Fire Resistance in Existing Buildings

• Design
• Installation
• Inspection
• Maintenance & Management

© FCIA 2020
Today’s Program

• Total Fire Protection
• Design - Specs, Codes, Testing, Products
• Installation – FM, UL/ULC Programs
• Inspection – ASTM Inspection Standards IAS AC 291, Inspector Qualifications
• Maintain Protection – Fire Codes
“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
D-DESIGN – Code, Specs, Systems

INSTALLATION

QUALITY PROCESS

MAINTENANCE

INSPECTION
Firestopping for Continuity

I – Classified Systems
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**, UL 2079, **E-2307** E-2837, ULC-S-115, as the test method…”
  - **Testing = Suitability statement for use of a firestop product in a specific system application**
I- Installation
SYSTEMS SELECTION
SYSTEMS ANALYSIS
Who’s Responsible, How to Choose???
Firestopping for Continuity
Products become SYSTEMS

- After Installation…
- ‘Field Erected Construction…Tested to…’
  - F Rating - Flame
  - T Rating – Temperature
    - H Rating – Hose
  - L Rating – Smoke
  - W Rating – Water

Graphics – 3M
Firestopping for Continuity
Products become SYSTEMS

• After Installation…
• ‘Field Erected Construction…Tested to…’
  – Movement
  – Exposure
    • Water
    • Salt
    • Chemicals
    • Temperature
    • “Expectations”
  – Life Span

Graphics – 3M
Firestopping for Continuity

Firestop Products

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

Graphics, STI, 3M, Rectorseal, HILTI, Nelson
Products become Systems
Hose Stream = Shock Test
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
Engineering Judgments/EFRRRA

• Field or other Variances to Tested and Listed Systems?
  – No System Exists, period….

• Why???
  – Lack of Planning
  – Unique Conditions
Engineering Judgments/EFRRRA

• **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**

• **Inspection Agency?**
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.

FCIA’s NOTE: Manufacturer needs to state the EJ / EFRA will pass a fire test if subjected…
D-DESIGN

MAINTENANCE

QUALITY PROCESS

INSPECTION

I-INSTALLATION
Systems Selection
Systems Analysis
Self Inspection
FCIA, FM & UL
MACC
Installation – Who?

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

Conclusion –

Without Single Firestop Installation Contractor…

fire & life safety risks

Adler Photo
Firestopping for Continuity
Products become Systems

• Firestop Systems Directories –
  – UL
  – Intertek
  – FM Approvals

*Systems Selection & Analysis…Not as easy as it looks*
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. 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 Procedures
- Non-Conformances
- Documentation
- Project closeout
2. Company MS Jobsite Audit by UL/ULC, FM or

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

- Retested every 3 years if not enough CEU’s

- 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
FM 4991, 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 Procedures
- Non-Conformances
- Documentation
- Project closeout
Why Contractor Qualifications?

- Built right the first time...Start a Trend...

- SYSTEMS Selection, Analysis, As-Built Inventory
  - Applied Fireproofing – Listings, Manufacturers Instructions
  - F, T, L, W Rated Firestop Systems
  - Tolerances - Annular Space Sizes
  - Angles @ Dampers
  - Door Gap Sizes - Undercuts - Framing
  - Door Frame Anchors - Spacing
  - Door Closers - Activation Sensors
  - Door Hardware
  - Damper Breakaway Connections
  - Wall fastener Patterns, Stud Spacing
  - Horizontal Assembly Construction
A Jobsite Specific Management System Audit – Our audit provides verified processes were followed to properly installed firestop systems.

A Renewable Jobsite Specific Certificate – After completion of a successful audit, we issue a jobsite specific certificate that is renewable for the building owner.

