FCIA & Koffel Associates
DIIM, Firestopping & Compartmentation
@ NFPA Expo

10 June 2013
Contacts

Firestop Contractors International Association
Hillside, IL – +1-708-202-1108 - office
Bill McHugh – bill @ fcia.org

Koffel Associates
Columbia, MD – +1-410-750-2246
Bill Koffel – wkoffel@koffel.com
Learning Objectives

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

2. Focus on Perimeter Fire Containment for Curtainwalls
3. Understand Requirements for Firestopping for Safety in the US and Canada
4. Section 07 84 00++ Highlights
5. Learn about ‘Why compartmentation and Firestopping”.'
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, ULC-S-115, ASTM E2307
  - Professional *Installation* – FCIA Member, FM 4991 Approved, UL Qualified Contractors
  - Properly *Inspected* - ASTM E 2174 / 2393 Protocol by IAS AC 291 Accreditation Criteria for Inspection Agencies
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
FCIA Members Active…

317 Members…US, Canada, Middle East, Far East
- **Accreditation** – FM, UL, ULC & IAS
- **Technical, Education & Apprenticeship**
  - FCIA MOP, UL TFPSS, FCIA Education for Staff, Workers
- **Marketing** – Relationships, Shows
- **Program** – Committee work, Education
- **Legislative** – Track, Advocate
- **Standards** – ASTM, IAPMO, UL/ULC STP’s
“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”

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

- **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

• **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**
  - 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 Unexpected Events?
  - Due Diligence - Review Required by code?
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”
Continuity
Effective Compartmentation Features

New UL test standards for Life Safety Dampers will take effect in July 2002
Fire Resistance Continuity
All Occupancies

• Compartmentation/
  Compartmentalization
  – Education
  – Office
  – Mercantile
  – Multi Family Residential
  – Industrial – Insurance influences
  – Institutional – Healthcare
Buildings are Safe Because….

- **Total Fire Protection History - 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
  - 85% of Schools 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**…
Buildings are Safe Because…. 

• National Institute of Standards & Technology  
  ‘NIST Reports - World Trade Center 7 –  
• Chapter 4.6, 'Factors that could have mitigated structural collapse'  
  – “.improved compartmentation in tenant areas to limit the spread of fires‘  

• ‘But first…DIIM’
Standards – Codes

– Standards – ASTM & UL Standards

  • NFPA 101 = Fire Code, NFPA 5000 Building Code
    – Fire Resistance = Hose Stream Test
  
  • International Fire Code
    – Fire Resistance = Hose Stream Test
  
  • International Building Code
    – Fire Resistance = Hose Stream Test
  
  • National Building Code of Canada
    – Fire Resistance = Mostly Hose Stream
Standards – Codes

– Standards – British Standards
  • Fire extinguishers, alarms sprinklers maintained
  • Fire alarms tested weekly
  • Routine checks ensure equipment working, not damaged, moved.
  • In buildings with a lot of people, relevant fire exit
  • Fire Resistance= No Hose Stream Test
Standards – Codes

• Keys to Safe Buildings Worldwide
  – Robust Compartmentation Limits Fire Spread
    • Compartment of Origin
    • Helps Smoke Control System
    • Sprinklers add to safety
    • Alarms & Occupant Education
Firestopping for Continuity

I – Classified Systems

SECTION A-A

1. Floor or Wall Assembly—He 2-1/2 in., thick lightweight or normal weight concrete 1000 to 3000 psi strength. Wall may also be lined with 2-1/2 in. Class A Firestop Mortar, (2) 6 in. x 6 in. x 6 in. Firestop bricks, (1) 12 in. x 12 in. x 6 in. Firestop brick, (1) 24 in. x 24 in. x 6 in. Firestop brick, or a combination of the above. A steel frame may be omitted if the wall has a continuous backup of a fire resistant material. See Section 3B for alternative methods of firestop brick or a combination of the above. A steel frame may be omitted if the wall has a continuous backup of a fire resistant material. See Section 3B for alternative methods of firestop brick or a combination of the above.

2. Through Penetrating Product—Model 4 in. thick (or smaller) stone, mortar into 3 in. thick (or smaller) aluminum flexible metal conduit. The non-metallic metal conduit to be installed near center of circular opening in floor or wall assembly. Flexible metal conduit to be tightly supported on both sides of floor or wall assembly.

3. Erection Details—(A) Horizontal: 1/2 in. thick concrete curtain wall with a vertical joint every 6 in. (B) Vertical: 1/4 in. thick concrete curtain wall with a horizontal joint every 6 in.

