FCIA Firestopping, Fireproofing
DIIM &
Effective Compartmentation
TIAC / ACIT

19 August 2013
Firestopping and Compartmentation
Fire & Life Safety 2013

Firestop Contractors International Association
Hillside, IL USA – 708-202-1108 – Office

Bill McHugh, FCIA Executive Director
bill @ fcia.org

FCIA Board Members from Canada…
Ken Slama, National Firestop Ltd.
Winnipeg, MB

Randy Perry, Past FCIA Board Member
Edmonton, AB – Randy@adlerfirestopping.com

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Learning Objectives

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

1. Recognize Perimeter Fire Containment, Penetration, Joint Product Design/Testing, **Installation & Inspection & Management** Standards & Code Requirements for Firestopping … to become a ‘System’.

2. Focus on Perimeter Fire Containment for Curtainwalls

3. Understand Requirements for Firestopping for Safety in the US and Canada

4. Section 07 84 00++ Highlights

5. Learn about ‘Why Compartmentation and Firestopping”.

6. Compartmentation & Structural Protection, Insulation and Abatement
Purpose of Associations…

• Body of Knowledge
• Educational Opportunities
• Certifications
• Industry Advocacy
• Share Best Practices
• Relationships…
Presentation Outline

– FCIA – A Trade Association
– Total Fire Protection & Effective Compartmentation
– Codes, Testing, Products – Materials = Systems
– Firestopping & Compartmentation for Safety

**A ‘DIIM’ Quality Protocol**
- Properly Designed and Specified Firestopping – 07-84-00
- Professional Installation – FM & ULC
- Properly Inspected – ASTM E 2174, ASTM 2393
- Maintained & Managed (Inspected) Annually by FCIA Member Contractors (Coordinated too)

– **Total Fire Protection Systems Concept…**
Introducing FCIA – History

- 1998/1999 – FCIA Formed, 1st FCIA Meeting – UL Chicago
- 2000 - FCIA Technical Committee – Manual of Practice
- 2000 - FCIA Accreditation Committee & FM Approvals Develop FM 4991 – 1st Firestop Exams
- 2001 - FCIA Code Consultant - Koffel Associates
- 2003 - FCIA Inspection idea becomes ASTM E 2174 & ASTM E 2393
- 2004 – MasterSpecs, FM 4991 – FCIA in Toronto; FCIA – CSC & CSI
- 2005 – Life Safety Digest Launches
- 2006 – FCIA in Montreal
- 2007 – FCIA & UL/ULC Qualified Firestop Contractor Program – Apprenticeship Initiatives
- 2011 – FCIA in Abu Dhabi, FCIA Firestop MOP Updates – FCIA @ ULC
- 2012 – FCIA in Dubai, more MOP Updates, Apprenticeship Videos – FCIA @ CSC Ottawa, ULC
- 2013 – FCIA in Canada - @ CSC & 2 CSC Chapters, @ Ottawa, TIAC, FCIA at Abu Dhabi, UAE and Doha, Qatar, Muscat, Oman

FCIA @ TIAC-ACIT
Who’s FCIA?

- FCIA – Worldwide Association
- Firestop Contractors, Manufacturers, Consultants, Reps, Distributors,
- FCIA Website Resources - FREE
- FCIA MOP on PDF FREE to Specifiers, Architects, Bldg./Fire Officials
  - www.fcia.org
FCIA at TIAC - ACIT

- FCIA Membership Reflects Activity…
  317 Members…worldwide, Committee Actions
FCIA at TIAC - ACIT

• FCIA Committees
  – Technical & Education – MOP, FCIA & UL TFPS'
  – Accreditation – FM, UL, ULC & IAS
  – Apprenticeship – US Dept. of Labor; CAN Ministry Code
    ICC, NFPA, IAPMO, NBC
  – Marketing – Relationships, Shows
  – Program – Committee work, Education
  – Legislative – Track, Advocate
  – Standards – ASTM, IAPMO, UL STP’s – Reality Check
FCIA at TIAC - ACIT

• FCIA Membership Benefits
  – FCIA Committee Participation
  – FCIA.org Website – 1500+/Mo. Visits
    • Member Lists - #1 Google
    • FCIA FM, UL, IAS Contractor Lists
    • Members Only Access
  – Build Industry Together
  – Relationships …
    • Friends at TIAC-ACIT, CSC, ULC
FCIA at TIAC - ACIT

FCIA Membership Means ……..

– Industry Interest
  • FCIA Advocacy
  • FCIA Publications – Enews, LSD

– Industry Investment
  • FCIA Firestop Manual of Practice
  • FCIA Conferences
    – Education & Committee Action
    – Firestop Industry Conference & Trade Show

– “Focus on Specialty Firestop Contractors”
  • Knowledge, Value, Expertise
FCIA at TIAC - ACIT

• FCIA Membership Benefits
  – Work, Grow, Relationships, Fun …
FCIA at TIAC - ACIT

• FCIA Members at this Conference
  Contractors
  – Adler Insulation Ltd. – Adler Firestopping – AB
  – NEXLEVEL (Custom Insulation)- ON
  – Dew Point Insulation Systems – ON
  – Fuller Austin Inc. – SK
  – Keating Insulation, Inc. – ON – THANKS!!
  – National Firestop, Ltd. (Thermo Applicators)– MB
  Associates/Manufacturers
  – Dispro, Inc. – QC
  – GlassCell Isofab, Inc. - ON
  – Specified Technologies, Inc. – NJ
  – TemproTec - AB
The FCIA’s mission is for member organizations to be recognized throughout the construction industry as preferred quality contractors of life safety firestop systems. Membership Benefits

Looking for a Firestop Professional? For the best Firestop Contractors, Manufacturers, Consultants, Distributors, Reps, and more, FCIA.org Member List is the place for you. Firestopping, Fire / Smoke Damper Inspections, Fire Door Inspections, Fire Rated Glazing, Fire Rated Expansion Joints, Fire Rated Wall and Floor Systems, Fireproofing.

FCIA Member Lists

Contractors with Canada operations

For the best in Specialty Firestop Contractors, click on a company name on the Contractor List. For other member types, choose on the links to the right. For detailed company information, click on the company name.

Specialty Firestop Contractor firms service new and old structures, providing firestopping, fire damper testing, fire door inspections, fire rated glazing, repair of existing fire resistance rated construction, photoluminescent marking systems, and much more.


Sort by company or state

A/T Firestop Solutions Inc.
Victor Wootton
Member Since July 1, 2006

Absolute Completions
(UL qualified)
Murray Aldred
Member Since October 1, 2008

Adler Firestopping

Ottawa, ON (613) 355-3845

Calgary, AB (403) 668-4142

Acheson (780) 962-9495
FCIA at TIAC-ACIT

- 36 FCIA Member Contractors in Canada
  - 5 ULC Qualified Firestop Contractors
  - Several in process…
FCIA Members by Source Industry?

