The New Stamford Hospital

A Case Study in the Implementation of the Newly Required Destructive Firestopping Special Inspections
Presentation Outline

- Stamford Hospital Introduction

- Regulatory Context
  - Model Code Adoption of Firestopping Special Inspection Requirement
  - 5 Key Points about the Adoption

- Case Study: The New Stamford Hospital
  - The Hospital’s Decision on Process for Fire Stopping QA/QC
  - Lessons Learned and Recommended Best Practices for Inspections
    - Design Documentation
    - Pre-installation Planning and Review
    - Inspection process throughout construction
  - Key Fire Stopping Challenges
  - Results and Post-Project Operational Benefits

- Conclusions
1. Identify what jurisdictions in New England and what types of projects firestopping special inspections are required.

2. Obtain an understanding of the process of performing special inspection in accordance with ASTM 2174 and ASTM 2393.

3. Identify management techniques and common pitfalls in implementing the process with contractors and Authorities Having Jurisdiction.

4. Identify best practices for managing firestop installations and the special inspection process per the applicable requirements.
Stamford Hospital Overview

- Independent Hospital System
  - 305 Licensed Beds
  - Main Hospital Site: 1.2 M square feet, 30 acre site
  - 2.4 M square feet on all sites
  - 700 Medical Staff; 2,700 employees (in 2016)
  - Member Dana Farber/Brigham and Women’s Cancer Care Collaborative
  - Collaborative with Hospital for Special Surgery (HSS) for Orthopedics
  - Planetree Hospital

- Highly competitive Marketplace:
  - Yale-New Haven
  - Western CT Health Network
  - 40 miles from New York City

- New Building Completed 2016 - 650,000 square feet
  - Started Design/Construction Prior to CT adoption of ASTM 2174 & 2393
ASTM has 9 sections on Test Standards for Firestop Systems:

- ASTM E 814 - Standard Test Method for Through-wall Penetrations
- ASTM E 1399 - Movement and Measurement in Joint Systems

- **ASTM E 2174** - “Standard Practice for On-Site Inspection of Installed Fire Stops”

- ASTM E 2307 - Standard Test Method for Perimeter Fire Barrier Systems

- **ASTM E 2393** - “Standard Practice for On-Site Inspection of Installed Fire Resistive Joint System and Perimeter Fire Barriers”

- ASTM E 2750 - Guide regarding ASTM E 814
- ASTM E 2837 - Standard Test Method for Head of Wall Joint Systems
- ASTM E 3038 - Assessing and Qualifying Inspectors
International Building Code first adopted the requirement in the 2012 Edition and has carried it forward since.

NFPA 1 adopted it in 2012 Edition

New England State Summary. Note that application for permit date will dictate applicable code.

<table>
<thead>
<tr>
<th>State</th>
<th>Building Code</th>
<th>Fire Code</th>
</tr>
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<tbody>
<tr>
<td>Massachusetts</td>
<td>Yes- 2015 IBC based</td>
<td>No- NFPA 1 language deleted</td>
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<tr>
<td>Connecticut</td>
<td>Yes- 2012 IBC based</td>
<td>Yes-NFPA 1 2012 based</td>
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<td>Rhode Island</td>
<td>Yes- 2012 IBC based</td>
<td>Yes-NFPA 1 2012 based</td>
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<tr>
<td>Maine</td>
<td>Yes- 2015 IBC based</td>
<td>No- NFPA 1 2009 based</td>
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<td>New Hampshire</td>
<td>No- 2009 IBC based</td>
<td>No- NFPA 1, 2009 based</td>
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<tr>
<td>Vermont</td>
<td>Yes- 2015 IBC based</td>
<td>Yes-NFPA 1 2015 based</td>
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</tbody>
</table>
What Building Types are Impacted?

IBC Requirements
- All High Rise
- Risk Categories III and IV
  - Assembly occupancies with occupant load greater than 300
  - College buildings with occupant load greater than 500
  - Hospitals, prisons, police stations, fire & rescue
  - Public power generating stations
  - Any building with occupant load greater than 5,000
  - Chemical Use - Highly toxic, toxic or explosive materials over exempt amounts
- New & Existing Buildings undergoing Renovation
  - Building officials have authority on existing conditions

NFPA 1 Requirements
- All buildings 3 stories or greater in height
- Required as part of quality assurance program
What Building Types are Impacted?

