FCIA Canada Symposium
Fire Separations – Fire Resistance & Smoke Resistant Systems
“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”

• Fire Resistance & Smoke Resistant Systems
  – Properly *Designed* and Specified Firestopping FCIA - 07-84-00 – Specification – RSW, CCS
  – Professional *Installation* – FCIA Member, FM 4991 Approved, ULC Qualified Contractors
Qualité du processus : inspection, installation, maintenance, design.
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 & Maintenance
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…

Includes Fire Dampers, Fire Doors… and Continuity
National Fire Code of Canada

Division B – Part 2, Building and Occupant Fire Safety

Fire Separation **Integrity** Maintained - How Often?
- Yearly?
- Weekly?
- Monthly?
- Maintain Integrity

Fire Separation Repaired with what?
- Original Construction Code?
- Current Technology?
- Mud and Tape? Non Firestop Foam?
- Systems…or to as originally permitted.
Building & Fire Code Requirements

• *Build it Right*
  – Walls / Horizontal Assemblies – Continuity
    • Firestop Products Become Firestop Systems
      – Penetrations
      – Joints – Head / Bottom of Wall – Perimeter Fire Barriers
    • Fire & Smoke Damper Duct Systems
    • Fire Doors and Hardware Systems
      – Rolling & Swinging
    • Fire Rated Glazing
Continuity
Effective Compartmentation Features

New UL test standards for Life Safety Dampers will take effect in July 2002
Firestopping for Continuity

I – Classified Systems
Barrier Continuity SYSTEMS

• **Products Become Systems – Test Standards**
  – Fire & Smoke Barriers – Fire Separations
    • CAN/ULC S-101; ASTM E 119, UL 263
    • **Firestopping** - **ULC-S-115**, ASTM E 814 / UL 1479, UL 2079, E-1966, E-2307, E-2837, …test method…”
  – Fire/Smoke Dampers – **CAN/ULC-S 112**, UL 555, UL 555S
  – Swing/Rolling Fire Doors – **CAN4-S104**, S-105 Frames; S113 for 20 minute wood doors, UL10B/C,

• **SYSTEM Testing = Suitability statement**
Firestopping for Continuity
Products become SYSTEMS

• Firestopping…..After Installation Sport…
• ‘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
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 ???*
Barrier Continuity
Products become SYSTEMS

- Fire Rated Systems Directories –
  - FM Approvals
  - Intertek
  - UL Fire Resistance Directory

*Systems Selection & Analysis...Not as easy as it looks...*
Engineering Judgments/EFERRA

- 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* – “EFERRA”
- 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;

….plus another several pages..

www.FIRESTOP.org
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.
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 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.)

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?

- 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

Walls - BOTH SIDES

Tool/Smooth
3

STI Graphic
Joints and Seams

Head of Wall
Joints and Seams

I-Beam to Fluted Deck
Sleeved Pipes
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
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
Firestop Materials, Systems
Spec Physical Properties Needed

• Serve Building Needs
  – Smoke
  – Germs
  – Chemical Resistance – Cleaning?
  – Chemical, Biological, Radiation?

• Product Types
  – Intumescent, Latex, Silicone
  – Ablative
  – Endothermic

Graphics – 3M, STI, Nelson
Barrier Continuity
I – Installation – Listed Systems
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
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**
Spec Contractor Qualifications

- FM 4991 – Standard for the Approval of Firestop Contractors
- UL Qualified Firestop Contractors
- Other Industries???
- **FM 4991/UL-ULC CONTRACTORS UNDERSTAND SYSTEMS & DOCUMENTATION**
Why Contractor Qualifications?

• Built right the first time…
• **Documentation**
• SYSTEMS Selection, Analysis, As-Builts
  – F, T, L, W Rated Systems
  – Tolerances - Annular Space Sizes, Angles
  – Gap Sizes - Undercuts - Framing
  – Anchors - Spacing – Hardware
  – Closers - Activation Sensors, more…
FM 4991 & ULC QFC

- ULC Firestop Exam @ 80% min.
- Management System (MS) Written
- MS Procedures implemented
- Audit
  - Contractor Office - Records & Documents
  - Jobsite – Observation, possible destructive.
- DRI – Appointed by Contractor, CEU’s

Listed at www.UL.com – www.FCIA.org
Management Systems

• Facility Tour
• Review MS Manual
• Construction Documents Req’t’s and Review
  • Systems Selection & Analysis
• Procurement
• Storage, Handling, Preservation and Delivery
• Installation, Application and Field Quality Assurance Procedures
  • Systems Installation, Self Inspection/Survey
Management System