- **Insulation**
  - Pipe/Duct Covering
  - Curtainwall & Building Insulation
  - Attic insulation
- **Sealants and Waterproofing, Roofing**
- **Structural Steel Fireproofing**
- **Firestopping**
FCIA Member Revenue by Industry

- Institutional
  - Healthcare
  - Education
- Hotel/Motel
- High Rise
  - All types...
- Industrial
  - Steel Mills
  - Pulp and Paper
  - Mining
- Other Occupancies
FCIA Member Workforce

- Firestop / Containment Worker Local 1

- Union Signatory Contractors
  - Carpenters
  - Insulators
  - Laborers
  - Pointers & Caulkers

- Non-Union Contractors

- FCIA is ‘Union/Non-Union Neutral’…

- Contractor Company Memberships
FCIA Firestop Industry Focus

- FIRESTOP CONTRACTOR COMPANY
  - Who has Financial Risk?
  - Who has Operational Risk?
  - Who buys WC, GL Insurance?
  - Who provides direction, Quality Control?
  - Who pays the workforce?
  - Who has to bill, collect? Pays the suppliers?
FCIA Industry Focus

• **FIRESTOP CONTRACTOR COMPANY**
  – Manufacturers, Distributors, Consultants role becomes valuable with knowledgeable customer
  – Firestop / Containment Workers…

• **FCIA Firestop Apprenticeship Education Program**

• Firestop Industry Conference & Trade Show, Albuquerque, NM USA Nov. 5-8
FCIA in Canada - 2013

- FCIA Educational Symposium in Ottawa
  - 2 days, NRC Tour
  - NRC, ULC, FCIA Members, Education & FM/ULC Exams
- FCIA @ Construction Specifications Canada (3x)
- FCIA @ ULC
- FCIA @ TIAC – ACIT –
- FCIA @ National Master Specifications
- Canadian Content at FCIA Conferences
  - NRC, CHES
FCIA Industry Focus

• **FIRESTOP CONTRACTOR COMPANY**
  – FM 4991, Standard for the Approval of Firestop Contractors
  – UL / ULC Qualified Firestop Contractor Programs
  – FCIA Firestop Containment Worker Education
  – FCIA Member in Good Standing
• FM 4991/ULC Qualified Contractors in Specs
• **NOT FM 4991/ULC Qualified Contractor?**
  – More Inspection to ASTM E 2174/ASTM E 2393?
  – More oversight?

  – *Company Driven, with Individual Component*
FCIA Members...

• Effective Compartmentation & Fireproofing Maintenance Contractors
  – Firestopping Surveys and Reconstruction
  – Fire Rated Swinging and Rolling Door Inspection & Maintenance
  – Fire and Smoke Damper Testing & Maintenance
  – Fire Rated Glazing Surveys
  – Fire Rated Wall (Barrier) Reconstruction
  – Structural Steel Fireproofing

• Barrier Management Initiatives

  – *Why Not Firestopping/Fireproofing Company?*
Firestop Maintenance

Barrier Management Symposium

Benefits
Over the past years non-compliance of barrier systems in healthcare buildings has resulted in findings by The Joint Commission. This Symposium was created by the Firestop Contractors International Association, UL and the Joint Commission to provide free education to those responsible for the management of barriers.

Barriers are more than walls. A continuous barrier includes the wall assembly, door/hardware/frames, windows (rated glazing), floors, openings, and penetration and joint systems. Managing the barrier as a continuous system through sound management principles is the goal of this Symposium.

FREE TO ATTENDEES

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

Participating Organizations
- AWCI & Gypsum Institute
- American Society for Healthcare Engineering
- Door and Hardware Institute
- Firestop Contractors International Association
- Fire Damper Industry
- Fire Rated Glazing Industry
- The Joint Commission
- National Concrete Masonry Association
- Underwriters Laboratories

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

BARRIER MANAGEMENT SYMPOSIUM
Contact the Joint Commission
ph 630 792 5901 | www.jointcommission.org

Penetration Firestopping

Faculty will present a topic based on their expertise

I. Introduction to Fire Safety
II. Design, Testing & Code
III. Installation
IV. Inspection
V. Maintenance
VI. Barrier Management System
VII. Conclusion

There is no cost to attendees

Design & Installation
- Design of Barrier Systems based on accepted practice and compliance with the National Fire Protection Association codes
- Correct installation of protective systems provides continuity to breached rated barriers

Inspection & Maintenance
- Ensuring the existing barrier is properly protected using commissioning, ongoing survey and documentation
- Maintaining existing barriers is based on sound management strategies, such as restricting access and routine maintenance surveys

The Joint Commission
ASHE
FCIA
UL
DIIM Means.

Proper ‘DIIM’ Effective Compartmentation Means Reliable Systems…

• **Properly Designed** - A/E, Firestop Consultant
  – Tested and Listed Systems, *Specified by RSW, CCS, CDT*
  – Tested to ULC-S-115

• **Properly Installed**
  – FCIA Member in Good Standing, “ULC or UL Qualified Contractors, FM 4991 Approved Contractors”

• **Properly Inspected**
  – ASTM E 2174 & ASTM E 2393, by IAS Qualified Inspectors at IAS AC 291 Accredited Inspection Firms

• **Properly Maintained and Managed** –
  – FCIA Member, FM 4991 Approved, or ULC – UL Qualified Contractor
FCIA &
“TOTAL FIRE PROTECTION”

• Effective Compartmentation
  – Fire Barriers, Walls/Floors, Smoke Barriers &
  – Firestopping, Fire Dampers, Swinging and Rolling Fire Doors, Fire Rated Glazing

• Detection & Alarm Systems

• Sprinkler Suppression Systems

• Education & Egress–
  – Building Managers, Occupants and Firefighters
Code Requirements

- **Canadian National Building Code – (NBC)**
  - New and Existing Buildings – 2005 & 2010
- **US, Middle East, Caribbean, Parts of Asia**
  - International Building Code (ICC’s IBC) – Chapter 7
    - New Construction
  - International Fire Code (IFC) – Chapter 7
    - Existing Buildings, Enforced by Fire Marshal
      - NFPA 5000 – NFPA 101- Chapter 8

- **Minimum requirements for Construction & Maintenance**
Code Requirements

National Building Code of Canada (NBC)

The Canadian Commission on Building and Fire Codes (CCBFC):
  – Volunteers appointed by NRC
  – Regulators, construction industry & public interest
  – 2009 Cycle Finished…published November 2010
  – 2015 Cycle Starting…

Oversees the code development system
Code Requirements

• National Building Code of Canada
  – NBCC 2005
    • Adopt Entirety
  – NBCC 2005
    • Adopt With Amendments
    • Publish Provincial Code based on National Code
  – NBCC 2010
Compartmentation Codes – NBC

