Firestopping
Barrier Management Symposium™
Summary

Bill McHugh, FCIA
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Details

• Emergency Exits
• Restrooms
• Mobile Phones…
Objective – Share Knowledge

• Barriers are for Safety – IF DIIM’D
  • Properly *Designed* and Specified
    – *Tested and Listed Systems* – Directories, Tables
    – *Specified*
  • Professional *Installation* Companies, Workforce
  • Properly *Inspected* – by Companies, Workforce
  • *Maintained* – *Organizations, Workforce*
    – NFPA 101 - (TJC, CMS)
    – International Fire Code - IFC 2012 - 2015- Annually (Local)

• *Effective Compartmentation for Fire & Life Safety*
Barrier Management Symposium

• **World Travelled Faculty – Summary Today**
  
  – Bill McHugh, FCIA
  – Rich Walke, UL, Testing, Glazing
  – Lennon Peake, Koffel Associates, Barriers
  – Nestor Sanchez, Gypsum Assoc., USG Corp.
  – Bill McHugh, FCIA – Firestopping
  – Laura Frye, DHI – Fire Doors
  – Marc Sorge, Greenheck – Fire & Smoke Dampers
  – Bill McHugh & Rich Walke, UL – Fire Rated Glazing
  – Bill McHugh, Barrier Management Systems
  – Don Murphy, FCIA
Barrier Management Symposium

...at no cost to the attendee...
“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 – Firestop Contractors International Association

- FCIA Members
  - Firestop Contractors
  - Firestop Manufacturers
  - Firestop Consultants
  - Firestop Distributors, Reps, Friends
- FREE MOP/Spec - Specifiers @ AE, Independent
- FREE Life Safety Digest
- 3rd Party Contractor/Inspection Company Accreditation Programs
- Chair, ASTM Inspection Standards
- Tools for Specifiers
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
Building & Fire Code Requirements

• Compartmentation Codes – US –
  – Fire Resistance – Time, in minutes or hours that materials or assemblies have withstood a fire exposure as determined by tests, methods based on tests, or this code …. NFPA, Ch 8. ICC adds… “Systems”
Building & Fire Code Requirements

- Compartmentation Codes – US –
  - Ch. 8 – NFPA & Ch. 7 IBC
    - *IBC & NFPA - ASTM E 119, UL 263 - Fire-resistance-ratings*
    - IBC Ch. 7 - **Fire Barrier** – Hourly Rated
    - IBC Ch. 7 - **Fire Wall** – Fire Rating, Structural independence
    - Ch. 7 IBC – **Fire Partition** – Rated, not continuous.
    - Ch. 8 NFPA/NFPA 221–**High Challenge Fire Walls**
Barrier Management Symposium
It’s about Effective Compartmentation
FIRE/SMOKE BARRIER FUNDAMENTALS FOR HEALTH CARE FACILITIES

Lennon Peake
Koffel Associates, Inc.
www.koffel.com
wkoffel@koffel.com
Objective

• Identify the different types of barriers used in health care facilities
• Identify the key characteristics for each barrier
  – Continuity
  – Protection of openings
• List at least three strategies that can be used to improve a barrier management program
Types of Wall Assemblies

- Exterior walls
- Fire walls
- Fire barriers
- Fire partitions – No such assembly in NFPA
- Smoke barriers
- Smoke partitions
Fire Tested wall Assemblies

- In accordance with ASTM E119/UL263
- Resist passage of heat and hot gases
- Structural integrity during the test fire
- Have something left at the end of the test
Five Points

• Required fire-resistance rating
• Continuity
• Openings and penetrations
• Types of materials
• Structural robustness
Fire Barriers

- Fire barriers are used in the following applications:
  - Fire area separations
  - Mixed occupancy separations
  - Incidental use areas
  - Hazardous area separations
  - Exit enclosures
  - Shaft enclosures
  - Horizontal exits
  - Corridor walls – NFPA only
Support

• Supported by construction with the same fire-resistance rating as the fire barrier
• Some exceptions
  – Vary between NFPA and ICC
# Summary of Fire Barriers