• Inspection, Testing and Calibration
  • Tape Measures
• Control of Nonconforming Product
• Training and Qualification of Staff
  • DRI’s, Workforce
• Corrective/Preventive Action
• Quality System Monitoring and Improvement
• Documentation and Record Keeping
  • 7 years
Firestop Installation & Inspection

- ASTM E 2174/ ASTM E 2393 – "Inspection Process"
I – Inspection – Options

• Contractor Self Inspection
  – Verify Management System validity

• Manufacturer Inspection?
  – Does not exist … Survey, maybe

• Special Inspection/Commissioning
  – ASTM E 2174 – ASTM E 2393
  – Independent 3rd Party
  – Destructive, Non Destructive
  – Specified Frequency
  – Inspection Agency Accreditation – IAS AC 291
I – Inspection – Options

• ASTM E 2174/2393 Firestop Inspection Standards
  – Independent 3rd Party
  – Destructive, Non Destructive
  – Specified Frequency
  – Inspector Qualifications
  – Inspection Agency Accreditation – IAS AC 291
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 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
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 or UL Firestop Exam
    - IFC 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
M – Maintenance
Starts at S - SPECS
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 SPECS

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

• Part II – Contractor 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 SPECS

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

• Part II – Qualifications – Inspection
  – Special Inspection Agency –
    • IAS AC 291 Accredited Special Inspection Agencies
  – Special Inspector Qualifications
    • FM Firestop Exam
    • UL Firestop Exam
    • AND
    • IFC Exam – ASTM E 3038
M–Barrier Management Systems
Starts with SPECS

- NEW Buildings – 07-84-00 Specs
- Part III – Execution
  - Firestop Inspection
    - ASTM E 2174 - Penetrations
    - ASTM E 2393 - Joints
Built Right = Maintain Right
Starts with SPECS

• Reference 01-78-00 Closeout Submittals
  – 01 78 13 Completion and Correction List
  – 01 78 19 Maintenance Contracts
  – 01 78 23 Operation and Maintenance Data
    – 01 78 23.13 Operation Data
    – 01 78 23.16 Maintenance Data
    – 01 78 23.19 Preventative Maintenance Instructions
Built Right = Maintain Right
Starts with SPECS

• 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
Built Right = Maintain Right
Starts with SPECS

• Why Specifications Division 01-78-00?
  – Fire Resistance Inventory STARTS HERE
    • Fire Rated Walls & Floors
    • Firestop Systems
    • Fire & Smoke Dampers
    • Fire Rated Rolling & Swinging Doors
    • Fire Rated Glazing
FCIA Canada Symposium
Fire Separations – Fire Resistance & Smoke Resistant Systems
M – Maintenance (& Management)
National Fire Code of Canada

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…

Includes Fire Dampers, Fire Doors…and Continuity
Firestop & Fire / Smoke Resistance

Fire Code

- What’s required?
- Maintenance
  - National Fire Code of Canada
    - Integrity Maintained
  - NFPA 101
    - Chapter 8....
  - ICC’s IFC
    - 703.1 Requires
    - 703.1 Compliance??
    - FCAC Proposals
A-2.2.6.2.(1) **Information Required on Drawings and Specifications.** Examples of information that should be shown on architectural drawings and drawings for heating, ventilating and air-conditioning systems are..

(n) the location and fire-resistance rating of required fire separations.

NOTE: This is the reason for of the FCIA National Fire Code Change…
National Fire Code of Canada

• **Division B – Part 2, Building and Occupant Fire Safety**
  • **Fire Separation Integrity Maintained - How Often?**
    – Yearly?
    – Weekly?
    – Monthly?
    – Maintain Integrity

• **Fire Separation Repaired with what?**
  – Original Construction Code?
  – Current Technology?
  – Mud and Tape? Non Firestop Foam?
  – Systems…or to as originally permitted.
National Fire Code of Canada

- Division B – Part 2, Building and Occupant Fire Safety
- Fire Separation & Features of Protection
- Gypsum Wallboard, Concrete Block, Concrete, Other Assemblies
- Fire Dampers
- Fire Rated Swinging & Rolling Doors
- Fire Rated Glazing
- Firestopping
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.
SECTION 703
FIRE-RESISTANCE-RATED CONSTRUCTION

