOM SURFACE OF CONCRETE FLOOR.

4. MINIMUM 1/4" DEPTH HILTI FS-ONE INTUMESCENT FIRESTOP SEALANT.

MAXIMUM PIPE DIAMETER	MAXIMUM DIAMETER OF OPENING	ANNULAR SPACE		NO. OF HILTI CP 648E WRAP STRIPS
		MINIMUM	MAXIMUM	
2"	3-1/2"	3/16"	7/8"	1
3"	5"	3/8"	1-1/8"	2
4"	6"	3/8"	1-1/8"	2

NOTES: 1. HILTI CP 648E WRAP STRIPS AND HILTI FS-ONE INTUMESCENT FIRESTOP SEALANT ARE REQUIRED ON BOTH SIDES OF A WALL ASSEMBLY.
 2. CLOSED OR VENTED PIPING SYSTEM (PVC, ABS, FRPP = SCH 40; CPVC = SDR 11 OR 13.5).

Firestopping & Compartmentation for Safety

- Copies of all documents sent to Authorizing Agency
- Product Data Sheets
- ‘SYSTEMS’, Fire Rated Assemblies = As Built
- Inspection Docs
- Warranty Docs
- Maintenance Requirements
- Letters of Compliance
- FCIA Member in Good Standing Certificate

CUL SYSTEM NO. C-AJ-2022
PLASTIC PIPE THROUGH CONCRETE FLOOR/WALL OR BLOCK WALL ASSEMBLY
 FIRE-RATING = 2-HR.
 FT. FH AND FTS-RATING = 1/4-HR.
 NOTE: TESTED WITH A 50 Pa PRESSURE DIFFERENTIAL

1. CONCRETE FLOOR OR WALL ASSEMBLY (2-HR, FIRE-RATING):
 A. LIGHTWEIGHT OR NORMAL WEIGHT CONCRETE FLOOR OR WALL (MIN. 2-1/2" THICK).
 B. ANY UL-LISTED CLASSIFIED CONCRETE BLOCK WALL.

