Barrier Management

FCIA Webinar
2016-04-14
Barrier Management Symposium
Effective Compartmentation Features

New UL test standards for Life Safety Dampers will take effect in July 2002
World Travelled Faculty
- Jonathan Flannery, ASHE Advocacy
- Anne Guglielmo, The Joint Commission
- Rich Walke, UL
- Bill Koffel, Koffel Associates
- Nestor Sanchez, USG Corp.
- Rich Walke, UL - Concrete Industry
- Bill McHugh, FCIA – Firestopping
- Paul Baillargeon, DHI – Fire Doors
- Marc Sorge, Greenheck – Fire & Smoke Dampers
- Tim Warren, TGP – Fire Rated Glazing
- Others…. 
Details – Jonathan Flannery

• Objective – YOU
• Speakers Volunteer
Why is ASHE Educating with TJC?

- Identified Problem
- Passion for Patient Safety
- Trusted Industry Resource

**ASHE Mission**
Dedicated to optimizing the health care physical environment
2015

BARRIER MANAGEMENT
SYMPOSIUM

Anne Guglielmo, Engineer
Department of Engineering
The Joint Commission
Barrier Management Symposium

Free Symposium
Sept 5-6
Steamboat Springs, CO
Hosted By CAHED

Learn about
Design, Installation,
Inspection & Maintenance
of Rated Barrier Systems in
Healthcare Environments

The safety and welfare of patients depends on many things, including a healthcare environment that is fire safe.
BARRIER MANAGEMENT SYMPOSIUM

Program Developers:
- Joint Commission
- Firestop Contractors International Association
- Underwriters Laboratories

Participating Organizations:
- American Society for Healthcare Engineering
- Gypsum Association
- Fire Damper Industry
- Fire Rated Glazing Industry
- Door & Hardware Institute
<table>
<thead>
<tr>
<th>Standard</th>
<th>2014 Non Compliance</th>
<th>2013 Non Compliance</th>
</tr>
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<tbody>
<tr>
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## Top Scored Standards

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<tr>
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Barrier Management Symposium

...at no cost to the attendee...
#4 LS.02.01.20

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<tr>
<th>EP</th>
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<th>Issue</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Door</td>
<td>Locking</td>
</tr>
<tr>
<td>2</td>
<td>Door</td>
<td>Swing</td>
</tr>
<tr>
<td>3</td>
<td>Horizontal exits</td>
<td>Requirements</td>
</tr>
<tr>
<td>4</td>
<td>Outside stair</td>
<td>Building protection</td>
</tr>
<tr>
<td>5</td>
<td>Horizontal exit: door</td>
<td>Requirements</td>
</tr>
<tr>
<td>6</td>
<td>Horizontal exit</td>
<td>Fire jump</td>
</tr>
<tr>
<td>8</td>
<td>Exit</td>
<td>Discharge</td>
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<tr>
<td>9</td>
<td>Stair doors</td>
<td>Hold open</td>
</tr>
<tr>
<td>10</td>
<td>Doors</td>
<td>New boiler rooms, mechanical rooms, and heater rooms</td>
</tr>
<tr>
<td>EP</td>
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<td>Issue</td>
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<tr>
<td>----</td>
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<tr>
<td>1</td>
<td>Building type</td>
<td>Construction type</td>
</tr>
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<td>3</td>
<td>Rated walls</td>
<td>Features</td>
</tr>
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<td>4</td>
<td>Rated walls</td>
<td>Openings</td>
</tr>
<tr>
<td>5</td>
<td>Rated doors</td>
<td>Features</td>
</tr>
<tr>
<td>6</td>
<td>Doors</td>
<td>Protective plates</td>
</tr>
<tr>
<td>7</td>
<td>Doors</td>
<td>Coverings</td>
</tr>
<tr>
<td>8</td>
<td>Ducts</td>
<td>Penetration</td>
</tr>
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<td>9</td>
<td>Penetrations</td>
<td>Firestopping</td>
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<td>EP</td>
<td>Assembly Affected</td>
<td>Issue</td>
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<td>Vertical openings</td>
<td>Protection</td>
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<tr>
<td>2</td>
<td>Hazardous areas</td>
<td>Walls &amp; doors</td>
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<tr>
<td>3</td>
<td>Gift shop</td>
<td>Protection</td>
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<td>6</td>
<td>Corridor partitions</td>
<td>Features</td>
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<tr>
<td>7</td>
<td>Corridor walls, new</td>
<td>Limit transfer of smoke</td>
</tr>
<tr>
<td>8</td>
<td>Fire windows in corridor walls</td>
<td>Features</td>
</tr>
<tr>
<td>9</td>
<td>Corridor doors</td>
<td>Features</td>
</tr>
<tr>
<td>10</td>
<td>Corridor doors</td>
<td>Plates</td>
</tr>
<tr>
<td>11</td>
<td>Corridor doors</td>
<td>Features</td>
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#9 LS.02.01.30