- Applies to new construction and work in existing buildings
- IEBC requires work in existing buildings to meet new construction requirements
- No prescribed threshold for project size
- These requirements to the newly installed firestop systems only
  - Building officials could require retroactive upgrades of existing non-conforming conditions through general hazardous condition language in Ch.1 of the building code
- Note that per the IBC, would not apply to ambulatory care unless a high rise. In NFPA 1, would apply regardless of use once 3 stories or greater.
What are Firestop Special Inspections?

- New inspection process to enhance enforcement
  - Goes beyond visual inspection and requires inspector to witness a percentage of firestopping that is installed or destructively inspect a percentage of firestopping installed.
- No code change on what is required to be installed for firestopping
- All based on ensuring **LISTED ASSEMBLIES** are installed, Not just firestopping products
  - Why?
How are Inspections Performed?

- In accordance with ASTM E 2174 and ASTM E 2393
- Inspector to witness 10% of each type of firestop system or perform 2% destructive test of each type of fire stop system per floor or for each area of a floor that is larger than 10,000 ft²
- Joints one sample per type of joint system per 500 lineal feet
- Inspector is to be provided with all approved assemblies prior to performing inspections
- Failures: Each failed test requires an additional up to a failure rate of 10%; then contractor is required to QAQC their own work
Who can serve as Special Inspector?

Approved Agency-

“An established and recognized agency that is regularly engaged in conducting tests or furnishing inspection services, where such agency has been approved by the building official.”

ASTM Standards Provide Additional Guidance:

- 2 Year experience in construction field inspections
- Education, credentials, and experience this is acceptable to the authorizing authority

Conflicts of Interest:

- Third party inspector is required to be independent of the manufacturer, contractor, installer, and supplier of the firestopping products
- Cannot be in competition with the manufacturer, contractor, installer, or supplier

No prescribed certifications

- International Firestop Council
- Intertek IQP- based on IFC program
- ISC AC 291- Agency certification
Case Study: Stamford Hospital New Building Project

- 12-stories, 650,000 SF
- $450 Million Project Budget
- Schedule:
  - Master Plan 2004-2010
  - Design & Site Prep 2009-2013
  - Central Utility Plant 2012-2013
  - New Building 2013-2016
  - MOB & Garage 2014-2016
  - Final Sitework 2016-2018
- Occupancy of New Building - September 2016
  - On time, Under budget
- LEED-Certified - currently largest LEED-HC Certified project in the country
Stamford Hospital New Building Program
Stamford Hospital New Building Project

Entry Concourse

ICU Room

ED Acute Treatment

New England Healthcare Engineers' Society
Common Risks with Firestopping

- Regulatory risk: Wanted highest level of quality assurance that firestopping was not going to be an issue on future building assessments by various AHJs
  - Building Department
  - Fire Department
  - Department of Public Health
  - Joint Commission
  - Center for Medicare and Medicaid Services

- Contractor/Sub-contractor inconsistency: inspection and quality of firestopping varies by contractors

- Un-documented Penetrations discovered Post-Project: late-project penetrations on prior projects

- Reactive Process: most detailed inspection sometimes come post-occupancy
  - Goal was to avoid patient care impacts and business interruptions associated with rework

- Material/Installation Inconsistencies: destructive testing rare; were assemblies done correctly?
Common Risks - Major Knowledge Gaps in Industry

- Firestopping Products
- Firestop Assemblies

UL/UL SYSTEM NO. C-AJ-1421

METAL PIPE IN A SLEEVE THROUGH CONCRETE FLOOR/WALL OR BLOCK WALL

F-RATING = 2HR, OR 3HR.
T-RATING = 8HR.
L-RATING AT AMBIENT = LESS THAN 1 CFM / SQ FT
L-RATING AT 400° F = LESS THAN 1 CFM / SQ FT

1. CONCRETE FLOOR OR WALL ASSEMBLY (2-HR, OR 3-HR FIRE-RATING):
   A. LIGHTWEIGHT OR NORMAL WEIGHT CONCRETE FLOOR OR WALL (MINIMUM 4-1/2" THICK).
   B. ANY UL/UL CLASSIFIED CONCRETE BLOCK WALL.