703.1 Maintenance. The required fire-resistance rating of fire-resistance-rated construction, including, but not limited to, walls, firestops, shaft enclosures, partitions, smoke barriers, floors, fire-resistive coatings and sprayed fire-resistant materials applied to structural members and fire-resistant joint systems, shall be maintained. Such elements shall be visually inspected by the owner annually and properly repaired, restored or replaced where damaged, altered, breached or penetrated. Records of inspections and repairs shall be maintained.
703.1 Maintenance. (continued) Where concealed, such elements shall not be required to be visually inspected by the owner unless the concealed space is accessible by the removal or movement of a panel, access door, ceiling tile or similar movable entry to the space. 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. Openings through fire-resistance-rated assemblies shall be protected by self- or automatic-closing doors of approved construction meeting the fire protection requirements for the assembly.
SECTION 703
FIRE-RESISTANCE-RATED CONSTRUCTION

703.1 Maintenance. (continued) 703.1.1 Fireblocking and draftstopping. Required Fireblocking and draftstopping in combustible concealed spaces shall be maintained to provide continuity and integrity of the construction.

703.1.2 Smoke barriers and smoke partitions. Required smoke barriers and smoke partitions shall be maintained to prevent the passage of smoke. Openings protected with approved smoke barrier doors or smoke dampers shall be maintained in accordance with NFPA 105.

703.1.3 Fire walls, fire barriers and fire partitions. Required fire walls, fire barriers and fire partitions shall be maintained to prevent the passage of fire. Openings protected with approved doors or fire dampers shall be maintained in accordance with NFPA 80.
701 General – ALL Fire Resistance

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.
701.6, Continued...PC2

Records of inspections and repairs shall be maintained. Where concealed, such elements shall not be required to be visually inspected by the owner unless the concealed space is accessible by the removal or movement of a panel, access door, ceiling tile or similar movable entry to the space.
FCAC F113-16
2018 International Fire Code

• 703.1 Maintaining protection. Materials and firestop systems used to protect membrane- and through-penetrations in fireresistance-rated construction and construction installed to resist the passage of smoke shall be maintained.
703.1 … Continued. PC 1
The materials and firestop systems shall be securely attached to or bonded to the construction being penetrated with no openings visible through or into the cavity of the construction. Where the system design number is known, the system shall be inspected to the listing criteria and manufacturer's installation instruction.
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
Firestop Maintenance

• Maintenance
  – Code Required
  – How??

• How to keep Track – Barrier Management Initiative
  – Paper
  – Software
  – Labeling
Built Right = Maintain Right
WHEN SPECIFIED

• Why Specifications Division 01-78-00?
  – Fire Resistance Inventory REQUIRED -
    • Fire Rated Walls & Floors
    • Firestop Systems
    • Fire & Smoke Dampers
    • Fire Rated Rolling & Swinging Doors
    • Fire Rated Glazing
M–Barrier Management Systems
Policies

• Barrier Management Policy
  – Inventory
  – Monitor
  – Permits
  – Management
  – Request Budget to Meet Code Requirements
  – Implement Maintenance
    • In House (Rules)
    • Outside Contractor (Rules)
M–Barrier Management Systems Policies

- **Barrier Management Policy**
  - Inventory - Items to Survey
  - Fire-Resistance-Rated Walls and Floors
    - Breaches for Penetrations, Joints, Doors, etc.
    - Wall not completed at new construction?
    - Wall removed above ceiling?
  - Treat the breach, intersection, joint, gap, void, space, contact areas…
M–Barrier Management Systems
Starts with CONSTRUCTION

• **Fire-Resistance-Rated Walls & Floors**
  – Walls - U, V 400, 900 Designs
  – Floors – P Designs
  – Calculated Fire Resistance
  – Code Defined Fire Resistance - 720
    • Firestop Systems
    • Fire & Smoke Dampers
    • Fire Rated Rolling & Swinging Doors
    • Fire Rated Glazing
M–Barrier Management Systems Operations

• Items to Survey

• Fire-Rated Doors – Annually – NFPA 80
  – Close and Latch
  – Holes
  – Attach at Frame
  – Undercut & Astragals
  – Labels Legible
  – Labels recertified, requirements of 3rd party certification agency
M–Barrier Management Systems Operations

- **Firestop Systems** – Not Concealed Only
- **Through & Membrane Penetrations**
  - Joints
    - Wall to Wall
    - Floor to Floor
    - Head – Bottom of Wall
    - Continuity Head of Wall
  - Perimeter Fire Containment
M–Barrier Management Systems
Operations