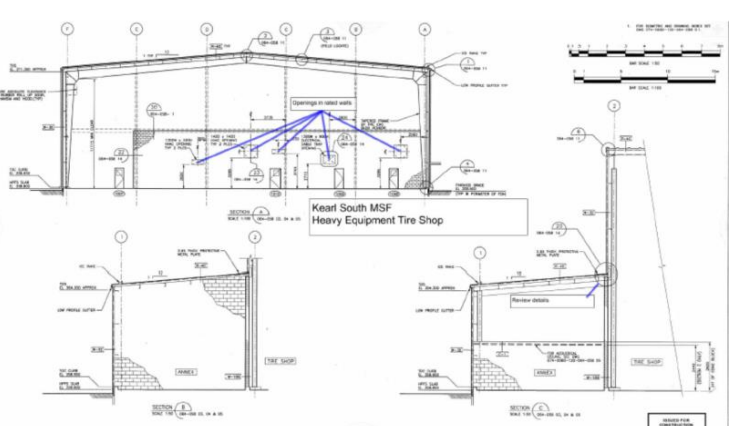
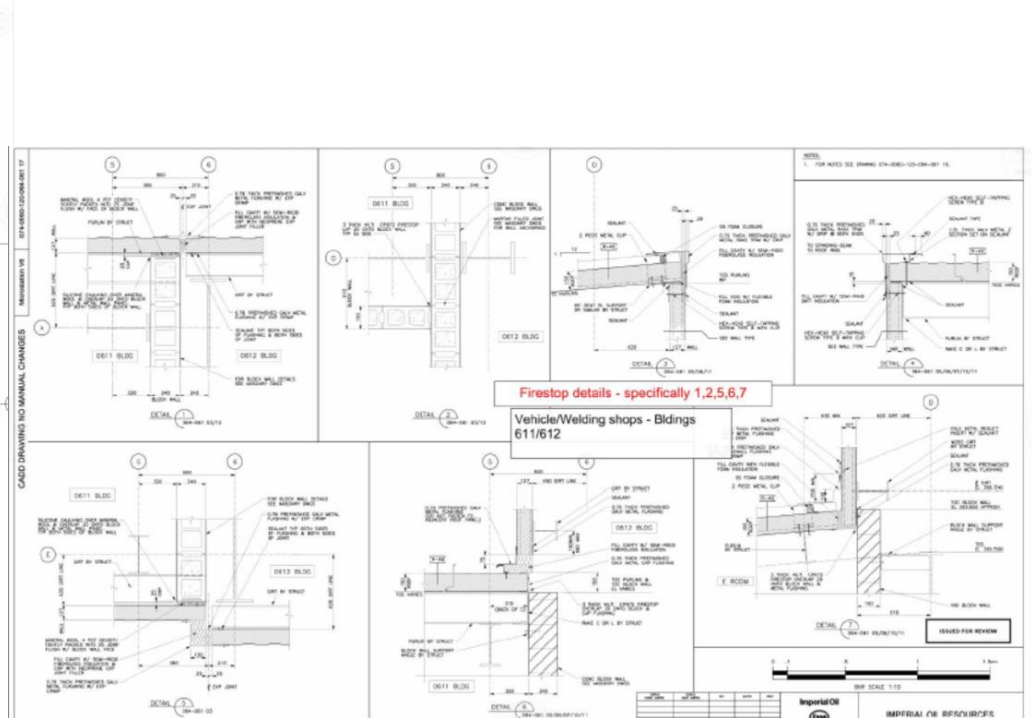
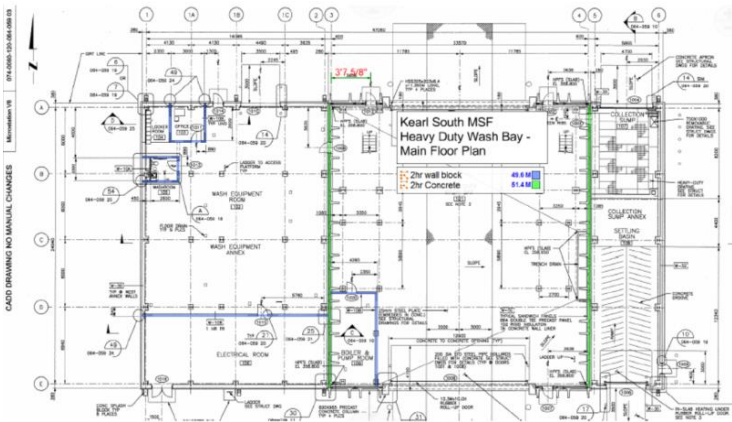
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 B. MAXIMUM 4" NOMINAL DIAMETER ABS PLASTIC PIPE (CELLULAR OR SOLID CORE).
 C. MAXIMUM 4" NOMINAL DIAMETER FRPP PLASTIC PIPE.
 D. MAXIMUM 4" NOMINAL DIAMETER CPVC PLASTIC PIPE (SDR 13.5) (CLOSED PIPING SYSTEM ONLY).
 E. MAXIMUM 2" NOMINAL DIAMETER AQUARIUM CPVC PLASTIC PIPE (SDR 11) MANUFACTURED BY IPEX, INC. (CLOSED PIPING SYSTEM ONLY).
 F. MAXIMUM 4" NOMINAL DIAMETER RIGID NONMETALLIC CONDUIT (SCH 40 PVC).
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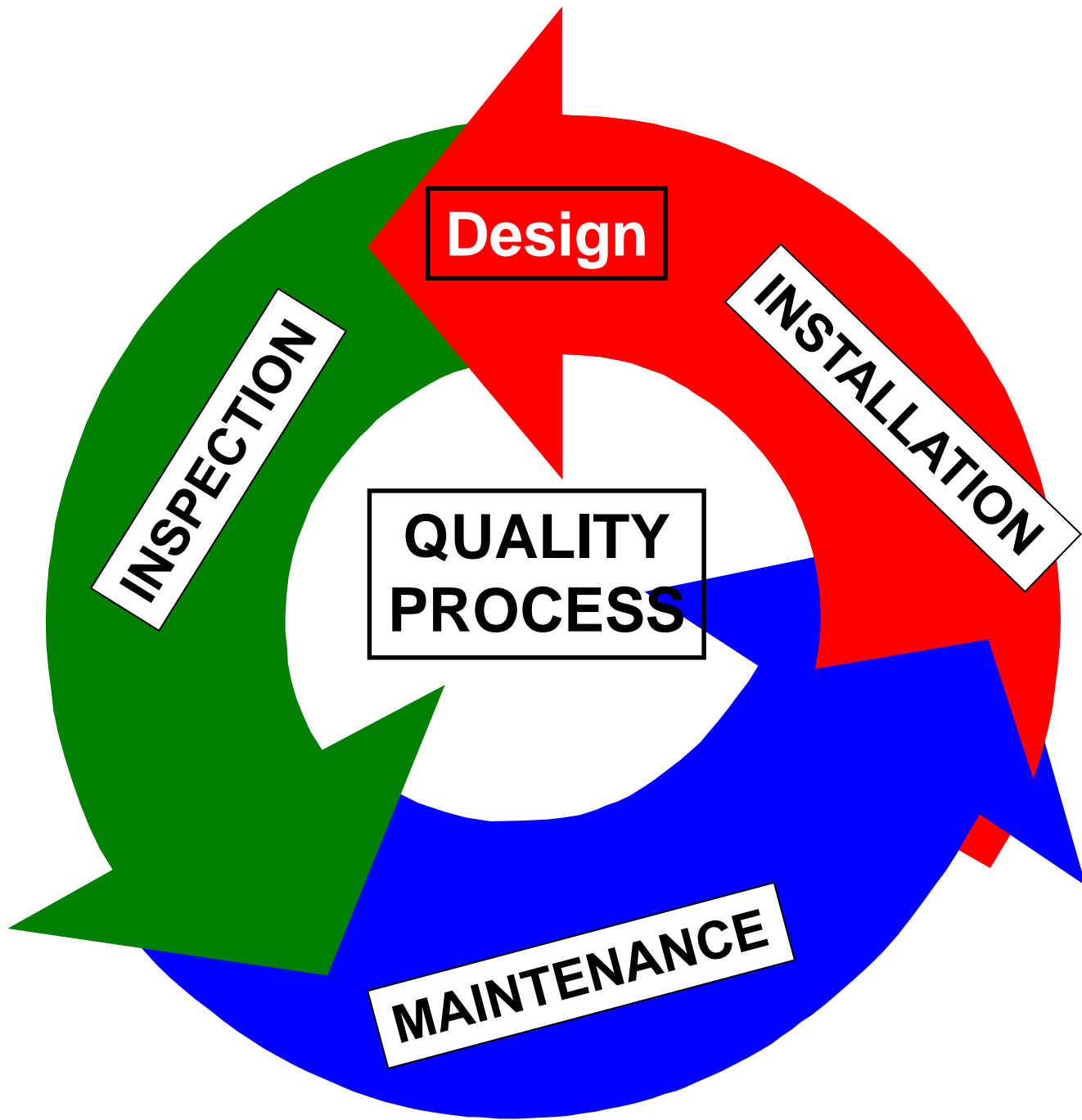
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 2. CLOSED OR VENTED PIPING SYSTEM (PVC, ABS, FRPP = SCH 40; CPVC = SDR 11 OR 13.5).