2. [OPTIONAL] MAXIMUM 8" DIAMETER STEEL PIPE SLEEVE (SCHEDULE 40 OR HEAVIER).

3. PENETRATING ITEM TO BE ONE OF THE FOLLOWING:
   A. MAXIMUM 4" DIAMETER STEEL PIPE (SCHEDULE 40 OR HEAVIER).
   B. MAXIMUM 4" DIAMETER CAST IRON PIPE.
   C. MAXIMUM 4" NOMINAL DIAMETER COPPER PIPE.
   D. MAXIMUM 4" NOMINAL DIAMETER STEEL CONDUIT OR EMT.

4. MINIMUM 4" THICKNESS MINERAL WOOL (MIN. 4 Pcf DENSITY) TIGHTLY PACKED.

5. MINIMUM 1/4" DEPTH HILTI FS-ONE MAX OR FS-ONE INTUMESCENT FIRESTOP SEALANT.
   HILTI CP 604 SELF-LEVELING FIRESTOP SEALANT, HILTI CFS-S SIL GG FIRESTOP SILICONE SEALANT, OR HILTI CFS-S SIL SL FIRESTOP SILICONE SEALANT.

6. MINIMUM 1/4" DEPTH HILTI FS-ONE MAX OR FS-ONE INTUMESCENT FIRESTOP SEALANT OR HILTI CFS-S SIL SL FIRESTOP SILICONE SEALANT APPLIED AT POINT OF CONTACT (NOT REQUIRED WHEN HILTI CP 604 SELF-LEVELING FIRESTOP SEALANT OR HILTI CFS-S SIL SL FIRESTOP SILICONE SEALANT IS USED, ITEM NO. 5).

NOTES:
1. MAXIMUM DIAMETER OF OPENING = 6".
2. ANNULAR SPACE = MINIMUM 6", MAXIMUM 5-3/8".
3. MINIMUM 1/4" DEPTH HILTI FS-ONE MAX OR FS-ONE INTUMESCENT FIRESTOP SEALANT OR HILTI CFS-S SIL GG FIRESTOP SILICONE SEALANT IS REQUIRED ON BOTH SIDES OF A WALL ASSEMBLY.
4. F-RATING IS 3HR. WHEN HILTI FS-ONE MAX OR FS-ONE INTUMESCENT FIRESTOP SEALANT IS USED, AND 2-HR. WHEN HILTI CP 604 SELF-LEVELING FIRESTOP SEALANT, HILTI CFS-S SIL GG FIRESTOP SILICONE SEALANT, OR HILTI CFS-S SIL SL FIRESTOP SILICONE SEALANT IS USED.
Common Risks - Design Documents

- Architectural Drawings-
  - Do not commonly identify the listed assemblies.
    - Often left to means and methods.
    - Specs reference the installation of Listed firestop assemblies per the applicable code requirements
  - New process represents increased risk to designers with notes on drawings that are not specific
  - Recommend avoiding ambiguous language on details such as “provide firestop sealant”
    - Avoid clarifying RFIs and confusion
    - Code minimum is listed assemblies, not products or sealants

![Diagram of firestop sealant at rated partition]
Stamford developed Firestopping Inspection approach developed in 2013

- Prior to adoption of ASTM 2174 & 2393 in CT

Goals for Stamford Project:

- ZERO Firestop Issues at Opening of Building
- PROACTIVE and efficient clarification process for installations
- FULL Documentation of Firestopping
- SEAMLESS Hand-off to Operations team
- DOCUMENTED COMPLIANCE for future inspections

Key Management Needs:

- Contractor Partnership - Contractor’s QA/QC APM charged with this role
- Owner Management - Owner’s QA/QC PM tracked this and managed Special Inspector
- Special Inspector - third-party consultant available as needed

Full Scope of Special Inspector/Code Consultant

- Firestopping
- Fire Rated Walls
- Egress Review
- Fire Doors
- Exit Signs
- Trouble-shooting on code questions
Stamford Hospital - Implementing Firestop Process