<table>
<thead>
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<th>Issue</th>
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<tr>
<td>12</td>
<td>Corridor walls</td>
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<td>16</td>
<td>Smoke barriers</td>
<td>Features</td>
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<td>18</td>
<td>Smoke barriers</td>
<td>Features</td>
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<tr>
<td>19</td>
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<td>Features</td>
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<td>Smoke barriers</td>
<td>Duct penetrations</td>
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<td>Smoke barriers</td>
<td>Damper protection</td>
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<td>22</td>
<td>Smoke barriers; smoke doors</td>
<td>Window opening rating</td>
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<td>23</td>
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<td>Features</td>
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<td>Assembly Affected</td>
<td>Issue</td>
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<tr>
<td>8</td>
<td>Linen &amp; waste chute inlet doors</td>
<td>Protection</td>
</tr>
<tr>
<td>9</td>
<td>Linen &amp; waste chute inlet &amp; discharge doors</td>
<td>Features</td>
</tr>
<tr>
<td>10</td>
<td>Linen &amp; trash chutes discharge door</td>
<td>Features</td>
</tr>
<tr>
<td>11</td>
<td>Linen &amp; waste chutes discharge</td>
<td>Separation</td>
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# TOP 10 CITED STANDARDS: 2011 – 2014

<table>
<thead>
<tr>
<th></th>
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<td>EC.02.06.01: Built Environment</td>
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<td>EC.02.05.01: Utility Systems Risks</td>
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<td>LS.02.01.20: Means of Egress</td>
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<td>EC.02.03.05: Fire Safety Systems</td>
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<td>#6</td>
<td>#6</td>
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<td>EC.02.02.01: Haz Materials &amp; Waste</td>
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<td>#11</td>
<td>#11</td>
<td>#15</td>
</tr>
</tbody>
</table>
DEPARTMENT OF ENGINEERING
630 792 5900

George Mills, MBA, FASHE, CEM, CHFM, CHSP, Green Belt
Director

Anne Guglielmo, CFPS, CHFM, CHSP LEED, A.P.
Engineer

John Maurer, SASHE, CHFM, CHSP
Engineer

Kathy Tolomeo, CHEM
Engineer

James Woodson, P.E., CHFM
Engineer
THE JOINT COMMISSION DISCLAIMER

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These slides are only meant to be cue points, which were expounded upon verbally by the original presenter and are not meant to be comprehensive statements of standards interpretation or represent all the content of the presentation. Thus, care should be exercised in interpreting Joint Commission requirements based solely on the content of these slides.

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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
• Required fire-resistance rating
• Continuity
• Openings and penetrations
• Types of materials
• Structural robustness
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
• Supported by construction with the same fire-resistance rating as the fire barrier

• Some exceptions
  ▪ Vary between NFPA and ICC
<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 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>
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</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 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 in 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
18017 SQ FT

ZONE H01-09
EXISTING HEALTH CARE
COMPLETE SPRINKLER PROTECTION
6231 SQ FT

ZONE H01-06
NEW HEALTH CARE
COMPLETE SPRINKLER PROTECTION
17628 SQ FT

STAIR 8

STAIR 4

STAIR 3

STAIR 9

STAIR 8

STAIR 8

STAIR 8

ZONE H01-08
EXISTING HEALTH CARE
COMPLETE SPRINKLER PROTECTION
11325 SQ FT

12H01-007

12H01-009

Blue dashed line clearly indicates extent of zones.
BUILD IT CORRECTLY!!
SUCCESSFUL STRATEGIES

• BUILD IT CORRECTLY
  ▪ Thorough plan review process
  ▪ Contractor qualifications
  ▪ Commissioning systems and buildings
    o NFPA 3, NFPA 4, ASHE documents, pending ICC std.
  ▪ Complete SOC documentation while contractor still on site
  ▪ Use of certified inspectors or special inspectors
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
Standards