– *Fire separation* means a construction assembly that acts as a barrier against the spread of fire.
  • Division A:1.4.1.2, NBCC 2005
    – Appendix A,
      » A *fire separation* may or may not have a fire-resistance rating.
Compartmentation Codes – NBC

- **Division A, 1.4.1.2**
- *Fire resistance rating means the time in minutes or hours that a material or assemblies of materials will withstand the passage of flame and the transmission of heat when exposed to fire under specified conditions of test and performance criteria, or as determined by extension or interpretation of information derived therefrom as prescribed in this Code.*

- **CAN/UL-S101, Standard Methods of Fire Endurance Tests of Building Construction Materials**
Compartmentation Codes – NBC

Compartmentation Codes
NBCC - 3.1.8.1.(1)(b)

Although a fire separation is not always required to have a fire-resistance rating, the fire separation should act as a barrier to the spread of smoke and fire until some response is initiated.

NEW 2010: When choosing products for fire stopping, the physical characteristics of the material used at the joints as well as the nature of the assembly and its potential movement should be taken into consideration.

If the fire-resistance rating of a fire separation is waived on the basis of the presence of an automatic sprinkler system, it is intended that the fire separation will be constructed so that it will remain in place and act as a barrier against the spread of smoke for a period of time until the sprinklers have actuated and controlled the fire.

• CAN/UL-S115 Listed Systems – NOTE: L-Rating.
Compartmentation Codes – NBC

3.1.8.1 – Barrier to control Smoke Spread

Although a fire separation is not always required to have a fire resistance rating, the fire separation should act as a barrier to the spread of smoke and fire until some response is initiated. If the fire resistance rating of a fire separation is waived on the basis of the presence of an automatic sprinkler system, it is intended that the fire separation will be constructed so that it will remain in place and act as a barrier against the spread of smoke for a period of time until the sprinklers have actuated and controlled the fire."

CAN/UL-S115 with “L” Rating
Compartmentation Codes – NBC

NBCC - 3.1.8.1. - General Requirements

1) Any wall, partition or floor assembly required to be a fire separation shall
   a) except as permitted by Sentence (2), be constructed as *continuous* element, and
   b) as required in this part, have a fire-resistance-rating as specified (see appendix A)

2) Openings in a *fire separation* shall be protected with closures, shafts or other means in conformance with Articles 3.1.8.4-7.
Compartmentation Codes – NBC

• 3.1.8.3 – Continuity
  – The continuity of a fire separation shall be maintained where it abuts another fire separation, a floor, a ceiling, a roof or an exterior wall assembly. (Appendix A, 3.1.8.3)
  
  – 9.10.9.2 Continuous Barrier
Compartmentation Codes – NBC

• 3.1.8.3 (4) Fire Separation Continuity – The continuity of a fire separation where it abuts against another fire separation, a floor, a ceiling or an exterior wall assembly is maintained by filling all openings at the juncture of the assembles with a material that will ensure the integrity of the fire separation at that location.

• 9.10.9.2 Continuous Barrier
3.1.9.1. Fire Stopping of Service Penetrations

Except as required by Sentences (2) and (3), and permitted by sentences (4) and (5), penetrations of a fire separation or membrane forming part of an assembly required to have a fire resistance rating shall be

a) **sealed by a fire stop system** that, when subjected to the fire test method in CAN/UL-S115, “Fire Tests of Firestop Systems,” has an F rating not less than the fire-protection rating required for closures in the fire separation in conformance with Table 3.1.8.4., or (50pa, plastics)

b) **cast in place** (see Appendix A).

SEE ALSO 3.1.9.4, penetrations by combustible drain, waste and vent piping.
3.1.9.1. Fire Stopping of Service Penetrations

2) Penetrations of a *firewall* or a horizontal *fire separation* that is required to have a *fire-resistance rating* in conformance with Article 3.2.1.2 shall be sealed at the penetration by a fire stop that, when subjected to the fire test method CAN/ULC-S115, “Fire Tests of Firestop Systems”, has an FT Rating not less than the *fire-resistance rating* of the *fire separation*. 
3.1.9.1. Fire Stopping of Service Penetrations

3) Penetrations of a fire separation in conformance with Article 3.6.4.2 (2) shall be sealed by a fire stop that, when subjected to the fire test method CAN/ULC-S115, “Fire Tests of Firestop Systems”, has an FT Rating not less than the fire-resistance rating of the fire separation.
Compartmentation Codes – NBC

3.1.9.1. Fire Stopping of Service Penetrations

b) *cast in place* (see Appendix A).
   – Concrete, Grout…Full Thickness of the Assembly
4) Sprinklers are permitted to penetrate a fire separation or a membrane forming part of an assembly required to have a fire-resistance rating without having to meet the fire stop requirements of sentences (1) to (3), provided that the annular space created by the penetration of a fire sprinkler is covered by a metal escutcheon plate in accordance with NFPA 13, “Installation of Sprinkler Systems”.
5) Unless specifically designed with a fire-stop, fire dampers are permitted to penetrate a fire separation or a membrane forming part of an assembly required to have a fire-resistance rating without having to meet the fire stop requirements of Sentences (1) to (3), provided the fire dampers is installed in conformance with NFPA 80, “Fire Doors and Other Opening Protectives”
3.1.9.4 – Combustible Piping Penetrations

4) Combustible drain, waste and vent piping is permitted to penetrate a fire separation required to have a fire-resistance rating or membrane that forms part of an assembly required to have a fire-resistance rating, provided

a. the piping is sealed at the penetration by a fire stop that has an F rating not less than the fire-resistance rating required for the fire separation when subjected to the fire test method in CAN/ULC-S115, Fire Tests of Firestop Systems”, with a pressure differential of 50 Pa between the exposed and unexposed sides, with the higher pressure on the exposed side, and

b. the piping is not located in a vertical service space.
3.1.9.4 – Combustible Piping Penetrations
NEW for 2010....

2) *Combustible* water distribution piping is permitted to penetrate a *fire separation* that is required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required by Article 3.1.9.2, provided, the piping is protected at the penetration with a *fire stop* in conformance with Sentence (4).
3.1.5.16 – Combustible Piping Penetrations
NEW for 2010....