- Prior to install
  - Design drawings and specifications
  - Product Selection
  - Installer Selection
  - Training & Education

- Installation & Inspections
  - Roles in QA/QC Process
  - Scheduling of Special Inspector
  - Tracking - BIM Documentation of Each Penetration
  - Labeling at Each Penetration
  - Engineering Judgements

- Results
Design Drawings and Specifications - Pre-planning

- **Special Inspector Provided:**
  - Review of drawings for key potential issues
  - RFI review
  - Submittal review from sub-contractors
  - Mock-up review

- **Contractor Provided:**
  - Mock-ups of installations
  - Recommendations for certain assemblies (e.g., sleeve)
  - Unit costs for certain assemblies in case additional units needed
  - Option for sub-contractor install versus single installer, including cost comparison
  - Labeling standard
  - Tracking method and resolution process (BIM 360)
Product/Material Selection - Single Source

- Submittals
  - Typically just reference acceptable manufacturers
  - Could identify if labeling of assemblies is required
    - Not a code requirement but is a best practice
- Multiple manufacturers could be utilized
- Each has approximately 1,200 different listed assemblies
- Cannot mix products of multiple manufacturer’s in the same opening

- Decision - Project elected to use sole source for the project to eliminate potential failure mode and simplify management of assemblies
Installer Selection

- Options:
  - Sole Source installer for all trades
    - Common method to reduce issues where they are certified
    - Well versed in firestop assemblies
    - Can resolve field issues on expedited path
  - Each sub-contractor install fire-stopping
    - Possible better initial cost during bid
    - More risk if sub-contractor does not perform
  - Hybrid

- Code does not require a certification
  - Certifications available: UL qualified firestop contractors program; and, FM 4991 Approved Firestop Contractor
  - On site manufacturer training is education, not certification

- Project initially had a mix of some trades using a sole source installer while others were performing the installation
  - Lesson Learned - Work eventually taken away from one of the sub-contractors due to under performance and given to sole source
Training & Education

- Installer should be educated on the inspection process prior to install
- Involves multiple trades
  - Drywall contractor critical piece
  - 63 total assemblies included in project mock up

Mock Ups

- Install training
- Walk through inspection process

<table>
<thead>
<tr>
<th>Mechanical Barber Firestop</th>
<th>Grodsky</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size of Blank Opening</td>
<td>F-Rating</td>
</tr>
<tr>
<td>Max. 20&quot; steel, cast iron, max. 6&quot; copper, condull or max. 4&quot; EMT pipe, 2 or 3 H</td>
<td>X</td>
</tr>
<tr>
<td>Max. 10&quot; steel, cast iron, max. 4&quot; copper, condull or EMT pipe includes Hollow Core (5/8&quot; to 3&quot; I.D.)</td>
<td>3 H</td>
</tr>
<tr>
<td>Max. 10&quot; steel, max. 6&quot; copper, condull or max. 6 EMT pipe (5/4&quot; to 2&quot; I.D.)</td>
<td>3 H</td>
</tr>
<tr>
<td>Max. 4&quot; steel or copper with max. 1/2&quot; AIB/PVC insulation; max. 1&quot; AIB/PVC on 3&quot; pipes and smaller; AS-12&quot; to 18&quot; for 3 hour; AS-12&quot; to 18&quot; for 3 hour</td>
<td>2 or 3 H</td>
</tr>
<tr>
<td>Max. 12&quot; steel, cast iron, max. 4&quot; copper pipe with nom. 2&quot; glass fiber or max. 2&quot; thick calcium silicate insulation (Steel sleeve optional)</td>
<td>2 H</td>
</tr>
</tbody>
</table>

The table above provides details on the mechanical barber firestop and grodsky systems, including sizes, ratings, and requirements for installation in mock-ups.
Managing the Installation & Inspection Process

- **Stamford QA/QC Manager**
  - Managed special inspector
  - In ASTM 2174 and 2393 served as the Authorizing Agent role
  - Focused on quality of install along with Special Inspector

- **GC QA/QC Manager**
  - Managed installers
  - QA/QC install prior to scheduling inspection
  - Managed punch list closeout and documentation

