

SECTION 07 84 13 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide penetrating firestopping in accordance with requirements of the Contract Documents.
- B. Section Includes:
 - 1. Penetrations in fire-resistance-rated walls.
 - 2. Penetrations in horizontal assemblies.
 - 3. Penetrations in smoke barriers.
- C. Related Sections:
 - 1. Section 07 84 46 "Fire-Resistive Joint Systems" for joints in or between fire-resistance-rated construction, at exterior curtain-wall/floor intersections, and in smoke barriers.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.
 - 1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
 - 2. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.
- C. Certifications: NYC Building Department Acceptance: Submit a copy of the NYC Building Department MEA/BS&A acceptance sheet for each firestopping system submitted for each specific condition on Project.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for penetration firestopping.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."
- B. Installer Qualifications: A firm experienced in installing penetration firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.
- C. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistant joint sealants in Project to a single qualified installer.
- D. Source Limitations: Obtain through-penetration firestop systems from a single manufacturer.
- E. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances and regulations of Federal, State and Municipal authorities having jurisdiction. Obtain necessary approvals from all such authorities.
 - 1. Comply with NYC Building Law, Reference Standard RS 5-19; "Fire Tests for Through-Penetration Fire Stops", including referenced provisions for ASTM E814. In addition, provide materials, accessories and application procedures which have been approved for use in the City of New York.
- F. Provide through-penetration firestop systems products containing no detectable asbestos as determined by the method specified in 40 CFR Part 763, Subpart F, Appendix A, Section 1, "Polarized Light Microscopy."
- G. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:
 - 1. Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems complying with the following requirements:
 - a. Penetration firestopping products bear classification marking of qualified testing and inspecting agency.
 - b. Classification markings on penetration firestopping correspond to designations listed by the following:
 - 1) UL in its "Fire Resistance Directory."
 - 2) Intertek ETL SEMKO in its "Directory of Listed Building Products."
 - 3) FM Global in its "Building Materials Approval Guide."
- H. Preinstallation Conference: Conduct conference at Project site.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life,

if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multi-component materials.

- B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.
- C. Notify Owner's testing agency at least seven days in advance of penetration firestopping installations; confirm dates and times on day preceding each series of installations.
- D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.

1.8 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace firestopping systems that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which firestopping manufacturer agrees to furnish firestopping material to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Life of the building.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Basis of Design: Subject to compliance with requirements, provide products by one of the following:
1. Hilti, Inc.
 2. RectorSeal Corporation.
 3. Specified Technologies Inc.
 4. 3M Fire Protection Products.
 5. Tremco, Inc.; Tremco Fire Protection Systems Group.

2.2 PENETRATION FIRESTOPPING

- A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
- B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
1. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
 2. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
 - a. For penetrations into storage areas containing combustible materials.
 3. W-Rating: Provide penetration firestopping showing no evidence of water leakage when tested according to UL 1479.
- D. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.
1. L-Rating: Not exceeding 5.0 cfm/sq. ft. (0.025 cu. m/s per sq. m) of penetration opening at 0.30-inch wg (74.7 Pa) at both ambient and elevated temperatures.
- E. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- F. VOC Content: Penetration firestopping sealants and sealant primers shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
1. Sealants: 250 g/L.
 2. Sealant Primers for Nonporous Substrates: 250 g/L.

3. Sealant Primers for Porous Substrates: 775 g/L.
- G. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.
 1. Permanent forming/damming/backing materials, including the following:
 - a. Slag-wool-fiber or rock-wool-fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Fillers for sealants.
 2. Temporary forming materials.
 3. Substrate primers.
 4. Collars.
 5. Steel sleeves.

2.3 FILL MATERIALS

- A. General: Provide through-penetration firestop systems containing the types of fill materials indicated in the Through-Penetration Firestop System Schedule at the end of Part 3 by reference to the types of materials described in this Article. Fill materials are those referred to in directories of the referenced testing and inspecting agencies as fill, void, or cavity materials.
- B. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- C. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- D. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- E. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.
- F. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
 1. Acceptable Products: TREMstop Putty Pads – Tremco TREMstop Firestopping.
- G. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
 1. Acceptable Products: TREMstop Super Strips – Tremco TREMstop Firestopping.
- H. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
 1. Acceptable Products: TREMstop Fire Mortar – Tremco TREMstop Firestopping.