- ANSI/UL 263
- ASTM E119
- NFPA 251 (Withdrawn)
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
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
Gypsum Core Types

Three (3) Types of Gypsum Cores

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

Partial Elevation - 1

Line of patch removal

Existing gypsum panel

Existing gypsum panel

Stud
Bill McHugh, Executive Director
Firestop Contractors International Association
Hillside, IL – +1-708-202-1108 - office
Bill McHugh – bill @ fcia.org
Firestopping for Continuity

I – Systems

SECTION A-A

1. Floor or Wall Assembly—Min 3/4 in. thick Lightweight or normal weight 1000 to 1700 psi concrete. All significant through openings in floor or wall assembly to be sealed with 1 3/4 in. of closed cell flexible high density foam insulation between layers or 2 in. of high density concrete fill. Min 2 in. of dense, non-combustible 1400 psi concrete fill around all penetrations. See Section A-A, Fig. 2 for details.

2. Through Penetration Product—Min 4 in. thick for window, door, or larger opening, Min 2 3/4 in. thick for smaller openings. Min 2 in. thick for smaller openings. Min 1 3/4 in. of dense, non-combustible 1400 psi concrete fill around all penetrations. See Section A-A, Fig. 2 for details.

3. Fill & Cavity Material—Min 2 in. thick for window, door, or larger opening, Min 1 3/4 in. thick for smaller openings. Min 1 3/4 in. of dense, non-combustible 1400 psi concrete fill around all penetrations. See Section A-A, Fig. 2 for details.

NT34A-1a, NT34A-7b, NT34A-7a, NT34A-1b
Firestopping for Continuity
I – 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**

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

• What are Firestop *Systems*?
• ‘Field Erected Construction…Tested to…’
  – **F Rating** - Flame
  – **T Rating** – Temperature
  – **H Rating** – Hose (Always)
  – **L Rating** – Smoke
  – **W Rating** – Water

Graphics – 3M
Products become Systems
Hose Stream = Shock Test
U.L. SYSTEM NO. CAJ1155
METAL PIPE THROUGH A SLEEVE IN CONCRETE FLOOR OR WALL

F RATING = 3-HR.
T RATING = 0-HR.
L RATING AT AMBIENT = LESS THAN 1 CFM/SQ. FT.
L RATING AT 400°F = 4 CFM/SQ. FT.

1. FLOOR OR WALL ASSEMBLY:
   A. MINIMUM 4-1/2" THICK LIGHTWEIGHT OR NORMAL WEIGHT CONCRETE FLOOR.
   B. U.L. CLASSIFIED CONCRETE BLOCK WALL (MINIMUM 8" BLOCK).

2. PENETRATING ITEM TO BE ONE OF THE FOLLOWING:
Firestopping for Continuity
Products become Systems

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

*Systems Selection & Analysis…Not as easy as it looks…*
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. ‘
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
Firestop Materials, Systems & Physical Properties

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

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

Graphics – 3M, STI, Nelson
QUALITY PROCESS

- Design
- Installation
- Maintenance
- Inspection
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
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
Firestop Installation & Inspection

Duct w/Pink FBGL

ST23-8a

ST23-8e
Firestop Installation & Inspection

- ASTM E 2174/ ASTM E 2393 – "Inspection Process"
[A] 110.4 Inspection agencies. The building official is authorized to accept reports of approved inspection agencies, provided such agencies satisfy the requirements as to qualifications and reliability. [IBC 2015,110.4]

[A] 110.6 Approval required. Work shall not be done beyond the point indicated in each successive inspection without first obtaining the approval of the building official….More. [IBC 2015 110.6]
I – Inspection –
Code Requirements

Definitions

APPROVED AGENCY. An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved.

[IBC 2015, 202.2 Definitions]

APPROVED. Acceptable to the building official or authority having jurisdiction.

[IBC 2015, 202.2 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 2015, 202.2 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. [IBC 2015, 1703.1]
I – Inspection – Code 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 2015, 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 2015, 1703.1.2]
1703.1.3 Personnel. An approved agency shall employ experienced personnel educated in conducting, supervising and evaluating tests and/or inspections.

[IBC 2015, 1703.1.3]
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 2015, 1704.2]
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.