- **Installer QA/QC**
  - Identification of assemblies
  - Identification and obtaining engineering judgements
  - Coordination with multiple trades
Driven by construction sequence and schedule

Optimized if can schedule multiple or all trades for a given 10,000 SF inspection block (rarely happens)

Multiple inspections per area:

- Through floor prior to wall closure
- Head of wall joints prior to ceiling or heavy MEP install
- Through Walls- First Pass for major issues prior to ceiling install
- Through Wall- Second Pass for low voltage and other trades with relatively small penetrations. Generally preformed through ceiling grid. Would need to pre schedule hard ceiling areas.
- Bottom of Wall Joints and Curtain Wall- Initial inspection and then follow up visual of condition just prior to closure behind construction
Documentation

- Project utilized BIM 360
  - Rapid communication between inspector and trades
  - Became record document for owner
  - Photos, drawings, details all provided.

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<thead>
<tr>
<th>Company</th>
<th>Barber Firestopping</th>
<th>Status</th>
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<tbody>
<tr>
<td>Type</td>
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<td></td>
<td></td>
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<tr>
<td>Due Date</td>
<td>15 Jan 2016 12:00 AM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Author</td>
<td>Tomc None (<a href="mailto:tomc@crcfire.com">tomc@crcfire.com</a>)</td>
<td></td>
<td>Code Red Consultants</td>
</tr>
<tr>
<td>Author's Company</td>
<td></td>
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<tr>
<td>Date Created</td>
<td>05 Jan 2016 9:58 PM</td>
<td></td>
<td></td>
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<td>Root Cause</td>
<td>Uncategorized - QC/QA</td>
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<td></td>
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<tr>
<td>Description</td>
<td>Destructive test failed; firestopping not provided; protect penetrating item with appropriate listed firestopping material</td>
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<td></td>
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<tr>
<td>Location</td>
<td>BUILDING &gt; INTERIOR &gt; LEVEL 8</td>
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<tr>
<td>Location Detail</td>
<td>SEE ATTACHED DRAWING ISSUE 8A.378</td>
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<td></td>
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</table>

Comments for ID 001085

- Daniel Beatty (danbeatty64@yahoo.com) 29 Jan 2016 9:54 AM
  - Firestop complete. Barber removed Sheetrock and caulked at rated wall. Then replaced Sheetrock and sound caulked. See 2 attachments.
- Daniel Beatty (danbeatty64@yahoo.com) 13 Jan 2016 7:35 AM
  - Carpenters patched wall before we could fire stop. Sheetrock must be removed again before BFS can fire stop pipe.
- Thomas Driscoll (thomas.driscoll@skanska.com) 06 Jan 2016 9:54 AM
  - Barber to firestop within partition cavity. After, Sloan to patch sheetrock.
BIM 360 Sample

- Firestopping Metrics
  - 3,669 total pins
  - Not just deficiencies - communication tool
  - Focused on quality of install along with Special Inspector

![BIM 360 Field](image)
BIM 360 Sample

**Engineering Judgment Firestop Detail**

**Project:** Stamford Hospital

**Contractor:** Barber Firestop

**Fire Rating:** 2-HR.

1. **Gypsum Wall Assembly (ULL, Classified U300, U400 or V400 Series) (2-HR, Fire Rating):** To include the following construction features:
   - **A.** (Not shown) Wood studs to consist of nominal 2” x 4” lumber (spaced maximum 16” OC).
   - **B.** Steel studs to be minimum 3/8” wide (spaced maximum 24” OC).
   - **C.** Two layers nominal 5/8” thick gypsum wallboard, type, number of layers, and sheet orientation as specified in the individual UL design.

2. **Penetrating Item to be one of the following:**
   - **A.** Maximum 4” nominal diameter steel pipe (SCH 10 or heavier).
   - **B.** Maximum 4” nominal diameter cast or ductile iron pipe.
   - **C.** Maximum 4” nominal diameter steel conduit or EMT.

3. **Minimum 5/8” Depth Hilti FS-One Max Intumescent Firestop Sealant flush with both surfaces of wall.

4. **Minimum 1/2” Bead Hilti FS-One Max Intumescent Firestop Sealant applied at point of contact.