<table>
<thead>
<tr>
<th>Issue</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required Fire-Resistance Rating</td>
<td>Depends upon specific use</td>
</tr>
<tr>
<td>Required continuity</td>
<td>Floor/ceiling below to deck above</td>
</tr>
<tr>
<td>Openings</td>
<td>General: Aggregate glazing area (or width) &lt;25% wall area/length; maximum size 120 sf. Specific: Rules based on use of barrier</td>
</tr>
<tr>
<td>Types of materials</td>
<td>As required for the type of construction</td>
</tr>
<tr>
<td>Robustness of structural system</td>
<td>If load bearing, fire tested with load</td>
</tr>
</tbody>
</table>
Smoke Barriers

• Smoke barriers are used in the following applications:
  – Group I-2
  – Group I-3
  – Areas or refuge
  – Other specific applications
## Summary of Smoke Barriers

<table>
<thead>
<tr>
<th>Issue</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required Fire-Resistance Rating</td>
<td>1-hour with the exception that a construction of a minimum 0.1” thick steel in Group I-3 buildings is allowed</td>
</tr>
</tbody>
</table>
| Required continuity                              | Horizontal: Outside wall to outside wall  
Vertical: Floor to slab or deck above, continuous through interstitial spaces  
Supporting construction may be required based upon the applicable codes |
| Openings                                        | 20 minutes – but not a true fire door in NFPA 101  
Smoke- and draft-controlled doors tested in accordance with UL 1784 – IBC only |
| Types of materials                               | As required for the type of construction |
| Robustness of structural system                 | If load bearing, fire tested with load |
Smoke Partitions

- Smoke partitions are used in the following applications:
  - Corridor walls in Group I-2 – IBC only
  - Sprinkler protected hazardous areas – NFPA
# Summary of Smoke Partitions

<table>
<thead>
<tr>
<th>Issue</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required Fire-Resistance Rating</td>
<td>Not required (unless otherwise required)</td>
</tr>
</tbody>
</table>
| Required continuity           | Floor/ceiling below to deck above or tight to underside of ceiling membrane designed to limit passage of smoke  
                               - Difference between NFPA/ICC for ceiling tiles                          |
| Openings                      | Windows: Sealed to resist free passage of smoke  
                               Doors: No louvers  
                               Air leakage rated (UL 1784) – IBC???  
                               Self closing, or automatic closing by smoke detectors                      |
| Types of materials            | As required for the type of construction                                    |
| Robustness of structural system | If load bearing, fire tested with load                                      |
LS Drawing Information

ZONE H01-04
EXISTING HEALTH CARE
COMPLETE SPRINKLER PROTECTION
180' SQ FT

ZONE H01-09
EXISTING HEALTH CARE
COMPLETE SPRINKLER PROTECTION
625' SQ FT

ZONE H01-08
NEW HEALTH CARE
COMPLETE SPRINKLER PROTECTION
1762' SQ FT

Blue dashed line clearly indicates extent of zones

EQUIVALENCY
UTILITIES RUN IN EXIT PASSAGEWAY

STAIR 6

STAIR 8

STAIR 4

STAIR 3

STAIR 9

ZONE H01-08
EXISTING HEALTH CARE
COMPLETE SPRINKLER PROTECTION
1125' SQ FT

12H01-009

12H01-007
Build it correctly!!
Testing of Fire Resistance and Smoke Resistant Assemblies

Rich Walke
UL Codes and Advisory Services
Fire-Resistance-Rated Construction
Code Requirements

• IBC Section 703.2 – Fire-resistance ratings shall be determined in accordance with ANSI/UL 263 or ASTM E119

• LSC 8.2.3.1 – The fire resistance of structural elements and building assemblies shall be determined in accordance with test procedures set forth in NFPA 251 (i.e. ANSI/UL 263 or ASTM E119)
Fire Resistance

- Expressed as an Hourly Time Period
- Ratings range from 1/2 to 4 hours
- Containment of Fire to Room or Floor of Origin
Through- and Membrane-Penetration Firestop Systems
Fire-Resistance-Rated Construction

Establishing an L Rating
Opening Protectives

• Fire Door Assemblies

• Fire Window Assemblies
Conditions of Acceptance – Walls

- Flame passage
- 250°F / 325°F
- Support load
- Hose stream
Where Are Listings Found?