• Firestop Systems – SYSTEMS
  – Visibly Comply with System
  – Visibly ‘sealed’
  – Without openings
  – Firestop Materials & Systems
  – Securely Attached
M–Barrier Management Systems
Items to Survey

Fire & Smoke, Ceiling, Radiation Dampers

• NFPA 80 –
• Initial Installation
• At 1 year, each 4 years,
• 6 years healthcare
  • Fire Dampers
  • Smoke Dampers
  • Combination Fire/Smoke Dampers
  • Ceiling Dampers
M–Barrier Management Systems

Items to Survey

• Fire Rated Glazing
  – Verify it’s still fire rated
  – Glazing / Frame Attachment
  – Frame attached to wall
  – Glazing Marking as Built
M–Barrier Management Systems
Items to Survey

• **Fire Resistance Inventory Systems**
  – Paper & Files
  – Spreadsheets
  – Software
M–Barrier Management Systems
Building Operational

• **Barrier Management Policy**
  – Repairs
    • As originally permitted and *approved*
    • *As required by Fire Code, Existing Building Code*
    • If SYSTEMS required, SYSTEMS REPAIRS
    • If no Systems, original materials.
    • Fire Official
    • Insurance Company
M–Barrier Management Systems

• Now it’s your building....

• Gleeson Powers Graphic
M–Barrier Management Systems

• **Barrier Management**
  – Issues...Budget???
  – Other Occupancies---Big Problem
  – Constant issues
  – Control?
  – Staff?
  – Manage?
Barrier Management HUB

• The HUB is Facility Director!

• HUB Controls Actions
  – C-Suite Execs – Budgeted Yearly
  – Construction –
    • In House Crews
    • Outside Contractors
  – I-T & Electrical Department –
    • In House Crews & Outside Contractors
Barrier Management
Policy Contents

• *Annual Line Item Budget*

• Rules of Engagement in Contracts
  • Internal Contracts
  • External Contracts

• Pre Construction Meetings

• Barrier Warnings - Markings

• Violation Consequences

• Ongoing Management

• Staff - Occupant Education
Barrier Management Policy Tool

• Contracts = Rules
  – Internal Contracts -
    • In House Departments similar to Outside Contractors
  – External Contracts
    • AIA Contract
    • Marked Fire - Smoke Barrier Actions
    • Barrier Permits
    • Documentation Systems
    • Report
M–Barrier Management Systems

• **Barrier Inventory Elements**
  – Life Safety Drawings
  – Existing Conditions Documented
  – Ongoing Survey Records
  – Deficiency Reports
  – Systems Documentation Control, Retrieval

• **ALL FIRE PROTECTION FEATURES**
M–Barrier Management Systems

• Barrier Repair Examples
Repair Small Holes

USG Photo
Gypsum Wallboard
Repair Large Holes

- USG Photo
M–Barrier Management Systems

• Electronic Best Practice Elements
  – Action Oriented
    • Projects - Specifications
    • Ongoing Surveys – FCIA RPPS 2010-1
  – Action Reminders
  – In Process Status
  – Record Retrieval
<table>
<thead>
<tr>
<th>LSR Data</th>
<th>Status</th>
<th>Latest Photo</th>
<th>Detail Description</th>
<th>Life Safety Tech</th>
<th>Life Safety Sub Group</th>
<th>Letters</th>
<th>Numbers</th>
<th>LSR Count</th>
<th>Notes</th>
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<tbody>
<tr>
<td>001</td>
<td>Non-compliant</td>
<td>![Image]</td>
<td>Firestopping Through Wall Penetration - Firestop</td>
<td>Firestopping</td>
<td>Through Wall Penetration</td>
<td>WL</td>
<td>1000-1999</td>
<td>1</td>
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<tr>
<td>002</td>
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<td>003</td>
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<td>Firestopping</td>
<td>Through Wall Penetration</td>
<td>WL</td>
<td>5000-5999</td>
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<td>WL</td>
<td>3000-3999</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
## Corrective Action Report

**Life Safety Type:** Firestopping  
**Life Safety Sub Type:** Through Wall Penetration - Firestop Systems  

<table>
<thead>
<tr>
<th>Penetration Type</th>
<th>Penetration Size</th>
<th>Annular Space</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMT or Conduit</td>
<td>Max 1&quot;</td>
<td>MIN: 0 to .50&quot;, MAX:</td>
</tr>
</tbody>
</table>