**Notes:**
1. Maximum diameter of opening = 3”.
2. Annular space = Minimum 0”, Maximum 24”.
3. On one side of the wall, the pipe is allowed to penetrate the membrane continuously in a plane parallel with the wall and studs.

**This engineering judgment represents a firestop system that would be expected to pass the stated ratings if tested.**

**Reference:** UL/ULC System No. W-L-1034 & W-L-1432

**Hilti Firestop Systems**

**Hilti Inc.**
Plano, Texas USA (972) 479-8000

**Designer:**
Daniel Crisler

**Engineer:**
May 10, 2010

**Scale:** 1/8” = 1’

**Drawing No.:** 233141a
1. Listed assemblies by the manufacturer
   1. All are tested by an approved testing agency and are listed
   2. These are explicitly permitted by the code

2. Engineering Judgements
   1. Issued by the manufacturer when a field condition deviates from a listed assembly and requested by the installing contractor
   2. Judgement based on tested assemblies
   3. Approval is subject to review by the AHJ and/or inspector
   4. Review Notes

---

**Engineering Judgements - Explained**

**1. Listed assemblies by the manufacturer**

1. All are tested by an approved testing agency and are listed
2. These are explicitly permitted by the code

**2. Engineering Judgements**

1. Issued by the manufacturer of the firestopping product when a field condition deviates from a listed assembly and requested by the installing contractor
2. Judgement based on tested assemblies
3. Approval is subject to review by the AHJ and/or inspector
4. Review Notes
Consider preformed devices rather than metered installations
Firestopping Metrics

- 85 total man day for site inspections
- Over 50 engineering judgements needed
- 3,669 total “pins” in our issue tracking system
  - Used as a communication tool, not just to identify deficiencies

### Results - Scale of Inspection Program

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<thead>
<tr>
<th>Issue ID</th>
<th>Description</th>
<th>Location Detail</th>
<th>Status</th>
<th>Company</th>
<th>Type</th>
<th>Date Updated</th>
<th>Due Date</th>
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<td>000600</td>
<td>NO LABEL; PROVIDE APPROPRIATE LABEL</td>
<td>POD 2E: SEE ATTACHED DRAWING ISSUE 2E.270</td>
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<td>Barber Firestopping</td>
<td>QA/QC</td>
<td>01 Aug 2016</td>
<td>30 Oct 2015</td>
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<td>000623</td>
<td>UNPROTECTED PENETRATING ITEMS (4) PROTECT PENETRATING ITEMS WITH APPROPRIATE LISTED FIRESTOPPING MATERIAL</td>
<td>SEE ATTACHED DRAWING ISSUE 3#293</td>
<td>Not Approved</td>
<td>Barber Firestopping</td>
<td>QA/QC</td>
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<td>30 Oct 2015</td>
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<td>003282</td>
<td>DESTRUCTIVE TEST; OPENING PROTECTIVE NOT CONSISTENT WITH UL 9087 LISTING AS INDICATED ON WALL LABEL (6&quot;x26&quot; HOLE, 5/8&quot; THICKNESS); NO BLOCKS OR WIRE MESH AS LISTING</td>
<td>BUILDING+INTERIOR+LEVEL</td>
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<td>Barber Firestopping</td>
<td>Non-</td>
<td>01 Aug 2016</td>
<td>11 Mar 2016</td>
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<td>004276</td>
<td>Fire alarm junction box embedded in drywall. Remove and place required thickness of drywall behind</td>
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<td>Skanska Punch List</td>
<td>03 Aug 2016</td>
<td>04 Apr 2016</td>
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<td>004546</td>
<td>BEAM FIREPROOFING HAS BEEN REMOVED. PROVIDE FIREPROOFING TO</td>
<td>BUILDING+INTERIOR+LEVEL</td>
<td>Closed</td>
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<td>Skanska Punch List</td>
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<tr>
<td>004639</td>
<td>2 PIPES INSTALLED IN PLANE OF WALL PROVIDE UL SYSTEM OR E J PROVIDED.</td>
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<td>Barber Firestopping</td>
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<td>005337</td>
<td>UNPROTECTED PENETRATING ITEM. PROTECT PENETRATING ITEM WITH APPROPRIATE FIRESTOPPING MATERIAL, OPEN CONDUIT</td>
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<td>Barber Firestopping</td>
<td>Non-</td>
<td>01 Aug 2016</td>
<td>24 Apr 2016</td>
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</table>
Drywall patching not tied to studs. Junction box needed to be removed and the drywall reinstalled behind before firestopping.
Multi Trade Coordination- Multiple Penetrants
Multi Trade Coordination - Head of Wall T Rating