3) Polypropylene pipes and fittings are permitted to be used for drain, waste and vent piping for the conveyance of highly corrosive materials and for piping used to distribute distilled or dialized water in laboratory and hospital facilities in a building required to be of non combustible construction provided:
Compartmentation Codes – NBC

3) Polypropylene pipes and fittings are permitted ... be of non combustible construction provided:

a) The building is sprinklered throughout

b) The piping is not located in a vertical shaft, and

c) Piping that penetrates a fire separation is sealed at the penetration by a ‘fire stop’ that has an FT rating not less than the fire-resistance rating of the fire separation when subjected to the fire test method CAN/ULC-S115, “Fire Tests of Firestop Systems”, with a pressure differential of 50 PA between the exposed and unexposed sides, with higher pressure on the exposed side.
Compartmentation Codes – NBC

• Change for 2010….
• Definition of Fire Stop

‘System consisting of a material, component and means of support used to fill gaps between fire separations or between fire separations and other assemblies, or used around items that wholly or partially penetrate a fire separation’
Compartmentation Codes – NBC

Definition - Fire Block

*Material, Component or system that restricts the spread of fire within a concealed space or from a concealed space to an adjacent space.*
Compartmentation Codes – NBC

- Compartmentation Codes - Penetrations of Fire Separations

- All penetrations of a fire separations must be fire stopped per CAN/ULC-S115 standard with an F Rating and similar FRR for closures

- All penetrations of a firewall must be fire stopped per CAN-ULC-S115 standard with FT rating and similar FRR for the fire separation.
Compartmentation Codes – NBC

• Compartmentation Codes – Sprinkler penetrations

• Fire Stopping not required around sprinkler head penetrating a fire separation
Compartmentation Codes – NBC

• Fire Stopping not required around *fire dampers* penetrating a *fire separations* where installation listing specifies a clearance for operational reasons…
Compartmentation Codes – NBC

• Combustible Piping Penetrations

• Any size combustible pipe permitted to penetrate a fire separation
Compartmentation Codes – NBC

• Combustible Piping Penetrations

• Any size *combustible* pipe permitted to penetrate a *fire separation*

• Elimination of restriction on drain piping penetrating a horizontal fire separation.

• **Fire Stop – Polypropylene pipes must now meet ULC-S115, ‘Fire Tests of Fire Stop Systems’ standard**
  – Pressure Differential of 50Pa between the exposed, unexposed with pressure on the exposed side.
Compartmentation Codes – NBC

- Emergency Conductors

- Single Conductors >25mm in overall diameter
  - Not Grouped
  - Spaced a minimum of 300 mm apart
Compartmentation Codes – NBC

• Emergency Conductors

• Installed in service spaces containing other combustible material and used in connection with fire alarm systems and emergency equipment (high buildings)

• Conductors from emergency power serving
  • Fire Alarms - High buildings
  • Emergency - Lighting high buildings
  • Fire Pumps all buildings
  • Mechanical Systems - Areas of refuge and contained use
  • Elevators – High Rise
Compartmentation Codes – NBC

• Emergency Conductors
  – Conform to ULC-S139, or Located in service space with fire resistance rating of 1-2 hours
  – Room must be dedicated solely for housing of electrical equipment and conductors
    • Protection from emergency power supply to distribution equipment
    • Between transponders or annunciators indifferent *fire compartments*
Compartmentation Codes – NFPA

• NFPA - Committees
  – NFPA 5000 – “Consensus Codes”
    • Other international locations…North America, not much…
    • Healthcare Industry
    • Overseas
Compartmentation Codes – ICC

• ICC=International Code Council
  • USA
  • Middle East
  • Caribbean
  • Asia
Compartmentation Codes – NBC

• ICC=International Code Council
  • IBC – Building Code - New
  • IFC – Fire Code – Maintenance
• Other “I-Codes”
  – IPC, IMC, IEBC, WUIC, IPMC
Compartmentation Codes – NBC

**IBC/NFPA Firestopping for Continuity**

- **International Building Code – US & Middle East**
  - **Fire Barrier** – Continuity; **Fire Wall** – Continuity & Independence
  - **Smoke Barrier** – IBC – Continuity - Hourly Rated, “L” Rating
    - <5cfm/sf (IBC 2006)
    - < 50 cfm, 100sf of Wall Area (IBC 2009)
- **NFPA** – Similar, no quantified “L” Rating
- Healthcare Occupancies
- Building Owner/Manager Preference
  - **Smoke Partition** – “Common Materials”
    - IBC – Continuous barrier, not rated…’retard’.
    - NFPA – Continuous membrane that is designed to form a barrier to limit the transfer of smoke….
- **Fire Partition** – Hourly Rated…
Structural Fireproofing Codes

• **Keys to Safe Buildings Worldwide**
  – *Robust Density Fireproofing (Super High Rise)*
  – *Increased Inspection Frequencies*
    • **Density**
    • **Bond Strength**
    • **Adhesion**
    • **Cohesion**
    • **Thickness**
  – *ULC Qualified SFRM Contractors, NFCA*
Compartmentation & Passive Life Safety

- Debate about safety – Worldwide Issues
  - Rated Corridors in Sprinklered Schools, Others
  - Rated Mechanical, Electrical Rooms
  - Occupancy Separations in Sprinklered Buildings
    - Business & Industrial
    - Business to Business
- Increases - Height and Area
- Egress Systems
- Many Sprinkler “Trade Offs”
Compartmentation & Passive Life Safety

• Compartmentation
  – Education
  – Office
  – Mercantile
  – Multi Family Residential
  – Industrial – Insurance influences
  – Institutional - Healthcare – No change
  – Residentail
Compartmentation & Passive Life Safety STATS

- **11,025 20 story + Tall Buildings, 70% in…. NY, SF, LA, CHI, HI, Toronto…**

- **Older Buildings - Compartmentation Primary…sprinklers, detection and alarms added later…**
  - Chicago, NY, Toronto, Vancouver, Montreal - Older buildings

- **Earthquakes – Total Fire Protection with compartmentation.**
  - San Francisco
  - Los Angeles
  - Honolulu

» Source, Emporis.com
Compartmentation & Passive Life Safety STATS

• *If stock of buildings older*
  = *Compartmentation Design*

• *Alarms*

• *Occupant Education*

• *Sprinkler added …*
  = *Safer buildings*
Why Compartmentation & Passive Life Safety?

• NIST Report - World Trade Center 7 - Chapter 4,

• 4.6, 'Factors that could have mitigated structural collapse'
  – "improved compartmentation in tenant areas to limit the spread of fires"

• ‘But first…DIIM’
Why Compartmentation & Passive Life Safety?

- **World Trade Center 7** - Recommendation C, (NIST NCSTAR 1A, report for towers I & II
- 'the need for redundancy in fire protection systems that are critical to life structural integrity; passive fire protection system, (including SFRM, Compartmentation and Firestopping) and the active sprinkler system each provide redundancy for maintaining structural integrity in a building fire, should one of the systems fail to perform it's intended function.'
- "the ability of the structure and local floor systems to withstand a maximum credible fire scenario, without collapse, recognizing that sprinklers could be compromised, not operational, or non existent."
Why Compartmentation & Passive Life Safety?