Improved Firestop Systems Documentation – The MACC certificate in conjunction with the firestop systems documentation, builds the fire-resistance inventory required by the 2018 International Fire Code for fire and smoke protection features.
I – Inspection – Options

• Contractor Self Inspection
  – Verify Management System validity
  – Not 2%, 10%
  – Required for FM & UL, ULC Contractors

• Manufacturer Inspection
  – Does not exist …

• ASTM E 2174 & ASTM E 2393 –
  – Independent 3rd Party
  – Destructive, Non Destructive
  – Specified Frequency
Inspection in Codes
ASTM E 2174 - ASTM E 2393


• FCIA Success @ 2012 International Building Code
  – CH 17 – Special Inspections
    • Buildings 75’ & higher above Fire Department Access
    • Occupancy Type III, IV, Chapter 16 Table 1604.5
  – Not all Jurisdictions Adopt…

• NFPA 101 / 5000 - Chapter 8 – FCIA ADDED to Annex

• NFPA 1 Refers to ‘Quality Assurance Program’ (FM/UL & Inspection)

• Master Specifications – 2012 – “It’s in the IBC Code”
Inspection – Regulations
12.2* Construction.

12.2.2 Fire safety construction features for new and existing occupancies shall comply with this Code and the referenced edition of NFPA 101.

12.3 Fire-Resistive Materials and Construction.

12.3.1 The design and construction of fire walls and fire barrier walls that are required to separate buildings or subdivide a building to prevent the spread of fire shall comply with Section 12.3 and NFPA 221.
12.3.2* Quality Assurance for Penetrations and Joints. In new buildings three stories or greater in height, a quality assurance program for the installation of devices and systems installed to protect penetration and joints shall be prepared and monitored by the RDP responsible for design. Inspections of firestop systems and fire-resistive joint systems shall be in accordance with 12.3.2.1 and 12.3.2.2.
• 12.3.2.1 … Penetrations … shall be inspected in accordance with ASTM E 2174

• 12.3.2.2. … Joint Systems … shall be inspected in accordance with ASTM E 2393

• FCIA Proposal…

• More about this later....
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

• 1705.1.1 Special cases. Special inspections shall be required for proposed work that is, in the opinion of the building official, unusual in its nature, such as, but not limited to, the following examples:
I – Inspection – Code Requirements

• Examples:
  – Construction materials and systems that are alternatives to materials and systems prescribed by this code. [EJ’s]
  – Unusual design applications of materials described in this code. [EJ’s]
  – Materials and systems required to be installed in accordance with additional manufacturer’s instructions that prescribe requirements not contained in this code or in standards referenced by this code.
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 in Codes

• **Table 1604.5 – Risk III** - *Buildings and other structures that represent a substantial hazard to human life in the event of failure, include but are not limited to:*
  
  – *Public Assy., Occupant Load >300*
  – *Bldgs. Containing Elem.,2nd’ary’, day care, >250*
  – *I-2, >50, no surgery, emergency; I-3*
  – *Occupancy load >5,000*
  – *Power-gen, h2o treatment, wastewater treatment, public utilities, not in IV*
  – *Buildings not in IV, with toxic or explosive*

[BCNYS 2020, Table 1604.5]
Inspection in Codes

- **Table 1604.5 – Risk IV - Buildings and other structures designated as essential facilities, including but not limited to:**
  - Group I-2 occupancies having surgery or emergency treatment facilities.
  - Fire, rescue, ambulance/police stations, emergency vehicle garages.
  - Designated earthquake, hurricane or other emergency shelters.
  - Designated emergency prep, communications and operations centers and other facilities required for emergency response.
  - Power-generating stations and other public utility facilities required as emergency backup facilities for

[BCNYS 2020, Table 1604.5]
Inspection in Codes

- **Table 1604.5 – Risk IV - Buildings and other structures designated as essential facilities, including but not limited to:**
  - Buildings and other structures containing quantities of highly toxic materials that:
    - Exceed maximum allowable quantities per control area as given in Table 307.1(2) or per outdoor control area in accordance with the International Fire Code, and are sufficient to pose a threat to the public if released.
    - Aviation control towers, air traffic control centers and emergency aircraft hangars.
    - Buildings and other structures having critical national defense functions.
    - Water storage facilities and pump structures required to maintain water pressure for fire suppression. [BCNYS 2020, Table 1604.5]
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]
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]
SECTION 1703 APPROVALS