Hard Copy

CD-ROM

Online
Successful strategies

• **BUILD IT CORRECTLY**
  – Thorough plan review process
  – Contractor qualifications
  – Commissioning systems and buildings
    • NFPA 3, NFPA 4, ASHE documents, pending ICC std.
  – Complete SOC documentation while contractor still on site
  – Use of certified special inspectors
Building & Fire Code Requirements

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

• Smoke Barriers
  – Healthcare
  – Other Occupancies

• NFPA 101 – Smoke Resistance & Firestops
  – Ch. 8 NEW Addition
  – NOT in Occupancy Chapters .... yet

• IBC – Ch. 7
  – Quantified L Rating for Firestops
Building & Fire Code Requirements

• Compartmentation Codes – US
  – Smoke Barrier – **Firestopping for Continuity**
    • IBC – Hourly Rated, “L” Rating, Ambient, 400F
      – <5cfm/sf (IBC 2006) … OR…
      – < 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-ated.
  – 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

• **Build it Right**
  – 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
Continuity
Effective Compartmentation Features

New UL test standards for Life Safety Dampers will take effect in July 2002
Barrier Management Symposium

April 14, 2015

Nestor Sanchez, USG Corporation
Learning Objectives

1. Explore the gypsum mineral and its impact on fire resistance in a systems basis
2. Understand the different types of gypsum core and their relation to fire resistance
3. Determine recognized methods for repair installed gypsum panels
4. Innovative Technology
Three (3) Types of Gypsum Cores

• Regular Core
• Type X
• Type C
Repair Small Holes

[Diagram showing repair of small holes with existing gypsum panel, runner, patch, and type "S" screw.]
Repair Large Holes

Partial Elevation - 1
Barrier Continuity SYSTEMS

• **Products Become Systems – Spec References**
  – Fire & Smoke Barriers - ASTM E 119, UL 263
  – Fire/Smoke Dampers - UL 555, UL 555S
  – Swing/Rolling Fire Doors - UL 10B, 10C
  – Fire Rated Glazing - UL 9

• **SYSTEM Testing = Suitability statement** for use of a product in a specific **system** application
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
Products become Systems
Hose Stream = Shock Test
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/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 – “EFRRIRA”
  – Based on engineering, IFC Protocol
IFC Guidelines for Evaluating Engineering Judgment Guidelines

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

As such, IFC developed *Recommended IFC Guidelines for Evaluating FireStop Systems in Engineering Judgments*. 
IFC EJ Guidelines - Engineering Judgments for firestop systems should:

1. Not be used in lieu of tested systems when available;

2. Be issued only by a firestop manufacturer’s qualified technical personnel or in concert with the manufacturer by a knowledgeable registered Professional Engineer, Fire Protection Engineer, or an independent testing agency that provides listing services for firestop systems;

3. Be based upon interpolation of previously tested firestop systems that are either sufficiently similar in nature or clearly bracket the conditions upon which the judgment is to be given. Additional knowledge and technical interpretations based upon accepted engineering principles, fire science and fire testing guidelines (e.g. ASTM E 2032 – Standard Guide for Extension of Data from Fire Endurance Tests, ULC Subject C263E – Criteria for Use in Extension of Data from Fire Endurance Tests, or ASTM E2750 – Standard Guide for Extensions of Data for Penetration Seals) may also be used as further support data;
IFC EJ Guidelines

Engineering Judgments for firestop systems should:

4. Be based upon full knowledge of the elements of the construction to be protected, the understanding of the probable behavior of that construction and the recommended firestop system protecting it were they to be subjected to the appropriate Firestop Standard Fire Test method for the rating indicated on the Engineering Judgment;

5. Be limited only to specific conditions and configurations upon which the engineering judgment was rendered and should be based upon reasonable performance expectations for the recommended firestop system under those conditions;

6. Be accepted only for a single, specific job and project location and should not be transferred to any other job or project location without thorough and appropriate review of all aspects of the next job or location’s circumstances.
IFC EJ Guidelines - Basic Presentation Requirements

Proper EJ’s should:

1. Be presented in appropriately descriptive written form with or without detail drawings where appropriate;

2. Clearly indicate that the recommended firestop system is an EJ;

3. Include clear directions for the installation of the recommended firestop system;

4. Include dates of issue and authorization signature as well as the issuer’s name, address and telephone number;

5. Reference tested system(s) upon which design (EJ) is based on;

6. Identify the job name, project location and firm EJ is issued to along with the non-standard conditions and rating supported by the EJ;
IFC EJ Presentation Guidelines – What’s Seen?