- **Keys to Safe Buildings Worldwide**
  - *Robust Compartmentation & Fireproofing Limits Fire Spread*
    - *Compartment of Origin*
    - *Helps Smoke Control System*
    - *Sprinklers add to safety*
    - *Alarms & Occupant Education*
    - *Structural Protection*
      - *Firestopping*
      - *Fireproofing*
Firestopping Role - Reliability

- FCIA Members Understand DIIM
  - Firestop *Systems Designs* Tested to CAN/ULC-S115, (ASTM E 814, UL 1479/2079, ASTM E 2307)
  - Specified by Professionals
  - **Installed** by FCIA Member, FM 4991, ULC Qualified Companies, with DRI’s
  - **Inspected** to ASTM E2174 & ASTM E2393 Inspection Process by IAS AC 291 Accredited Firms
  - **Maintained & Managed** by FCIA Member Firestopping Contractors
Building High Rise Safety … >75’

• **Higher Density Fireproofing, Inspection**
• **Firefighter floor area sizes – 100,000CF?**
• **Stairwells – Photoluminescent Markings…**
• **Havens of Safety – Horizontal Compartmentation?**
• **Occupancy Separations – 12000 SF Max?**
• **Smoke Control Systems for CBR?**
  – Activation devices…Chemical, Biological, Radiation?
Who owns the Compartment?
Firestop Contractor

• Egress – 2009 IBC Code
  – Canada’s Research Shows....
  – ‘Obvious & Intuitive’
    Egress Systems

• Photoluminescent Markings?

• Retroactive Life Safety Measure
• Firestop Contractor!!
Continuity Compartmentation Components

- Fire Walls and Floors –
  - Continuous Fire Resistance Rated Assemblies
    - Concrete
    - Concrete Block
    - Plaster
    - Gypsum Block
    - Gypsum Wallboard
    - Floor/Ceiling Assemblies
    - Firestop Systems

“Listed Wall/Floor Systems or Equivalencies from Code”
Continuity

Effective Compartmentation Features

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

- **Standards – ASTM & ULC/UL Standards**
  - **National Building Code of Canada**
    - Fire Resistance = Mostly Hose Stream
    - Fireproofing - ULC S-101
    - Firestopping - ULC S-115, ASTM E 2307
  - **NFPA 101 = Fire Code, NFPA 5000 Building Code**
    - Fire Resistance = Hose Stream Test
  - **International Fire Code**
    - Fire Resistance = Hose Stream Test
  - **International Building Code**
    - Fire Resistance = Hose Stream Test
Firestopping

I – Listed Systems
Firestopping for Continuity
I – Listed Systems
Firestopping for Continuity

- Firestop Products Become Firestop Systems --
  - “A Specific field erected construction, consisting of an assemblage of materials to prevent the spread of fire through openings in fire rated walls and floors using ASTM E 814 / UL 1479, **ULC-S-115**, UL 2079, E 2307 as the test method…”
  - Testing = Suitability statement for use of a firestop product in a specific **system** application
Firestopping for Continuity
Firestop Products

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

Graphics, STI, 3M, AD, HILTI, Nelson
Continuity for Combustible Penetrations

- Intumescent sealant expands and fills the void that opens as the combustibles burn away
- Collar expands to crush the pipe
- Direction of Expansion Critical…

Charred Pipe
Knot formed from Collapsing pipe

Hot-Side View
Cold-Side View
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
Firestop Systems Definition

- “A Specific field erected construction, consisting of an assemblage of materials to prevent the spread of fire through openings in fire rated walls and floors using CAN/ULC-S115, (US-ASTM E 814 / UL 1479-2079, ASTM E 2307) as the test method…”

- CAN/ULC S115 – Incorporated UL 2079 in 2004

- Testing = Suitability statement for use of a firestop product in a specific sy application
Firestop Testing = Suitability for Use

  - **F Rating** - Flame
  - **FT Rating** – Temperature (T-181°C + Ambient….200°C)
  - **FH Rating** – Hose (CAN-Optional)
  - **FTH Rating** – Hose (CAN-Optional)
  - **L Rating** – Smoke (usUL/CAN/ULC)
  - **W Rating** – Water (ULus, CANULC)
Firestop Hose Stream is Shock Test, Not “W” Rating
Firestopping for Continuity
Products become Systems

- Firestop Systems Directories have Listings
  - UL/ULC – Optional ‘US/CAN’ Listings
  - Intertek
  - FM Approvals

*Systems Selection…Not as easy as it looks…*
Firestop Listings

• Firestop Products Become Firestop Systems --
  – ULC Directory – UL Directory
  – HW – Head of Wall Joint Firestop Systems
  – BW – Bottom of Wall
  – JF – Joint Firestop Systems
  – FW – Floor to Wall
  – WW – Wall to Wall
Firestop Testing - Joints

• Firestop Products Become Firestop Systems --
  – **Construction Joints** – The 2005 Edition of CAN/ULC-S115 contains a new joint cycling requirement for cycling construction joint fire stops through their intended range of movement prior to the fire test. (500 Cycles)…
UL – ULC Directory

• Firestop Products Become Firestop Systems --
  – ULC Directory – UL Directory
  – SP – Service Penetration Firestop Systems
  – SPC – Service Penetration for Combustible Systems

• NOTE: NBC Requires 50pa Furnace Pressure Differential for DWV Plastic pipes in fire resistance rated assemblies, very different than the US ICC Codes.
Alternative Descriptions – ULC and UL different still…

**Alpha:** The first letter is either “F” for floors, “W” for walls or “C” for a combination of walls and floors. The second letter or combination of letters, signify the following.

- **A** Concrete floors < 5”
- **B** Concrete floors > 5”
- **C** Frame floors
- **D** Deck construction
- **E – I** Reserved for future use
- **J** Concrete or Masonry walls < 8”
- **K** Concrete or Masonry walls > 8”
- **L** Framed Walls
- **M** Bulkheads
- **N** Composite Panel Walls
- **O – Z** Reserved for future use
UL Directory

• **Numeric:** The first digit of the four digit number, identifies the type of penetrant in accordance with the following list. The next three digits will be assigned sequentially to successfully tested systems.
  - 0000 – 0999  No Penetrant
  - 1000 – 1999  Metallic Pipe, Conduit or Tube
  - 2000 – 2999  Non Metallic Pipe, Conduit or Tube
  - 3000 – 3999  Cables
  - 4000 – 4999  Cables in a Tray
  - 5000 – 5999  Insulated Pipes
  - 6000 – 6999  Misc. Electrical Penetrates
  - 7000 – 7999  Misc. Mechanical Penetrates
  - 8000 – 8999  Groupings, Mixed multiple penetrates
  - 9000 – 9999  Reserved for future use
Firestopping is “System Selection/Analysis”

- Firestop Systems Directories
  - Intertek
  - FM Approvals
  - ULC, UL

Systems Selection…Not as easy as it looks…
System Example:

CAJ 1155

Metal Pipe in Concrete Floor or Wall

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:
   A. Maximum 20" diameter steel pipe.
   B. Maximum 6" diameter copper pipe.
   C. Maximum 6" diameter steel conduit.
   D. Maximum 4" diameter EMT.