1703.1 Approved agency. An approved agency shall provide all information as necessary for the building official to determine that the agency meets the applicable requirements.
1703.1.1 Independence. An approved agency shall be objective, competent and independent from the contractor responsible for the work being inspected. The agency shall also disclose possible conflicts of interest so that objectivity can be confirmed. [IBC 1703.1.2]

1703.1.2 Equipment. An approved agency shall have adequate equipment to perform required tests. The equipment shall be periodically calibrated. [IBC 1703.1.2]
I – Inspection –
Code Requirements

1703.1.3 Personnel. An approved agency shall employ experienced personnel educated in conducting, supervising and evaluating tests and/or inspections.

[IBC 1703.1.3]
I – Inspection –
Code Requirements

1704.2 Special inspections. Where application is made for construction as described in this section, the owner or the registered design professional in responsible charge acting as the owner’s agent shall employ one or more approved agencies to perform inspections during construction on the types of work listed under Section 1705. These inspections are in addition to the inspections identified in Section 110. [IBC 1704.2]
I – Inspection – Code Requirements

1704.2.1 Special inspector qualifications. The special inspector shall provide written documentation to the building official demonstrating his or her competence and relevant experience or training. Experience or training shall be considered relevant when the documented experience or training is related in complexity to the same type of special inspection activities for projects of similar complexity and material qualities. These qualifications are in addition to qualifications specified in other sections of this code.

The registered design professional in responsible charge and engineers of record involved in the design of the project are permitted to act as the approved agency and their personnel are permitted to act as the special inspector for the work designed by them, provided they qualify as special inspectors.
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

• 1705.1.1 Special cases. Special inspections shall be required for proposed work that is, in the opinion of the building official, unusual in its nature, such as, but not limited to, the following examples:
I – Inspection – Code Requirements

• Examples:
  – Construction materials and systems that are alternatives to materials and systems prescribed by this code. [EJ’s]
  – Unusual design applications of materials described in this code. [EJ’s]
  – Materials and systems required to be installed in accordance with additional manufacturer’s instructions that prescribe requirements not contained in this code or in standards referenced by this code.
I – Inspection –
Code Requirements

HIGH-RISE BUILDING. A building with an occupied floor located more than 75 feet (22,860 mm) above the lowest level of fire department vehicle access. [IBC 202]
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.
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
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
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
  – Hired by & Report to Building Owner, Architect, Owners Rep, other than GC.
    = Authorizing Authority
Inspection – What’s needed?
Firestop Inspection Standards & Professional Contractor = Success

- ASTM E 2174/ ASTM E 2393 Standard Practice
I – Inspection – What’s Needed?

- Life Safety Drawings
  - Architectural Plans with Fire-Resistance Rated Assemblies noted
- Tested and Listed System Designs
  - UL Product iQ, FM Approval Guide, others.
  - Firestop Penetrations
  - Fire-Resistive Joints –
    - HW, WW, FW, FF, CW, etc.
I – Inspection – What’s Needed?

• Manufacturers Installation Instructions
• Safety Data Sheets
• Identification Systems!!
I – Inspection – What’s Needed?