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

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

a. Basic, Common
   - Type(s) of assembly used or being penetrated;
   - Rating supported by the EJ.

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

c. Joints
   • Joint Width (installed width, nominal)
   • Movement Capability;
   • Movement Class (thermal wind sway, seismic);
   • Accessory item(s) (i.e. insulation type, thickness and compression, etc.)
IFC EJ Presentation Guidelines – What’s Seen?

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

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

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

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

Walls - BOTH SIDES

STI 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
Physical Properties Needed

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

• Product Types
  – Intumescent, Latex, Silicone
  – Ablative
  – Endothermic
Barrier Continuity
I – Installation – Listed Systems
I- Installation
Who’s Responsible, How to Choose???
Spec Contractor Qualifications

• Any Company
• FCIA Member
• 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…
Installation & Inspection

Duct w/Pink FBGL

ST23-8a  ST23-8e
I – Inspection – Options

• Contractor Self Inspection
  – Verify Management System validity

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

• Special Inspection/Commissioning
  – Independent 3rd Party
  – Destructive, Non Destructive
  – Specified Frequency
  – Inspection Agency Accreditation – IAS AC 291
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 – 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 – ASTM E 3038
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 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
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
M – Maintenance (& Management)
Fire Code Requires Fire & Smoke Resistance Maintenance

- International Fire Code
- NFPA 101
- National Building Code of Canada
- UAE Fire and Life Safety Code of Practice

- Minimum Requirements Stated

- Frequency
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.
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.
703.1 Maintaining protection. Materials and firestop systems used to protect membrane- and through-penetrations in fire-resistance-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
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

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  – www. FCIA .org

• Part II – 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
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Starts with CONSTRUCTION

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• **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 – ASTM E 3038
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 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 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
Built Right = Maintain Right WHEN SPECIFIED

• Why Specifications Division 01-78-00?
  – Fire Resistance Inventory REQUIRED -
  – F-113-16 – 2018 International Fire Code
  – Section 703.1 becomes 701.1
    • Fire Rated Walls & Floors
    • Firestop Systems
    • Fire & Smoke Dampers
    • Fire Rated Rolling & Swinging Doors
    • Fire Rated Glazing
M–Barrier Management Systems

• Why Manage Barriers?
• International Fire Code
• International Property Maintenance Code
M–Barrier Management Systems
ICC’s IPMC

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.

International Existing Building Code
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?
M–Barrier Management Systems Policies

• “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.

• [IFC 2015, 703.1]
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 Department –
    • In House Crews & Outside Contractors
Barrier Hub = Facility Director?

• YOU answer to…
  – Other AHJ’s
  – C-Suite
  – Occupants, Students, Faculty, Patients
  – Building Official, Fire Marshal
  – Insurance Company
  – The Joint Commission
  – CMS Inspectors
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
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
Sample Project

Project is assigned to Contractor or Contractor evaluates Project Barrie RS?

11 Finish Fire Barrier Permit is issued to Contractor Is Contractor Qualified? Qualified Contractor Installs Firestop Systems Qualified Contractor is subcontracted Completed Work is reviewed for Compliance Firestop Installations Complaint? Project Documentation is submitted as part of Closeout

YES

NO

YES

NO

YES

Gleeson Powers Graphic
Barrier Management Policy

Code Guidance

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.
Barrier Management Policy Tool
– Barrier Warnings on ASSEMBLIES
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

• 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

• Find Violators….
  – Staff Awards
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
  - Ladder = ?? Permit Sticker?
  - Fire Rated Walls - Holes
    - 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
“DIIM”

- Barriers are for Safety – DIIM
  - Properly *Designed* and Specified
    - *Tested and Listed Systems* – Directories,
  - Professional *Installation* - Companies
  - Properly *Inspected* – Commissioned
  - *Maintained* - Annually –
    - NFPA 101
    - International Fire Code
    - International Property Maintenance Code
    - It’s required by Code
    - Minimize Liability
    - Protect Occupants
Effective Compartmentation is a SYSTEM

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

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