[IBC 2015, 1704.2.1 ]
I – Inspection –

Code Requirements

1705.16 Fire-resistant penetrations and joints. In high-rise buildings or in buildings assigned to Risk Category III or IV in accordance with Section 1604.5, special inspections for through-penetrations, membrane penetration firestops, fire resistant joint systems, and perimeter fire barrier systems that are tested and listed in accordance with Sections 714.3.1.2, 714.4.1.2, 715.3 and 715.4 shall be in accordance with Section 1705.16.1 or 1705.16.2. [IBC 2015, 1705.16 ]
Firestop Systems Inspection
ASTM E 2174 - ASTM E 2393

- “Standard Practice for On-Site Inspection of Installed Firestops
  - Breaches by Penetrations (2174) and Joints (2393)
  - Standard Inspection Procedure
  - Inspection Agency Companies
  - Report to Contractor, Building Owner, (Authorizing Agency)
Inspection - 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**
Inspection - Qualifications
IAS AC 291 Accreditation

• Inspection Firm shall have at least one ...
  – 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
IAS AC 291 Accredited Inspection Agencies

• Specify IAS AC 291 –
  – Quantified Qualifications
  – Helps AHJ with “Approved Agency”
  – Not in ASTM Standards, Code

• Specify Individual Certifications
  – 3rd Party, Independent Exams verify Knowledge
    • FM Firestop Exam
    • UL Firestop Exam
Inspection 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
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… notified 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
1704.2.4 Report requirement. Special inspectors shall keep records of inspections. The special inspector shall furnish inspection reports to the building official, and to the registered design professional in responsible charge. Reports shall indicate that work inspected was or was not completed in conformance to approved construction documents. Discrepancies shall be brought to the immediate attention of the contractor for correction. If they are not corrected, the discrepancies shall be brought to the attention of the building official and to the registered design professional in responsible charge prior to the completion of that phase of the work. A final report documenting required special inspections and correction of any discrepancies noted in the inspections shall be submitted at a point in time agreed upon prior to the start of work by the applicant and the building official.
Inspection Final Report
ASTM E 2174 - ASTM E 2393

• Name, address, location – project, installer, inspector
• Type and quantity of firestops inspected
• Verification method
• Percentage Deviation
• Copies of all documents sent to Authorizing Agency
Firestopping & Compartmentation for Safety
Firestopping & Compartmentation for Safety

- Inspection Agency
  - Copies of all documents sent to Authorizing Agency
- Firestop Contractor
  - Product Data Sheets & Installation Instructions
  - ‘SYSTEMS’, Fire Resistance-Rated Assemblies As Built
  - Inspection Documents
  - Warranty Documents
  - Maintenance Requirements
  - Certificate of Compliance to Specs
  - FCIA Member in Good Standing Certificate
Why Specify Inspection?

- **DIIM** – ‘II’ of Quality Process
  - Install, **Inspect**

- Verify Field Installations

- **Specify Accredited Inspection Agencies**
  - IAS AC 291 – Accreditation Criteria for Special Inspection Agencies

- **Individuals Educated & Trained**
  - 3rd Party Exam, Approved Source
  - FM or UL Firestop Exam
Design

QUALITY PROCESS

MAINTENANCE

INSTALLATION

INSPECTION
07-84-00 Specifications (FREE @ FCIA.org)

MasterFormat - 07 84 00 - Firestopping

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

- **Part II** – Firestop Products – Testing, Physical Properties to protect breaches in fire resistance-rated and smoke resistant...
  - Penetrations & Fire Resistance Rated Joints –
  - Perimeter Fire Containment Joints

- **Part III, Execution, Quality Assurance (DIV 1 Reference)**
  - ASTM E 2174 & ASTM E 2393 Inspection
  - IAS AC 291 Accredited Inspection Agency
    - Individual on staff passed FM or UL Firestop Exam
Inspecting Swinging Fire Doors with Builders Hardware

A Practical Guide for AHJ's and Facility Management Personnel

Paul Baillargeon, DSSF/ DHI
Top 10 Deficiencies
Swinging Fire Doors

- Painted or missing fire door labels
- Poor clearance dimensions around the perimeter of the door in the closed position
- Kick down door holders
- Auxiliary hardware items that interfere with the intended function of the door
- Fire door blocked to stay in the open position
- Area surrounding the fire door assembly blocked by furniture, equipment, and/or boxes
- Broken, defective, or missing hardware items (e.g., latch bolts, strike plates, closer arms, cover plates, etc.)
- Fire exit hardware installed on doors that are not labeled for use with fire exit hardware
- Missing or incorrect fasteners
- Bottom flush bolts that do not project 1/2-inch into the strikes
Care and Maintenance