3. OPTIONAL: Maximum 22" diameter steel pipe sleeve (Schedule 10 or heavier).

4. Minimum 4" thickness mineral wool (min. 4 pcf density) recessed 1/2" from top of sleeve.

5. Minimum 1/2" depth Hilti FS-One Firestop sealant.

6. A generous bead of Hilti FS-One Firestop sealant around outer perimeter of steel sleeve.

NOTES:
1. Maximum diameter of opening = 22".
2. Annular space = minimum 0", maximum 1-1/2".
Every application has its own unique UL tested assembly which specifies:

- **Hourly Fire Rating**
- **Type of Barrier**
- **Type of Penetrant**
- **Min/Max Hole/Gap Size**
- **Firestop Products**
How Installers Select UL/ULC Systems

- Wall or Floor Construction Type
- Wall or Floor Thickness
- Penetrating Item, Coverings
- Size, Type, Thickness
- Annular Space, Joint / Gap Sizes
- Backing Materials
- Fill Material(s)
Min/Max Hole Size

Annular Space
1. Centered

2. Off-Centered

3. Point Contact

4. Continuous Point Contact
Firestopping & Compartmentation for Safety

• Field or other Variances to Tested and Listed Systems?
  – Impractical
  – Annular Space / Gap too large / small
  – No System Exists
  – Oversized penetrating item

• Why?
  – Pre-Planning ?
  – Unique Conditions

Graphics – Firestop Tecnologies, Inc.
Firestopping & Compartmentation for Safety

- **Variances to Systems? – Now What…**
  - First Action in Process
    - Find another system – Same Manufacturer
    - Find another system – Different Manufacturer
  - If no system exists in either case…. 
    - *Engineering Judgment* – “EJ”
    - *Equivalent Fire Resistance Rated Assembly* – “EFARRA”
    - Based on sound engineering -- IFC Protocol

- **Follow the rules – Reduced risks**
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;
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.
Firestop sealant must be well bonded to
penetrating item and surrounding wall or floor

Measure & Pack

Caulk

Tool/Smooth

1

2

3

Always Check BOTH SIDES

STI Graphic
Properly Tooled Penetrations
Intumescent Wrap Strips and Steel Collars

- **Key Points - Restricting Collars**
  - Fastening Tabs – 90 degree bends for expansion
  - Directional Tabs
  - Bands
Unlisted, Untested Firestop Systems
Firestopping & Compartmentation for Safety
Unlisted, Untested Firestop Systems
Joint Compound
Incomplete is ineffective
Great Stuff
Fire/Smoke Dampers & Firestops

• **Fire Damper Systems** - CAN/ULC-S112
  - (ULus 555, 555S Listed *Systems*)
    - Installed to manufacturer’s written instructions (Systems
      - Angles…no sealants)

• **Firestop sealants** – VERIFY w/MANUFACTURER

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”

- Greenheck Graphic
Barriers With Combustible Penetrants

- Plastic Pipe
- Plastic-Jacketed cables
- Certain pipe insulation
Firestopping & Compartmentation for Safety

- Firestop Joint Systems Definition
- Joint Firestop – JF
  - CAN/ULC-S115 (UL-2079)
- “A joint system is a specific construction consisting of adjacent wall and floor assemblies, and the materials designed to prevent the spread of fire through a linear opening between the wall and / or floor assemblies.

Graphics - STI
Firestopping & Compartmentation for Safety

• Firestop Joint Systems Definition – CAN/ULC-S115
  – Positive Pressure
  – Movement Cycling
    • Class I – min. 500 cycles, min. 1 cycle / minute
    • Class II- min. 500 cycles, min. 10 cycles / minute
    • Class III-min 100 cycles, min. 30 cycles / minute
  – Fire Tested at Maximum Joint Width
  – No Load Bearing Characteristics, unless noted
  – Assembly, L or W Ratings
Gypsum Wall assembly running up to concrete over metal deck

TOP OF WALL JOINT: 1 HR. OR 2 HR. GYPSUM WALL ASSEMBLY
ASSEMBLY RATING = 1 HR. OR 2 HR. (DEPENDING ON RATING OF WALL AND FLOOR ASSEMBLY)
CLASS B MOVEMENT CAPABILITIES - 50% COMPRESSION OR EXTENSION

HILTI FIRESTOP SYSTEMS
HILTI, Inc. Tulsa, Oklahoma USA (918) 252-4600

UL/ULC SYSTEM NO. HWD-0042

HWD 0042g

HILTI Photos
Good Firestop Applications

Floor to Wall

Top of Wall

Graphics – Firestop Solutions
Joints and Seams
Top of Wall
Joints and Seams

I-Beam to Fluted Deck
Penetrations with Top of Wall
Results of Improperly Installed Mineral Wool
Tamweel Towers, Dubai
Perimeter Fire Protection
Gulf News: A discarded cigarette ???
Energy & Fire Codes Converge

- Safer Buildings - Tamweel Apartment Tower...

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

thenational.ae
Perimeter Fire Containment Joint Testing

• Firestop Perimeter Systems
• 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.”...and do not incorporate penetrating items, such as a pipe...
Proper Installation of Mineral Wool

- Compressed mineral wool must be inserted perpendicular to the joint to allow for movement between the slab and wall.
Joints and Seams

Edge of Slab

Graphics – Firestop Solutions
Wall to Wall / Wall to Floor

Caulk and Self Leveling
Poor Firestop Installation of Perimeter Barriers
Penetration, Joints Perimeter Fire Containment Systems
Installation
FCIA Member in Good Standing (2 yrs.)
FM 4991 & ULC, UL Contractors

Graphics – STI
Installation – Non Qualified?

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

Conclusion –
Without Single Firestopping Trade….
fire & life safety risks
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**
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*
Firestop Contractor Qualifications

- FCIA Member
- Insurance – Classification?
  - Specialty Firestop Contractor?
  - Plumber, other trade??
- Workforce – Educated as Firestop/Containment Workers
- Bonding Capability
- Project References & Experience
- Management System reviewed by….
  - FM 4991, UL or ULC?
Firestop Contractor Qualifications

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

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

• Manufacturer Educated
  – Short Class – 25 - 60 minutes
    • Some Training
    • Worker educated
    • Short test
    • Administered by salesperson
  – Worker Education at Shop
  – Manufacturer HQ Education
    • 1-2 Days Education
    • Test – Teach to the Test?
    • Not 3rd Party
Firestop Contractor Qualifications

1. **Bought at Hardware Store, etc.**
   - Contractor or Individual?