**Date Completed:** May-02-2011  
**Contractor:** Fire Barrier

**Permit is Issued:**  
**Is Contractor Qualified?** NO

**Qualified Contractor Installs Firestop Systems:**

**Qualified Contractor is Subcontracted:**

**Completed Work is reviewed for Compliance:**

**Firestop Installations Complaint?** NO

**Project Documentation is submitted as part of Closeout:**

**Suggested CA Notes:** Install UL Listed Firestopping System at penetration/joint

---

**Survey Photo**

- **Side:** 3C1  
  - **Photo ID:** 37296  
  - **Photo Notes:**

- **Side:** 3L1  
  - **Photo ID:** 37297  
  - **Photo Notes:**

---

**Survey Photo**

- **Side:** 3C1  
  - **Photo ID:** 37298  
  - **Photo Notes:**

- **Side:** 3L1  
  - **Photo ID:** 37299  
  - **Photo Notes:**

---

**Survey Date:**

---

**Gleeson Powers Graphic**
Barrier Management Policy Tool

• Pre Construction Meetings - Education
  – Barrier Markings Mean...
  – Actions when at Barriers Required...
    • Permit required – Above Ceiling, Barrier Hole...
    • Infection Control Rules
    • Healthcare facility Rules
Barrier Management
Policy = Tool
Barrier Management Policy = Tool to Comply w/NFC

• “Integrity Maintained…..”
  – Building Owner and Manager Responsibility
  – Continuous Maintenance
  – Manage Breaches in Fire Separations
    • At Penetrations, Voids, Gaps
  – Barriers - Fire Separation Permits?
Barrier Management
Policy Tool

• Violation Consequences
  – In House –
    • 2 strikes & work reassignment to cleaning…
    • Others…

  – Outside Contractors
    • 2 strikes & not allowed to work above ceilings
    • Others…
Barrier Management Policy Tool

• Control Access to Fire Separation Work
  – In House –
    • Carpenters, Electricians, Plumbing/HVAC
  – Outside Contractors
    • Carpenters, Electricians, Plumbing/HVAC
    • Firestop Contractors
Barrier Management Policy Tool

• Process
  – Apply to perform work at barriers.
  – Permits by Project, Area, Building
  – Permit reviewed:
    • Service compliance
    • Fire Resistance compliance
  – Permit Granted
    • Sleeve Band on people
    • Ladder Stickers
    • Paper
    • Electronic Files
  – Notify Area of Work to commence/finish
  – Permit Expiration Dates
Barrier Management Policy Tool

• Who Finds Violators….
  – Staff Awards
  – Occupant Awards
  – Governmental Officials
  – Visitors
Barrier Management Policy Tool

• Ongoing Management
  – Engineering Staff Reviews
  – User Staff Reviews
  – Inside Construction
  – Outside Contractor
Barrier Management
Policy Tool

• Education - Staff Repairs – Simple??
  – Fire Doors & Hardware – Simple things…
    • Close & Latch
    • Holes in Door
  – Fire Damper Testing?
  – Firestopping Surveys?
  – Ladder = ?? Permit Sticker?
  – Fire Rated Walls – Breaches/Holes - TREAT
    • Accidental
    • Workers
Barrier Management Policy Tool

• Budgets…
  – Sprinkler Maintenance
  – Alarms Maintenance
  – Security
  – Fire and Smoke Resistant Assemblies
    • Doors
    • Dampers
    • Firestops
    • Glazing
    • Walls/Floors
“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
Proper **‘DCIIM’** Means Reliable Systems…

**• Properly Designed** - A/E - Consultant
  – Tested and Listed Systems, FCIA Member Mfr’s., Compartments to NBC/NFC, Provincial Mods
  – *Specified by RSW, CCS, CDT*

**• Properly Coordinated & Installed**
  – FCIA Member, FM 4991, or ULC *Qualified Contractors*

**• Properly Inspected**
  – ASTM E 2174 & ASTM E 2393,
  – *Inspectors, who Passed the FM or UL Firestop Exam, IFC*
  – *IAS AC 291 Accredited Inspection Firms*

**• Properly Maintained & Managed** –
  – FCIA Member, FM 4991, or UL-ULC Qualified Firms
  – Surveys by FCIA Member, FM, UL Qualified, IAS Accredited
Effective Compartmentation is a SYSTEM

New UL test standards for Life Safety Dampers will take effect in July 2002
Contacts

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Hillside, IL – +1-708-202-1108 - office
Bill McHugh – bill @ fcia.org
FCIA Canada Symposium
Fire Separations – Fire Resistance & Smoke Resistant Systems