• Ladders, Lifts??
• Tools ... more later.
Firestop Inspection Process
ASTM E 2174 - ASTM E 2393

• Inspection Documents
  – Specifications and Drawings
  – Manufacturer Product Data Sheets and Installation Instructions
  – Listed Systems and EJ’s/EFRRRA’s
Firestop 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
Firestop Inspection Process
ASTM E 2174 - ASTM E 2393

• Pre-Construction Meeting
  – Mock Up Review
  – Observation or Destructive Review (Testing)
  – Inspection Type Methodology
    • Frequency of reviews
    • Description of reviews
    • Specification and drawings

• Meeting(s) are required
  – During and Post Inspection
A GC that gets It!
Prep – Inspection/Installation

C. Zussman Pepper Photo
Firestop Inspection Process
ASTM E 2174 - ASTM E 2393

• Inspection Schedule
  – Notifies Inspector
  – Inspections within 2 days
  – Inspector verifies installation
    • Is in accordance with Documents
    • Meets Manufacturers Installation Instructions
Firestop Inspection Process
ASTM E 2174 - ASTM E 2393

• Observation Reviews
  – Performed during construction
  – Witnessed randomly of the installed systems on each floor
  – 2174 - 10%, each type of Service Penetration Firestop System
    – Type = By System, By Scope of Work
  – 2393 - 5% of Total Lineal Feet for each type of Fire Resistance Rated Joint System
    – Type = By System, By Scope of Work
Firestop Inspection Process

ASTM E 2174 - ASTM E 2393

• Destructive Reviews (Testing)
  – Performed Post-Construction
  – **2174 - Minimum 2% , no less than 1, each type per 930 m2 (10,000 SF) of floor area**
    • Type = By System, Scope of Work
  – **2393 - Minimum 1 / 152 LM (500 LF) of Joint Area, by type, mandatory; Exception mechanical joints**
    • Type = By System, Scope of Work
Measure Sealant Thickness
NOT MIDDLE
Bond Lines – Pen./Assy.
Firestop Inspection
ASTM E 2174 - ASTM E 2393

• Equipment –
  – Tapes
  – Tablets w/Systems
  – Borescope to explore areas that are concealed or partially
  – NOT MICROMETERS
Firestop Inspection Process
ASTM E 2174 - ASTM E 2393

• Inspectors shall
  – Not supervise or direct FS Contractors
  – Commence reviews at the start of FS installation
  – Review installation based on manufacturers and system requirements
  – Selecting Systems, Coaching is Supervising...
Firestop Repairs

• Repairs
  – Instruction requirements by manufacturer
  – Listed systems
  – Patching
    • Systems…
    • Adhesion
    • Movement
    • T, L, W Ratings
    • *As recommended by MFR*
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
• TYPE = By System, By Contractor…. 
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
Firestop Contractor Provides Documentation = Inventory

- 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
Without Inspection?
Really?

J. Sharp Photo
Protected?
Really?
Inspection?
Firestop Repairs

• Repairs
  – Instruction requirements by manufacturer
  – Listed systems
  – Patching
    • Systems….
    • Adhesion
    • Movement
    • T, L, W Ratings
    • As recommended by MFR
Building & Fire Code Requirements

- **Smoke Barriers differ from Smoke Partitions?**
  - **Smoke Barrier** –
    - IBC – Hourly Rated, Quantified Firestop “L” Rating
      - <5cfm/sf (IBC 2006)
      - < 50 cfm, 100sf of Wall Area (IBC 2009)
    - NFPA – … ‘restricting the passage of smoke’…
      - Hourly Rated, Quantified Firestop L Rating Chapter 8
      - NO quantified “L” Rating … Healthcare Chapter.
      - Continuous, Barrier to Barrier, … through concealed spaces,
      - Not always fire resistance rated.