2. **Manufacturer Trained Individuals**
   - 1 hour program
   - ½ day program
   - 2 day education

3. **ULC Qualified, FM 4991 Approved Companies**
   - 3rd Party Verified *Company* Management System
   - *Individuals* Pass 3rd Party Exam
   - *Individual* Knowledge – FCIA MOP
   - All Manufacturers Products Covered
   - *Company gets Approved or Qualified, not Individual*
Contractor Qualifications
Independent Audited Programs

ULC Qualified Firestop Contractor Program

FM 4991 Standard for the Approval of Firestop Contractors
1. ULC, FM or UL Office Audit of Company Management Systems Manual

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

- Contractors Listed www.fcia.org
2. ULC, FM or UL Jobsite Audit of Management System (MS)

- Employee Training & Education
- Systems Selection
- Communicate systems to Field
- Material Controls
- Systems installation “protocol”
- Labeling
- Record keeping - Variance Procedures
- Non-Conformances
- Documentation
- Project closeout
2. Company MS Jobsite Audit by ULC, FM or UL

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

» Adler Photo
3. Company Appoints an Individual as DRI if ....

- Pass Rigorous Firestop Examination
  - FCIA Firestop Manual of Practice
  - Firestop Systems Selection & Protocol
  - Management System Knowledge
  - Canada’s Best Practice Guide - Firestopping
- Keep CEU’s – 6 FM, 10 UL, ea. 3 yrs.
- Retested every 3 years (FM Only)
- One DRI per Approved Contractor Location
4. Independent Annual Audit

ULC, FM, UL Personnel

• Continued satisfactory performance
  • Quality Manual Implementation

• Documented - Archived record keeping

• Employee Training Documentation

• Jobsite Visit

• DRI CEU Verification

• Find @www.fcia.org
Search results

Number of hits: 6 The maximum number of hits returned is 4500.
You may choose to Refine Your Search.

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ULC/FM Contractor
Company Benefits

Quantified Differentiation from Trades...
– Focus on the Company
– Investment in Company Procedures
– Investment in People Education
– Investment in FCIA Manual of Practice
  • Project Successful Proven Contractor
  • Education, Training, Accountability
    = Reduced Risk – Life, Property, Business
III – Inspection
Systems Analysis
I – Inspection – Options

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

• Manufacturer ‘Inspection’
  – Does not exist … Survey, maybe…

• ASTM E 2174 & ASTM E 2393 –
  – Independent 3rd Party
  – Destructive, Non Destructive
  – Specified Frequency
Firestop Installation & Inspection

- ASTM E 2174/ ASTM E 2393 – "Inspection Process"
Firestop Installation & Inspection

- ASTM E 2174/ASTM E 2393 -
Firestop Systems Inspection
ASTM E 2174 - ASTM E 2393

• “Standard Practice for On-Site Inspection of Installed Fire Stops – Penetrations - Joints”
  – Standard Inspection Procedure
  – Special Inspection Agency Companies
  – Other Qualified Firms
  – Report to Building Owner, Fire Marshals & Code Officials
Inspection in Codes
ASTM E 2174 - ASTM E 2393

• NFPA 101 / 5000 - Chapter 8 - Annex

• 2012 International Building Code
  – CH 17 – Special Inspections
    • Buildings 75’ & higher above Fire Department Access
    • Occupancy Type III, IV, Chapter 16 Table 1604.5

• Abu Dhabi International Building Code

• Not in Canada’s NBC yet
Inspector Qualifications  
ASTM E 2174 - ASTM E 2393  

- Inspector Firm & Inspectors  
  - ‘Independent of, and Divested from ’ Installing firm, Distributor, Manufacturer, Competitor, Supplier…  
  - ‘Not a Competitor of the Installer, contractor, manufacturer, or supplier ….  
  - Submit notarized statements of …
ASTM E 2174/ASTM E 2393
“Inspector & Company Requirements”

• NEW Inspector Company Accreditation

• International Accreditation Services
  IAS AC 291
Firestopping & Compartmentation for Safety

- ASTM E 2174/ASTM E 2393 - “NEW Inspector & Firm Credentials”
  - IAS AC-291 – Individual Knowledge
    - PASS UL, ULC or FM Exam
    - 1 year Experience in Quality Assurance
  Or...
    - PASS UL-ULC /or FM Exam, and PE, FPE, Registered Architect, or
    - PASS UL-ULC/ or FM Exam, and Education by Certified Agency

- IAS Accreditation Criteria AC-291 – Company Audits
  - Must Specify IAS, not part of ASTM Standards
Inspection Process
ASTM E 2174 - ASTM E 2393

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

• Inspection Documents’’
  – Manufacturer Product Data Sheets
  – Tested and Listed Systems & EJ’s
Inspection Process
ASTM E 2174 - ASTM E 2393

• Pre-Construction Meeting
  – Mock Ups
  – Destructive Testing
  – Installation Measurements
  – Discuss Inspection Method

• Meeting Required
  – During/Post Inspection Methods
Inspection Methods
ASTM E 2174 - ASTM E 2393

• During Construction
  – Random witness, Each Floor
    • **10%, each type** of Penetration Firestop, no less than one per floor
    • **5% of Total Lineal Feet** of Fire Resistance Rated Joint System, each type

Adler Photo
Inspection Methods
ASTM E 2174 - ASTM E 2393

• Post Construction - Destructive Testing
  – Minimum 2%, no less than 1, each type per 10,000 SF of floor area
  – Minimum 1 / 500 LF of Joint Area, mandatory
  – If 10% variance per firestop type
    – Inspection stops
    – Installer inspects, repairs
    – Inspector reinspects
Inspection Methods
ASTM E 2174 - ASTM E 2393

• Both Methods…
  – If 10% variance per firestop type
    – Inspection stops
    – Installer inspects, repairs
    – Inspector reinspects
  – Inspector Shall not Supervise Workers…
  – Inspect @ Firestop Installation Start
Inspection Forms
ASTM E 2174 - ASTM E 2393

• One for each type of firestop
• Submit 1 day after Inspection to Authorizing Agency
• Numbered – Controlled
• Required – During/Post Construction Methods
Inspection Final Report

ASTM E 2174 - ASTM E 2393

- Name, address, location – project, installer, inspector
- Type and quantity of firestops inspected
- Verification method
- Percentage Deviation
- Copies of all documents

Authorizing Agency
Firestopping & Compartmentation for Safety

- Copies of all documents sent to Authorizing Agency
- Product Data Sheets
- ‘SYSTEMS’, Fire Rated Assemblies = As Built
- Inspection Docs
- Warranty Docs
- Maintenance Requirements
- Letters of Compliance
- FCIA Member in Good Standing Certificate
Firestopping & Compartmentation for Safety