- Replacing door frames, doors, and builders hardware
  - Meets the requirements for fire protection
  - Meets the requirements for new installations

- Replacing glass and glazing products
  - New glass and glazing products are required to be labeled
  - Existing glass and glazing products are permitted to be replaced with same (e.g., 1/4-inch wire glass can be replaced with same)
Field Modifications

- NFPA 80, Chapter 5 contains provisions for field modifications
  - Contact the testing laboratory whose label is on the product being modified
  - Verify the proposed work does not compromise the integrity of the door assembly
  - Might not require field inspection by testing laboratory
Safety Inspections of Fire Door Assemblies

- Inspections are required to be performed by a qualified person.

- Qualified Person:
  - “A person who, by possession of a recognized degree, certificate, professional standing, or skill, and who, by knowledge, training, and experience, has demonstrated the ability to deal with the subject matter, the work, or the project.”

- AHJs need to have confidence in the expertise of the persons performing NFPA 80’s safety inspections.
Index of Fire Door Assemblies

- Assign each fire door a unique identifier
  - Door number
  - Bar code
Documentation

- **Acceptance Testing**
  - Initial installation
  - After maintenance work

- **Safety Inspections**
  - Annual safety inspections
  - Performance-based inspections
Documentation

➢ Acceptance Testing records
  o Retained for life of installation
    • Before Certificate of Occupancy is issued
    • After maintenance work is performed

  o Format that survives the retention period
    • Digital (secured – can’t be edited)
    • Paper

  o Signed by inspector(s) and kept for AHJ’s review
Documentation

- Safety Inspections
  - Format that survives the retention period
  - Minimum retention period of 3 years
  - Signed by inspector and kept for the AHJ’s review.
Corrective Actions

- Inspection reports
  - Inspector’s recommendations for repairing fire doors

- Minor corrective actions
  - Replacing and/or tightening fasteners
  - Adjusting doors and hardware
    - Shimming doors to correct excessive clearance gaps
    - Adjusting door closers
    - Aligning latching hardware with strike plates
  - Filling unused fastener holes
Steel Door Frames  5.2.3.5.2(1)

➢ Frame Condition
  o No unused fastener holes.
  o Frame jamb extends to floor. No space between bottom of frame and floor.
  o Fasteners installed in miters of knock down frames.
Steel and Wood Doors  5.2.3.5.2(2)

- No broken welds on rails or stiles of steel doors.
- No holes in faces and edges of steel doors.
- Verify face of door for delaminating of face skins from core of door.
Glazing

4.4.1

- Glazing beads securely fastened/no missing fasteners.

- Labeled light kits secured fastened - no missing fasteners.

- Correctly sized fire rated glazing installed.
Hinges, Continuous Hinges, Pivots

6.4.3.1

- Labeled or listed.
- Steel hinges and pivots.
- Ball Bearing hinges.
- Spring Hinges (must be labeled on fire doors)
- Door must fully close from an open position of 30 degrees with spring hinges.
Fire Exit Hardware  6.4.4.2.1

- Must bear fire exit hardware label

- Latch bolt projects the required distance into the strike
  - 1/2-inch minimum or as required by the manufacturer

- No missing parts
  - lever, knob
  - end caps
  - Strikes
  - bottom rods
  - fire pin
Blockage  5.2.3.5.2(10)  

- Area around door must remain clear of any materials
Door Wedges  5.2.3.5.2(10)

- Manual blocking open of doors is not permitted
  - Kick-down door holders
  - Friction door holders
  - Overhead door holders
  - Hold open arms on door closers
  - Furniture, trash cans, fire extinguishers, etc…
Decorations  5.2.3.5.2(13)

- Decorations can cause premature door failure due to additional fuel added to fire loading of door
Swinging Fire Door Assemblies
2 Basic Rules

Rule #1
- All fire door assemblies shall consist of:
  - Labeled door frames
  - Labeled fire doors
  - Labeled or listed hardware & glazing

Rule #2
- Any field modification to a labeled product must be approved by the testing laboratory that labeled or listed the product or component
Marc Sorge, Mark Belke
Fire Damper Agenda

- Installation/Configuration
  - Fire Dampers
  - Smoke Dampers
  - Combination Fire/Smoke Dampers

- Operational Test/Inspection
- Periodic Test/Maintenance
What is it?