- **Smoke Partition**
  - IBC – Continuous barrier, not fire rated…’retard’.
  - NFPA – Continuous membrane that is designed to form a barrier to *limit the transfer of smoke*….
Building & Fire Code Requirements

• What Gets Used Where?
  – Smoke Barrier –
    • IBC - Firestop System With L Rating
    • NFPA – Firestop System with L Rating
  – Smoke Partition
    • IBC – Smoke and Sound OR Firestop System with L Rating
    • NFPA - Smoke and Sound OR Firestop System with L Rating
• 701.6 Owner's responsibility. The owner shall maintain an inventory of all required fire-resistance-rated and smoke resistant construction, and the construction included in Sections 703 through 707 and such construction shall be visually inspected by the owner annually and properly repaired, restored or replaced where damaged, altered, breached or penetrated.
2018 International Fire Code Explained

• What’s a Fire-Resistance Inventory?
  – Life Safety Drawings
  – Designs, Systems and Assemblies
    - Listings
  – Manufacturers Installation and Maintenance Instructions
  – Paper & Files
  – Spreadsheets
  – Software
M–Barrier Management Systems
Starts @ NEW CONSTRUCTION

• NEW Buildings – 07-84-00 Specs
  – www.FCIA.org

• Part I – Focus on
  – Systems
  – Not Products
  – Manufacturers

• “Single Manufacturer to the greatest extent possible” – EJ’s
M–Barrier Management Systems Starts with CONSTRUCTION

• NEW Buildings – 07-84-00 Specs
  – www. FCIA .org

• Part II– Contractor/Installer Qualifications
  – FCIA Member in Good Standing, AND
  – FM 4991, Standard for the Approval of Firestop Contractors, OR
  – UL Qualified Firestop Contractor Program
  – AND
  – Manufacturer Accredited, Approved, Trained
M–Barrier Management Systems
Starts with CONSTRUCTION

- **NEW Buildings** – 07-84-00 Specs
  - www.FCIA.org

- **Part II – Qualifications – Special Inspection**
  - Special Inspection Agency –
    - IAS AC 291 Accredited Special Inspection Agencies
  - Special Inspector Qualifications
    - FM Firestop Exam
    - UL Firestop Exam
    - AND
    - IFC Exam
M–Barrier Management Systems
Starts with CONSTRUCTION

• NEW Buildings – 07-84-00 Specs
• Part III – Execution
  – Special Inspection
    • ASTM E 2174 - Penetrations
    • ASTM E 2393 - Joints
Built Right = Maintain Right WHEN SPECIFIED

• Reference 01-78-00 Closeout Submittals
  – 01 78 29 Final Site Survey
  – 01 78 33 Bonds
  – 01 78 36 Warranties
  – 01 78 39 Project Record Documents
  – 01 78 43 Spare Parts
  – 01 78 46 Extra Stock Materials
  – 01 78 53 Sustainable Design Closeout Documentation
IPMC SECTION 703

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

[F] 703.2 Opening protectives. Required opening protectives shall be maintained in an operative condition. Fire and smokestop doors shall be maintained in operable condition. Fire doors and smoke barrier doors shall not be blocked or obstructed or otherwise made inoperable.
Chapter 1, SECTION 21
Firestopping

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…

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

  FCIA recommends Barrier Management for Effective Compartmentation and Structural Protection
M–Barrier Management Systems

• **Barrier Management Starts at New Construction Specification….**
M–Barrier Management Systems

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

- Competent Personnel
Building & Fire Code Requirements

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  – **Smoke Barrier** –
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    • **NFPA** – … ‘restricting the passage of smoke’…
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  – Smoke Partition
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    • NFPA - Smoke and Sound OR Firestop System with L Rating
Are Fire-Resistance Rated Assemblies to be Marked? YES

703.7 Marking and identification. Fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions or any other wall required to have protected openings or penetrations shall be effectively and permanently identified with signs or stenciling. Such identification shall:

1. Be located in accessible concealed floor, floor-ceiling or attic spaces;
2. Be located within 15 feet (4572 mm) of the end of each wall and at intervals not exceeding 30 feet (9144 mm) measured horizontally along the wall or partition; and
3. Include lettering not less than 3 inches (76 mm) in height with a minimum 3/8 inch (9.5 mm) stroke in a contrasting color incorporating the suggested wording. “FIRE AND/OR SMOKE BARRIER—PROTECT ALL OPENINGS” or other wording.