- I. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
 - 1. Acceptable Product: Flamesafe Pillow by Rectorseal.
 - J. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
 - K. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of nonsag grade for both opening conditions.
 - 2. Acceptable Products: TREMstop Fyre-Sil (self-leveling/gun grade) – Tremco TREMstop Firestopping.
 - L. Intumescent Acrylic Sealant: Firestop sealant that expands when exposed to heat. Protects penetrations containing combustible and non-combustible penetrants.
 - 1. Acceptable Products: TREMstop Fyre-Caulk & IA+ - Tremco TREMstop Firestopping.
 - M. Firestop Sleeve Device: Factory assembled sleeves formed from galvanized steel and lined with intumescent material designed to fit specific diameter of penetration.
 - 1. Acceptable Products:
 - a. CP653 Speed Sleeve by Hilti.
 - b. Pass-Thru Device by Rectorseal
 - N. Polyurethane Firestop Foam: Two component polyurethane foam created through chemical reaction of polyol, water and polyisocyanate, plus flame retardants and other additives (all included in the polyol component). Foam cures within one minute at room temperature to produce non-shrinking smoketight firestopping system and does not require additional firestop coating.
 - 1. Acceptable Product: CP620 Fire Foam by Hilti.
- 2.4 MIXING
- A. For those products requiring mixing before application, comply with penetration firestopping manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Follow manufacturer's installation instructions. In situations where the requirements of this Section differ from those of the manufacturer, the more conservative requirements shall govern.

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping's seal with substrates.

3.3 INSTALLATION

- A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.
- C. Install fill materials for firestopping by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
 1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
 2. Contractor's name, address, and phone number.
 3. Designation of applicable testing and inspecting agency.
 4. Date of installation.
 5. Manufacturer's name.
 6. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections.
 1. Inspecting agency will state in each report whether inspected through-penetration firestop systems comply with or deviate from requirements.
 2. Inspection agency shall verify that installed systems are in accordance with either a UL-classified system or engineer judgment drawing as described in Part 1.
 3. Inspections of the firestopping work shall comply with New York City "Controlled Special Inspections" statutory requirements for the requirements of the component materials and installation.
- B. Where deficiencies are found or penetration firestopping is damaged or removed because of testing, repair or replace penetration firestopping to comply with requirements.
- C. Proceed with enclosing penetration firestopping with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping is without damage or deterioration at time of

Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

3.7 PENETRATION FIRESTOPPING SCHEDULE

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.
 - 1. Equivalent approved systems by the following are acceptable:
 - a. Intertek ETL SEMKO-approved systems that are listed by design numbers in Intertek ETL SEMKO's "Directory of Listed Building Products" under "Firestop Systems."
 - b. FM Global-approved systems that are listed by design numbers in FM Global's "Building Materials Approval Guide" under "Wall and Floor Penetration Fire Stops."
- B. Firestop Systems for pipes, plastic or metal, conduit in vertical runs, installed through firestop devices: Comply with the following:
 - 1. Acceptable UL-Classified Systems with FA 1000 Series Systems equivalent to, but not limited to, the following:
 - a. FA1016, FA1017, FA2053, FA2054, FA2066, FA2103, FB5004, FA1128, FA2213, FA5046, FB1026 and FB2048 by Hilti.
 - 2. Type of Firestop Device:
 - a. CP 680-P/M Cast-in Firestop Device by Hilti.
 - b. CFS-DID Firestop Drop-In Device by Hilti.
- C. Firestop Systems with No Penetrating Items: Comply with the following:
 - 1. Acceptable UL-Classified Systems with CAJ 0000 Series Systems equivalent to, but not limited to, the following:
 - a. CAJ0055, CAJ0070, CAJ0090, CAJ0097 by Hilti.
 - b. CAJ0012, CAJ0102 by RectorSeal.
 - c. CAJ0011, CAJ0130, CAJ0096, CLIV by Tremco TREMstop Firestopping.
 - 2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Silicone sealant.
 - c. Acrylic sealant.
 - d. Intumescent putty.
 - e. Mortar.
 - f. Preformed intumescent blocks/plugs.
 - g. Pillows/Bags
- D. Firestop Systems for Metallic Pipes, Conduit, or Tubing: Comply with the following:
 - 1. Acceptable UL-Classified Systems with CAJ, WL, or FC 1000 Series Systems, equivalent to, but not limited to, the following:
 - a. CAJ1184, CAJ1226, CAJ1291, CAJ1277, CAJ1382, CAJ1388, WL1054, WL1249, FC1009 by Hilti.
 - b. CAJ1403, CAJ1235, CAJ1406, WL1152, WL1207, FC1020 by RectorSeal.
 - c. CAJ1064, CAJ1302, CAJ1448, CAJ1529, CAJ1518, TL/PV 120-04, WL1158, WL1302, WL1328 – Tremco TREMstop Firestopping.
 - 2. Type of Fill Materials: One or more of the following:

- a. Latex sealant.
 - b. Silicone sealant.
 - c. Acrylic sealant.
 - d. Intumescent putty.
 - e. Mortar.
 - f. Polyurethane firestop foam.
- E. Firestopping for Nonmetallic Pipe, Conduit, or Tubing: Comply with the following:
1. Acceptable UL-Classified Systems with CAJ, FA, or WL 2000 Series Systems, equivalent to, but not limited to, the following:
 - a. CAJ2109, CAJ2167, CAJ2271, CAJ2342, FA2053, WL2078, WL2128 by Hilti.
 - b. CAJ2212, CAJ2171, CAJ2210, WL2167, WL2185, WL2170, WL2259 by RectorSeal.
 - c. CAJ2184, CAJ2615, CAJ2618, CAJ2621, TL/PH 120-05, TL/PH 120-06, WL2129, WL2463, WL2463 – Tremco TREMstop Firestopping.
 2. Type of Fill Materials: One or more of the following:
 - a. Intumescent sealant.
 - b. Intumescent putty.
 - c. Intumescent wrap strips.
 - d. Firestop device.
 - e. Firestop sleeve device.
 - f. Latex sealant.
- F. Firestop Systems for Electrical Cables: Comply with the following:
1. Acceptable UL-Classified Systems with CAJ, FC, or WL 3000 Series Systems, equivalent to, but not limited to, the following:
 - a. CAJ3095, FC3012, WL3065, WL3112 by Hilti.
 - b. CAJ3185, CAJ3199, CAJ3234, FC3018, FC3060, WL3179 by RectorSeal.
 - c. CAJ3141, CAJ3297, CAJ3036, CAJ3228, CAJ3237, WL3131, WL3346, FC3037, FC3085 – Tremco TREMstop Firestopping.
 2. Type of Fill Materials: One or more of the following:
 - a. Intumescent sealant.
 - b. Latex Sealant
 - c. Pillows/bags
 - d. Intumescent putty.
 - e. Silicone foam.
- G. Firestopping for Cable Trays with Electric Cables: Comply with the following:
1. Acceptable UL-Classified Systems with CAJ or WL 4000 Series Systems equivalent to, but not limited to, the following:
 - a. CAJ4035, CAJ4054, WL4011, WL4038 by Hilti.
 - b. CAJ4035, CBJ4023, WL4025, WL4030 by RectorSeal.
 - c. WJ4053, WL4056 – Tremco TREMstop Firestopping.
 2. Type of Fill Materials: One or more of the following:
 - a. Intumescent sealant.
 - b. Intumescent putty.
 - c. Silicone foam.
 - d. Pillows/bags.
 - e. Foam blocks.
 - f. Firestop mortar.

- g. Polyurethane firestop foam.
- H. Firestop Systems for Insulated Pipes: Comply with the following:
 - 1. Acceptable UL-Classified Systems with CAJ or WL 5000 Series Systems, equivalent to, but not limited to, the following:
 - a. CAJ5091, WL5029 by Hilti.
 - b. CAJ5222, WL5171 by RectorSeal.
 - c. CAJ5111, CAJ5121, CAJ5287, CAJ5324, WL5081, WL5115, CAJ5083, FC5055 – Tremco TREMstop Firestopping.
 - 2. Type of Fill Materials: One or more of the following:
 - a. Intumescent sealant.
 - b. Silicone foam.
 - c. Intumescent wrap strips.
 - d. Pre-formed intumescent blocks.
 - e. Latex sealant.
- I. Firestop Systems for Miscellaneous Electrical Penetrants: Comply with the following:
 - 1. Acceptable UL-Classified Systems with CAJ 6000 Series Systems equivalent to, but not limited to, the following:
 - 2. CAJ6006, CAJ 6017 by Hilti.
 - 3. CAJ6012, CAJ6013, CAJ6027 by RectorSeal.
 - 4. Type of Fill Materials: One or more of the following:
 - a. Intumescent sealant.
 - b. Latex sealant
 - c. Intumescent putty.
 - d. Mortar.
- J. Firestop Systems for Miscellaneous Mechanical Penetrations: Comply with the following:
 - 1. Acceptable UL-Classified Systems with CAJ 7000 Series Systems equivalent to, but not limited to, the following:
 - a. CAJ7046, CAJ7051 by Hilti.
 - b. CAJ7067, CAJ7075, CAJ7082 by RectorSeal.
 - c. CAJ7090, CAJ7136, CAJ7139, CAJ7002, WL7039, WL7113, WL7125, WL7172 – Tremco TREMstop Firestopping.
 - 2. Type of Fill Materials: One or both of the following:
 - a. Intumescent sealant.
 - b. Latex sealant.
 - c. Mortar.
 - d. Acrylic sealant.
 - e. Silicone sealant.
- K. Firestop Systems for Groupings of Penetrations: Comply with the following:
 - 1. Acceptable UL-Classified Systems with CAJ or WL 8000 Series Systems, equivalent to, but not limited to, the following:
 - a. CAJ8056, CAJ8096, WJ8007, WL8014, WL8019 by Hilti.
 - b. CAJ8042, CAJ8101, CAJ8133, WL8007 by RectorSeal.
 - c. CAJ8134, CAJ8111, CAJ8158 – Tremco TREMstop Firestopping.
 - 2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Mortar.

Maine Medical Center
Bean 2 Roof Addition
For Construction
Issued for Permit

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June 14, 2013
February 07, 2014

- c. Intumescent wrap strips.
- d. Firestop device.
- e. Intumescent composite sheet.
- f. Pre-formed intumescent blocks.
- g. Polyurethane firestop foam.

END OF SECTION