4. Installation of Firestop Mortar—(A) Mortar shall be placed in the area between the opening and the wall or floor assembly. (B) Mortar shall be placed in the area between the opening and the wall or floor assembly. (C) Mortar shall be placed in the area between the opening and the wall or floor assembly.
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, S-115, UL 2079, E 2307 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

Graphics, STI, 3M, AD, HILTI, Nelson
Firestopping for Continuity
Firestop Products

• 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

Graphics - AD, Nelson, Tremco
D- Design
SYSTEMS SELECTION
Who’s Responsible, How to Choose???

Graphics – STI
Firestopping for Continuity
Products become Systems

• What are Firestop Systems?
• ‘Field Erected Construction…Tested to…’
  – 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…Not as easy as it looks…*
1. FLOOR OR WALL ASSEMBLY:
   A. MINIMUM 4½” THICK LIGHTWEIGHT OR NORMAL WEIGHT CONCRETE FLOOR.
   B. U.L. CLASSIFIED CONCRETE BLOCK WALL (MINIMUM 6” 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 GENTLE BEAD OF HILTI FS-ONE FIRESTOP SEALANT AROUND OUTER DIAMETER OF PIPE.
Gypsum Wall assembly running up to concrete over metal deck

**UL/cUL System No. HWD-0042**

**Top of Wall Joint:** 1.0 HR. or 2.0 HR. Gypsum Wall Assembly

**Assembly Rating:** 1.0 HR. or 2.0 HR. (Depending on rating of wall and floor assembly)

**Class B Movement Capabilities:** 50% compression or extension

Front View

Section A-A

**HILTI**

**Firestop Systems**

Saving Lives through Innovation and Education

HILTI, Inc.

Tulsa, Oklahoma USA (918) 252-4000

Sheet 1 of 2

Drawing No. HWD 0042

Date FEB. 20, 2008

---

Fire Stop Technologies, Inc.
How do Installers Select Systems?

• 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/EFRRA

- 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
INSTALL FIRESTOP SYSTEM
Firestop Sealant, MW installation to Tested and Listed System Limits = Firestop System

1. Pack
2. Apply Sealant
3. Tool/Smooth

Walls - BOTH SIDES

STI Graphic
Properly Tooled/Smoothed Firestop Sealants
Sleeved Pipes
Correct Collar or Sealant Must Be Selected for Combustible Penetrations

• 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

STI Graphic
Unlisted, Untested Firestop Systems
Firestopping for Safety
Unlisted, Untested Firestop Systems
Joint Compound
Incomplete is ineffective
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”
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
Firestop Applications

Floor to Wall

Top of Wall

Fire Stop Technologies, Inc.

Graphics – Firestop Solutions
Joints and Seams

Top of Wall
Joints and Seams
I-Beam to Fluted Deck
Penetrations with Top 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.”

Graphic - Superl
Firestop Perimeter Fire Containment Systems
Proper Installation of Mineral Wool

- Compressed mineral wool must be inserted perpendicular to the joint to allow for movement between the slab and wall.
Firestop Installed at Perimeter of Floors at Curtainwall
Safer Buildings ...

– Tamweel Apartment Tower, Dubai
Safer Buildings ...

- Safer Buildings - Tamweel Apartment Tower...

‘Tamweel Tower fire started by cigarette butt, say Dubai Police’

[Source: thenational.ae]
Firestop Products Become Systems when Installed to SYSTEM
Results of NOT USING An Approved / Qualified Contractor??

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

No Single Firestopping Trade means fire & life safety risk…
I- Installation
Who’s Responsible, How to Choose???

Graphics – STI
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

- FCIA 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?

- **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 3\textsuperscript{rd} Party
Firestop Contractor Qualifications

• **FCIA Member in Good Standing**
  – Two years Continuous Membership
  – FCIA Firestop Manual of Practice

• **FCIA Member, FM 4991, UL Qualified Firestop Contractor**
  – Management System Audited – Office, Jobsite
  – Person appointed DRI –
    • FM or UL Firestop Exam
    • FCIA Firestop Manual of Practice, Systems
Contractor Qualifications
FM & UL/ULC – 4 Components

1. Office Facility Procedures Audit
2. Field Procedures 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

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

- Contractors Listed  www.fcia.org
2. FM, UL/ULC Jobsite 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
2. **Company MS Jobsite Audit by FM, UL/ULC**

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

• Continued satisfactory performance
  • Quality Manual Implementation
• Documented - Archived record keeping
• Employee Training Documentation
• Jobsite Visit
• DRI CEU Verification
• Find @www.fcia.org
Wednesday, February 10, 2010

Mr. Randy Perry
Adler Firestopping Ltd.
#23, 51016 Hwy 60
Acheson, AB T7X 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 of 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:

Moreover, Randy Perry has successfully attended our intensive, two-day FT 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
I- Inspection
SYSTEMS ANALYSIS

Graphics – STI
Firestop Installation & Inspection

Duct w/Pink FBGL

ST23-8a

ST23-8e
Firestop Installation & Inspection

• ASTM E 2174/ ASTM E 2393 – “Firestop System Features”
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
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
Inspector 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 …
Inspector 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 Inspector Personnel / Firm Qualification – IAS AC 291 – NFPA 101/5000?
Optional Inspector 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