Firestopping & Compartmentation for Safety





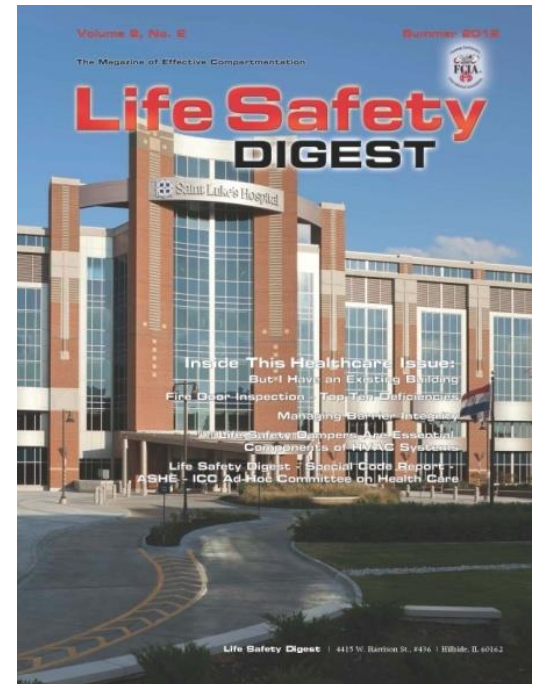
FCIA DIIM & Firestopping

Proper ***DIIM*** 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, RSW)*
- **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 *Maintained & Managed*** –
 - FCIA Member, FM 4991, or UL Qualified Contractors.

FCIA DIIM & Firestopping I & I - Inspection Webinar

- Free Subscription to Life Safety Digest
- Specifications @ FCIA.org,



Effective Compartmentation is a SYSTEM





Contacts

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Bill McHugh – bill @ fcia.org

DIIM & Firestopping

Firestopping Firestop Systems

Bill McHugh, FCIA

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