Labels
Installed with sleeves

- factory or field mounted
- sleeve requirements
Smoke Damper Construction

- **Type**
  - multi-blade
  - 3-V or airfoil blade

- **Construction**
  - blade and jamb seals
  - *always* with a UL-approved actuator
Smoke Damper Actuators

- **Mounting**
  - must be factory mounted
  - internal or external

- **Operation**
  - spring return
  - two position or modulating
Purpose of Fire/Smoke Damper

- Provide the same level of protection as individual fire and smoke dampers.

- Installation guidelines of fire and smoke dampers apply.
Operational Test

NFPA 80
Standard for Fire Doors and Other Opening Protectives

Frequency
“After the installation of a damper is completed, an operational test shall be conducted.”

Test Method
“The damper shall fully close from the open position.”

“The operational test shall verify that there is full and unobstructed access to the fire damper and all listed components.”

“All indicating devices shall be verified to work and report to the intended location.”

“The operational test shall be conducted under non-fire HVAC airflow conditions as well as static flow conditions.”
Operational Test

NFPA 105

Standard for the Installation of Smoke Door Assemblies and Other Opening Protectives

Frequency

“An operational test shall be conducted after the building’s HVAC system has been balanced.”

Test Method

“The operational test shall be conducted under normal HVAC airflow conditions as well as static flow conditions. The damper shall fully close/seal under both test conditions.”

“All indicating devices shall be verified to work properly and report to the intended location.”

“Combination fire/smoke dampers shall also meet the testing requirements contained in NFPA 80.”
Fire, Smoke, and Combination Fire Smoke Dampers
2015

Barrier management Symposium

Anne Guglielmo, Engineer
Department of Engineering
The Joint Commission
Barrier Management Program: Policy, Permit, Educate and Inspect

- Policy:
  - Define
    - Scope
    - Authority
    - Management process
  - Interim Life Safety Measures
  - Pre-construction Risk Assessment
Deficiency Resolution

- Deficiency Resolution Options:
  - Correct it immediately
  - Correct it within 45 days
    - Management process that documents the deficiency and actions to resolve
    - ILSM must be considered
  - Plan For Improvement located in the Statement of Conditions™
    - Corrected within 6 months of the Projected Completion Date
    - ILSM must be considered
Interim Life Safety Measures

- Order of Standards (LS.01.02.01)
  - EP 1 & 2 regardless of ILSM policy
  - EP 3 must clearly define the ILSM policy including
    - AFS 10 Process
    - When to implement
    - What to do to protect occupants
    - Both construction related and non-compliance with the LSC
  - EPs 4 – 14 align with policy and implementation strategies
Preconstruction Risk Assessment (PRA)

Construction or renovation in occupied healthcare facilities can result in environmental problems such as:

- Noise
- Vibration
- Creation or spread of contaminants
- Disruption of essential services
- Emergency Procedures
- Air quality
Barrier Management Program: Policy, Permit, Educate and Inspect

- Permit
  - Follows policy
  - Define when permits are issued
  - Define criteria for awarding permits
  - Define permit display requirements
  - Define scope of permit: where the work is being done
  - Define time frame for the permit will expire
Barrier Management Program:
Policy, Permit, Educate and Inspect

- **Educate**
  - Facilities staff
    - Components of the Barrier System
    - Maintenance of the Components
  - All other staff
    - Barrier System awareness
    - Permit awareness
  - Contractors
    - Barrier Management expectations
Barrier Management Program: Policy, Permit, Educate and Inspect

- Inspect
  - Establish inspection frequencies
    - Hospital experience
    - Reliability Centered Maintenance
  - Document inspection activities
  - Management inspections
    - Verify quality
    - Modify program as needed
George Mills, MBA, FASHE, CEM, CHFM, CHSP, Green Belt
  Director

Anne Guglielmo, CFPS, CHFM, CHSP, LEED, A.P.
  Engineer

John Maurer, CHFM, CHSP, SASHE
  Engineer

Kathy Tolomeo, CHEM
  Engineer

James Woodson, P.E., CHFM
  Engineer
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M – Maintenance ( & Management)
Firestop Maintenance

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

• **How to keep Track – Barrier Management Initiatives**
  Paper
  Software
  Labeling
SECTION 4.5.8 Maintenance, Inspection, and Testing.