Exception: Walls in Group R-2 occupancies that do not have a removable decorative ceiling allowing access to the concealed space.

Mark Walls with Code Defined Terms? NOT IBC; YES NFPA
International Building Code, Section 703.7

FIRE AND/OR SMOKE BARRIER – PROTECT ALL OPENINGS

~ 6 feet (914 mm)

Minimum 3” (76 mm)

Minimum 3/8” stroke width (9.5 mm)

Heckler Slide
NFPA 101 - Life Safety Code, Section 8.2.2.5 (2018 edition)

FIRE BARRIER – 1 HOUR

Identify the wall type and its fire resistance, as applicable

Minimum 3” (76 mm)
Minimum 3/8” stroke width (9.5 mm)

Heckler Slide
Firestopping for Continuity
I – Listed Systems
Firestopping for Continuity
Firestop Products

• Sealants
  – Silicone, Latex, Intumescent

• Wrap Strips
  – “Thick, Thin, Wide, Less Wide”

• Putties

• Pillows

• Composite Sheets

• Bricks / Plugs

• Pre Fabricated Kits

• Mortar

• Spray Products

• Tapes

• Wraps, Ductwrap

Graphics, STI, 3M, Rectorseal, HILTI,
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
Why Inspection?
Firestop Installation Methods

• Each Construction Discipline – MEP, etc.
  – “He/She who pokes hole, fills hole”

• Multiple Contracts
  – Firestop Contractors, Trades

• Single Source Firestop Contractor
  – FCIA Member in Good Standing
  – UL/ULC Qualified, or FM 4991
Firestop Inspection Standards & Professional Contractor = Success

• ASTM E 2174/ ASTM E 2393 Standard Practice
Inspection in Codes
ASTM E 2174 - ASTM E 2393

• NFPA 101 / 5000 - Chapter 8 - Annex
• 2012 International Building Code
  – CH 17 – Special Inspections (FCIA Proposals)
    • Buildings 75’ & higher above Fire Department Access
    • Occupancy Type III, IV, Chapter 16 Table 1604.5
    • Residential > 250 Occupants – 2021 (FCIA Proposal)
• Abu Dhabi International Building Code
IAS AC 291 Must be Specified

- **IAS AC 291 Quantified Qualifications**
  - Helps AHJ with “Approved Agency”
  - Not in ASTM Standards, Code

- **Individual Competencies - Exams**
  - FM Firestop Exam
  - OR
  - UL Firestop Exam
  - AND
  - IFC Exam
Measure Sealant Thickness
NOT MIDDLE
Bond Lines – Pen./Assy.

Adler Photos
Firestop Inspection

ASTM E 2174 - ASTM E 2393

• Equipment –
  – Tapes
  – Tablets w/Systems
  – Borescope to explore areas that are concealed or partially
  – NOT MICROMETERS
• 12.3.3* Maintenance of Fire-Resistive Construction, Draft-Stop Partitions, and Roof Coverings.

12.3.3.1 Required fire-resistive construction, including fire barriers, fire walls, exterior walls due to location on property, fire-resistive requirements based on type of construction, draftstop partitions, and roof coverings, shall be maintained and shall be properly repaired, restored, or replaced where damaged, altered, breached, penetrated, removed, or improperly installed.
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.
Effective Compartmentation is a SYSTEM

New UL test standards for Life Safety Dampers will take effect in July 2002
Fire Resistance in Existing Buildings

- Design
- Installation
- Inspection
- Maintenance & Management

© FCIA 2020
Today’s Program

• Total Fire Protection
• Design - Specs, Codes, Testing, Products
• Installation – FM, UL/ULC Programs
• Inspection – ASTM Inspection Standards IAS AC 291, Inspector Qualifications
• Maintain Protection – Fire Codes
Contact

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Fire Resistance in Existing Buildings

- Design
- Installation
- Inspection
- Maintenance & Management

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