• ASTM E 2174/ ASTM E 2393 – “Inspection Process”

• Increase inspection frequency for
  – NON FM Approved / ULC Qualified ??
    • Min. 10% Destructive
    • Min. 25% Visual
Firestopping & Compartmentation for Safety
Why Specify?
ASTM E 2174 - ASTM E 2393

- DIIM – II of Quality Process
- Install, Inspect
- Verify Field Installations
- Specify Accredited Inspection Agencies
  - IAS AC 291 – Accreditation Criteria for Special Inspection Agencies
Firestopping & Compartmentation for Safety

- ASTM E 2174/ ASTM E 2393 –
  - Verify Quality Process is working
    - DIIMM - *Install, Inspect*
  - Verify Field Installations
  - Destructive or During Installation
  - Circle of Quality
IV Maintenance & Management
(BARRIER MANAGEMENT INITIATIVES)
Firestop Maintenance

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

• **How to keep Track – Barrier Management Initiatives**
  - Paper
  - Software
  - Labeling / Identification Systems

• **Barrier Management Symposium**
  – FCIA/UL/ASHE/TJC
Barrier Management Symposium

Keeping the Healthcare Experience Safe for Patients

For Registration information contact
The Joint Commission at
www.jointcommission.org

Mission Statement
To provide concise, accurate education at no cost to the attendee, resulting in excellent barrier system management in healthcare buildings.

In 2012* three of the Top SIX Most Often Scored Findings included barriers. The standards are LS.02.01.10, LS.02.01.20 & LS.02.01.30.

LS.02.01.10
This standard was scored 46% of the time during all hospital surveys in 2012. This standard addresses General Requirements, including PENETRATIONS and JOINTS in fire rated barriers.

LS.02.01.20
This standard was scored 51% of the time during all hospital surveys in 2012. This standard addresses Means of Egress, including VERTICAL OPENINGS, DOORS.

LS.02.01.30
This standard was scored 39% of the time during all surveys in 2012.

This standard addresses protection, including vertical openings, stairs, doors, and smoke barriers.

* Hospital surveys conducted by The Joint Commission in 2012
Division B – Part 2, Building and Occupant Fire Safety

2.2.1.2 – Damage to Fire Separations – where fire separations are damaged so as to affect their integrity, they shall be repaired so that the integrity of the fire separation is maintained…

City of Calgary – Best Practices (1997)

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

Best Practice Guide - NRC

Includes Fire Dampers, Fire Doors…and Continuity
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]
National Fire Protection Association - NFPA 101

• 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.
CHAPTER 1-
SECTION 21
FIRE STOPPING

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.

- FCIA Recommended Practice for Surveying Existing Buildings
Specifications

Quality Assurance – CSI & CSC MasterFormat 2004-now
Specifications – MF 04, 10 - 07 84 00 … was 07270
– 07 84 00 – Both Penetrations & Joints
  • Pipes, cables, ducts, cable trays, MEP&C Systems
  • Top of Wall, Bottom of Wall
  • Fire Resistance Rated Joints – Soft, Metals & Fire Inserts
  • Perimeter Joints (Floor Slab edge/Exterior Wall)
  • Labeling, ‘Identification & Marking’
• Systems Spec, and product properties spec…
Specifications

Quality Assurance – CSI & CSC MasterFormat 2004-now
Specifications– MF 04 - 07 84 00 … was 07270

• Contractor Qualifications –
  – ULC Qualified Contractors
  – FM 4991 Approved Contractors

  – ULC Qualified OR ASTM Inspection…
  – AND
  – FCIA Member in Good Standing

• Why??? Investment in Quality
Specifications

Quality Assurance – CSI & CSC MasterFormat 2004-now
Specifications– MF 04-12 - 07 84 00 … was 07270

- ADD Contractor Qualifications
  - FCIA Member in Good Standing
  - FM 4991 Approved, ULC Qualified Firestop Contractors

- Add Inspection Standards – DIV. 1 – OWNER HIRED
  - 3rd Party, ASTM E 2174, ASTM E 2393 Standards for Inspection of Installed Firestop

- ADD Inspector Qualifications –
  - IAS AC 291 Accredited Special Inspection Agency

- ADD FCIA Member in Good Standing

- Systems Spec, and product properties spec…
Specifications

- 07-84-00 Specifications– Product Testing
  - “F” Ratings - Fire Resistance Rated Assy.
  - “FT” Ratings = F & T Ratings equal to Barrier?
  - “FTH” Ratings – Hose Stream
  - “L” Ratings = Fire & Smoke Resistance Rated Construction
  - “W” Ratings – Floors; Functional when? Floor Loading Capabilities?

- Match Physical Properties of Environment
  - Chemicals, Movement, Exposure, Radiation

- Systems after installation..
Specifications

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

Proper ‘DIIM’ Effective Compartmentation Means Reliable Systems…

• **Properly Designed** - A/E, Firestop Consultant
  – Tested and Listed Systems, *Specified by RSW, CCS, CDT*

• **Properly Installed**
  – FCIA Member, “FM 4991, UL Canada, or UL *Qualified Contractors*”

• **Properly Inspected**
  – ASTM E 2174 & ASTM E 2393, by IAS *Qualified Inspectors at IAS AC 291 Accredited Inspection Firms*

• **Properly Maintained and Managed** –
  – FCIA Member, FM 4991, or ULC – UL Qualified Contractor
Trends for 2013….

- ULC Contractors – next Canada Code Cycle
- NFPA 101-5000 References – Qualifications, ‘L’
- Materials manufacturers’ systems
  - Reflect what can reasonably be expected to occur…
  - Movement, Exposures, etc.
- IBC 2012 Chapter 17 Special Inspection
  - Inspection agencies drives demand for quality installation
  - Results in more FM & UL Contractors.
- FM & UL Contractors in Specifications
- Building Owners and Managers learning DIIM…
Why not Effective Compartmentation Maintenance Contractors?
Summary

• “TOTAL FIRE PROTECTION
  – Effective Compartmentation -Fire Walls/Floors & Firestopping
  – Fire Dampers, Fire Glass
  – Detection & Alarm Systems
  – Sprinkler Suppression Systems
  – Building Personnel, Occupant and Firefighter Education
Thanks to Members
FCIA Welcomes New Members

- *Life Safety Digest, the Magazine of Effective Compartmentation*
FCIA DIIM & Effective Compartmentation
TIAC / ACIT

Firestop Contractors International Association
Hillside, IL USA – 708-202-1108 - office
FCIA Info – info @ fcia.org

Bill McHugh, Executive Director – bill @ fcia.org

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FCIA Firestopping & Fireproofing
DIIM & Effective Compartmentation
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19 August 2013