4.5.8.1 Whenever or wherever any device, equipment, system, condition, arrangement, level of protection, fire-resistive construction, or any other feature is required for compliance with the provisions of this Code, such device, equipment, system, condition, arrangement, level of protection, fire-resistive construction, or other feature shall thereafter be continuously maintained in accordance with applicable NFPA requirements or requirements developed as part of a performance-based design, or as directed by the AHJ. [NFPA 101-2012:4.6.12.1]
• 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. [NFPA 101-2012:4.6.12.5]
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.
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, Marking & Identification Systems

FCIA recommends Barrier Management Systems and Identification/Marking Systems (Labels, Tags.) for Effective Compartmentation and Structural Protection

Includes Fire Dampers, Fire Doors…and Continuity
Barrier Maintenance

• Maintenance
  – Code Required
  – How??

• How to keep Track – Barrier Management Initiative
  – Paper
  – Software
  – Labeling
Barrier Management Begins when new construction ends...
M–Barrier Management Systems

• Now it’s your building....

• Gleeson Powers Graphic
WHAT NEEDS TO BE MAINTAINED?

- Fire Resistive Wall Construction
- Fire Doors
- Fire Dampers
- Firestop Systems:
  - Joint Systems
- Hot and Cold Water Piping
- Laboratory Waste
- Medigas Piping
- Pneumatic Tubing
- Sprinkler Piping
- Rigid Electrical Conduits
- Cable Trays
- BX Cables
- Low Voltage Cables
- and More....
  - Low Voltage!!!!
Barrier Management
Policy = Tool

- ASHE Member Healthcare Engineer &
  Director Communicates...
  - Rules of Engagement in Contracts
    - Internal Contracts
    - External Contracts
  - Pre Construction Meetings
  - Barrier Warnings - Markings
  - Violation Consequences
  - Ongoing Management
  - Staff Education & Incentives
Sample Permit – Area
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<th>Status</th>
<th>Latest Ph...</th>
<th>Detail Description</th>
<th>Life Safety T...</th>
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<td>Suggested CA Notes: Install UL Listed Firestopping System at penetration/joint</td>
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| Survey Photo | Side: 2: 3L1 | Photo ID: 37297 |

| Corrective Action Photo | Side: 1: 3C1 | Photo ID: 37298 | Photo Notes: |
| Corrective Action Photo | Side: 2: 3L1 | Photo ID: 37299 | Photo Notes: |

05/02/2011
Barrier Management
Policy Tool

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

• Education - Healthcare Staff
  – Fire Doors & Hardware – Simple things…
    • Close & Latch
    • Holes in Door
  – Ladder = ?? Permit Sticker?
  – Fire Rated Walls - Holes
    • Accidental
    • Workers
M–Barrier Management Systems

• Barrier Management
  – TJC # 1 & 2 Violations
  – Constant issues
  – Control?
  – Staff?
  – Attitude?
Barrier Management HUB

• A HUB must control all Action
  – C-Suite Execs
  – Construction – In House & Outside
  – I-T Department – In House & Outside

• The HUB is YOU!
Why Barrier Hub is YOU?

• YOU answer to…
  – The Joint Commission
  – CMS Inspectors
  – Building Official, Fire Marshal
  – Other AHJ’s
  – C-Suite
  – Staff
  – Patients
M–Barrier Management Systems

• Barrier Management Policy - Tool
• ASHE Member Healthcare Engineer & Director Communicates…
  – In House Construction & I-T Crews
  – Outside Contractors
Barrier Management
Policy = Tool

• ASHE Member Healthcare Engineer & Director Communicates...
  – Rules of Engagement in Contracts
    • Internal Contracts
    • External Contracts
  – Pre Construction Meetings
  – Barrier Warnings - Markings
  – Violation Consequences
  – Ongoing Management
  – Staff Education & Incentives
Barrier Management Policy Tool

− Rules of Engagement in Contracts

• Internal Contracts -
  − In House Departments similar to Outside Contractors

• External Contracts
  − AIA Contract
  − Marked Fire - Smoke Barrier Actions
  − Barrier Permits
  − Documentation
  − Report
M–Barrier Management Systems

• **Methods to Control**
  – Paper, Pictures & Files
  – Electronic Pictures & Files
    • ‘Custom’
    • ‘Packages’
M–Barrier Management Systems