- Joints required to have an Assembly Rating (F and T equal)
- Through wall penetrations F rating only
- By mixing the two together, T rating of joint now brought in to question

**NOTES:**
1. MAXIMUM WIDTH OF JOINT = 0".
2. T-RATING MAY NOT EQUAL F-RATING IN ACCORDANCE WITH UL 2079.
3. FIRE-RATING OF ASSEMBLY IS DEPENDENT UPON THE PERFORMANCE OF GYPSUM WALL ASSEMBLY AND CONCRETE COLUMN UNDER FIRE CONDITIONS.
4. THIS SYSTEM IS DESIGNED AS A STATIC SYSTEM ONLY.
Results - Ongoing Building Maintenance

- Starts with staff training
  - Know the building and LS structural features.
  - Fire stopping materials and components
  - Attend on-site seminars given by contractors and suppliers.
  - Attend inspection sessions and walk the site.
  - Review of testing documentation and procedures that have occurred.
Utilize past inspections as a base line

- FM performs quarterly inspection of separation walls.
- FM conducts internal permitting process.
- Negative results from the internal permits can be tracked back to the responsible party.
Types of Regulatory and Accreditation Inspections/Surveys:
- DPH Inspections consisted of 75%, 90% and 100% progress inspections.
- Continuous Fire Marshal Inspections
- Local Building Department Inspections
- Joint Commission Post Occupancy Inspection
- Varying levels of inspections at different times

Benefits of Inspection Process:
- Non-Biased third party survey
- Knowledge of systems and methods as applied in our building
- Reference library of listed assemblies and engineering judgements
- Resulted in trusting relationship between building officials, third party Inspectors, and owners.
  - Process allowed inspectors to focus their trade inspections.
- Code research where applicable
- Documentation of past inspections and illustrations or photos
  - Useful for tracking violations with internal permitting process.
**System No. HW-D-0495**

**March 06, 2018**

<table>
<thead>
<tr>
<th>ANSI/UL 2079</th>
<th>CAN/ULC S135</th>
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<tbody>
<tr>
<td>Assembly Ratings — 1 and 2 Hr (See Item 2)</td>
<td>F Ratings — 1 and 2 Hr (See Item 2)</td>
</tr>
<tr>
<td>Nominal Joint Width — 3/8 to 1-1/2 in.</td>
<td>FT Ratings — 1 and 2 Hr (See Item 2)</td>
</tr>
<tr>
<td>Joint Widths</td>
<td></td>
</tr>
<tr>
<td>Class II or III Movement Capabilities — 100% Compression or Extension for Nom 3/8 in. to 3/4 in. (10 to 19 mm) Joint; or 100% Compression and 0% Extension for Nom 3/4 in. to 1 1/2 in. (10 to 38 mm) Joint (See Item 3)</td>
<td>FH Ratings — 1 and 2 Hr (See Item 2)</td>
</tr>
<tr>
<td>L Rating At Ambient — Less Than 1 CFM/ft</td>
<td>FTH Ratings — 1 and 2 Hr (See Item 2)</td>
</tr>
<tr>
<td>L Rating At 400 F — Less Than 1 CFM/ft</td>
<td></td>
</tr>
<tr>
<td>Class II or III Movement Capabilities — 100% Compression or Extension for Nom 19 mm to 19 mm Joint; or 100% Compression and 0% Extension for Nom 19 mm to 38 mm Joint (See Item 3)</td>
<td></td>
</tr>
<tr>
<td>L Rating At Ambient — Less Than 1.55 L/s/m</td>
<td></td>
</tr>
<tr>
<td>L Rating At 204 C — Less Than 1.55 L/s/m</td>
<td></td>
</tr>
</tbody>
</table>

**Configuration A**

**Mineral Wool**

**Specified Joint Widths**
Questions?