Specify IAS, not part of ASTM Standards

Find @ www.fcia.org
Inspection Process
ASTM E 2174 - ASTM E 2393

• Pre Construction Meeting
  – Review Documents – Identify Conflicts
  – Review Materials – SYSTEMS
    • ASTM E 814 or UL 1479- ASTM E 1966, UL 2079, ASTM E 2307 Systems

• Inspection Documents”
  – Manufacturer Product Data Sheets
  – Tested and Listed Systems & EJ’s
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, no less than one per floor
    • 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

• 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
Firestopping & Compartmentation for Safety
Why Specify?
ASTM E 2174 - ASTM E 2393

- DIIM – II of Quality Process
- Install, Inspect
- Verify Field Installations
- **Specify Accredited Inspection Agencies**
  - IAS AC 291 – Accreditation Criteria for Special Inspection Agencies
07-84-00 Specifications (FREE @ FCIA.org)

MasterFormat - 07 84 00 - Firestopping

• **Part I** – FCIA Member, FM 4991 Approved or UL Qualified Firestop Installer/Contractor - Valid DRI, Test Standards

• **Part II – Products** – Testing, Properties
  • Pipes, cables, ducts, cable trays, MEP&C Systems -
  • Fire Resistance Rated Joints –
    – Head of Wall, Wall to Wall, Wall to Floor
  • Perimeter Fire Containment Joints
    – Floor Slab edge/Exterior Wall

• **Part III, Execution, Quality Assurance** (DIV 1 Reference)
  – ASTM E 2174 & ASTM E 2393 Inspection
  – IAS AC 291 Special Inspection Agency –
    • Individual on staff passed FM or UL Firestop Exam
07-84-00 Specifications

- Systems Testing – Part 1 – DIIM References
  - Penetrations - ASTM E 814 & UL 1479,
  - Joints - ASTM E 1966, UL 2079, S115 -
  - Perimeter - ASTM E 2307 –
  - FM 4991 Standard for the Approval of Firestop Contractors
  - UL Qualified Firestop Contractor Program
  - ASTM E 2174 & ASTM E 2393 - Inspections
  - IAS AC 291 Accredited Special Inspection Agency
07-84-00 Specifications

• Single Source Product??

• YES, BUT…..
  – ‘…to the greatest extent possible.’
  – Number of Systems v. EJ’s
  – IFC Protocol for EJ’s
  • No EJ if Tested/Listed System Available
07-84-00 Specifications

• **Part 1 - Systems**
  - “F” Ratings - Fire Resistance Rated Assy.
  - “T” Ratings - = F & T??
  - “H” Ratings – Hose Stream
  - “L” Ratings = Smoke Resistance
  - “W” Ratings – Floors, Walls

• **Materials & Physical Property Requirements**
  - Chemicals, Movement, Exposure
M – Maintenance (& Management)
Firestop Maintenance

• **Maintenance**
  – Code Required
  – How??

• **How to keep Track – Barrier Management Initiatives**
  Paper
  Software
  Labeling
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]
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]
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.
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.
• **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…

• **City of Calgary – Best Practices (1997)**

• **FCIA Manual of Practice – Appendix, Maintenance**
  FCIA recommends Barrier Management for Effective Compartmentation and Structural Protection

• **Best Practice Guide - NRC**

*Includes Fire Dampers, Fire Doors…and Continuity*
“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
FCIA DIIM & Firestopping @ NFPA Expo

Proper ‘DCIIM’ 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 Coordinated & 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, IAS Accredited Firms
Trends for 2013....

• NFPA 101-5000 References – Qualifications, ‘L’
• IBC 2012 Chapter 17 Special Inspection
  – Inspection agencies drives demand for quality installation
  – Results in more FM & UL Contractors.
– FM & UL Contractors in Specifications
– Building Owners and Managers learning DIIM…
– Materials manufacturers systems
  • Reflect what can reasonably be expected to occur … ’
  • Movement, Exposures, etc.
FCIA DIIM & Firestopping @ NFPA Expo

• Free LSD, Specifications @ FCIA.org,
• FREE FCIA Firestop Manual of Practice
  For Specifiers at
  Architectural Firms
  Building Officials,
  Civil Defence, ROP,
  Municipal Fire Marshals,
  Inspectors
Contacts

Firestop Contractors International Association
Hillside, IL – +1-708-202-1108 - office
Bill McHugh – bill @ fcia.org

Koffel Associates
Columbia, MD – +1-410-750-2246
Bill Koffel – wkoffel@koffel.com
FCIA & Koffel Associates
DIIM, Firestopping & Compartmentation
@ NFPA Expo

10 June 2013