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

• Document & Control

• Fire Resistance Rated & Smoke Resistant
  – Barrier Walls, Floors
  – Firestop Systems - Penetrations & Joints
  – Fire Doors – Rolling & Swinging
  – Fire Rated Glazing
  – Fire/Smoke, Combination Dampers
“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
Continuity
Effective Compartmentation & Features

New UL test standards for Life Safety Dampers will take effect in July 2002
Objective – Share Knowledge

• Barriers are for Safety – DIIM
  • Properly *Designed* and Specified
    – *Tested and Listed Systems* – Directories, Tables
    – *Specified*
  • Professional *Installation* Companies, Workforce
  • Properly *Inspected* – by Companies, Workforce
  • *Maintained* –
    – NFPA 101 - 2000 (TJC, CMS)
    – International Fire Code - IFC 2012 - Annually  (Local)

• *Effective Compartmentation for Fire & Life Safety*
### ASHE Day Program

**Barrier Management Symposium – AGENDA**

**Kahler Grand Hotel – 20W. 2nd Avenue – Rochester, MN 55902 - Heritage Hall**

**April 14 & 15, 2015**

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Topic</th>
<th>Speaker</th>
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</thead>
<tbody>
<tr>
<td><strong>April 14</strong></td>
<td><strong>MONDAY</strong></td>
<td></td>
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<tr>
<td>1:00 pm – 1:30 pm</td>
<td>Welcome &amp; Remarks</td>
<td>• ASHE Region, Jonathan Flannery, ASHE Advocacy Bill McHugh, FCIA</td>
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<tr>
<td>1:30 pm – 1:45 pm</td>
<td>TJC Perspective ‘Systems’</td>
<td>• Anne Guglielmo, The Joint Commission</td>
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<tr>
<td>1:45 pm – 2:45 pm</td>
<td>Barrier Fundamentals &amp; Systems</td>
<td>• Bill Koffel, Koffel Associates, Representing FCIA</td>
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<tr>
<td>2:45 pm – 3:00 pm</td>
<td>BREAK</td>
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<tr>
<td>3:00 pm – 4:00 pm</td>
<td>Testing for Fire Resistance and Smoke Resistant Systems</td>
<td>• Rich Walke, UL – testing &amp; certification of all components of fire resistance rated assemblies including wall, ceiling and features for Fire &amp; Smoke Barrier Continuity</td>
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<td>4:00 pm – 4:45 pm</td>
<td>Gypsum Fire Resistance</td>
<td>• Gypsum Industry - Nestor Sanchez, USG Corp.</td>
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<tr>
<td>4:45 pm – 5:00 pm</td>
<td>BREAK</td>
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<tr>
<td>5:00 pm – 5:30 pm</td>
<td>Concrete &amp; Masonry</td>
<td>• Rich Walke, UL – Fire Resistance Rated Assemblies and tested systems from directories, equivalent thicknesses from the International Building Code.</td>
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| **April 15** | **TUESDAY** |                                                      |                                                                         |
| 9:00 am – 9:15 am | Welcome & Announcements |                                                   |                                                                         |
| 9:15 am – 10:30 am | Firestopping – Penetrations and Joints | • Firestop Industry - Bill McHugh, Firestop Contractors International Association |
| 10:30 am – 10:45 am | BREAK |                                                      |                                                                         |
| 10:45 am – 12:00 pm | Swinging Fire Doors & Hardware | • Swinging Door Industry - Paul Baillargeon, Door and Hardware Institute’s Door Safety & Security Foundation |
| 12:00 pm – 1:00 pm | LUNCH |                                                      |                                                                         |
| 1:00 pm – 2:00 pm | Fire & Smoke Dampers | • Fire and Smoke Damper Industry - Marc Sorge, GREENHECK, Inc. |
| 2:00 pm – 2:15 pm | BREAK |                                                      |                                                                         |
| 2:15 pm – 3:00 pm | Fire Rated Glazing | • Fire Rated Glazing Industry – Tim Warren, Technical Glass Products |
| 3:00 pm – 3:30 pm | Barrier Management Systems Options | • Anne Guglielmo, The Joint Commission Bill McHugh, FCIA |
| 3:45 pm – 4:00 pm | Barrier Management Symposium Wrap-up | • ASHE Region, Jonathan Flannery, ASHE Bill McHugh, FCIA |
Barrier Management

FCIA Webinar

2016-04-14