

## **SECTION 078413 - PENETRATION FIRESTOPPING**

First Edition: 09-09-2021 See Underlined Text for Latest Edits.

(Consultant shall edit specifications and blue text in header to meet project requirements. This includes but is not limited to updating Equipment and/or Material Model Numbers indicated in the specifications and adding any additional specifications that may be required by the project. Also turn off all “Underlines”)

### **PART 1 – GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### **1.2 SUMMARY**

- A. Section Includes:

- 1. Penetration firestopping systems for the following applications:

- a. Penetrations in fire-resistance-rated walls.
    - b. Penetrations in horizontal assemblies.
    - c. Penetrations in smoke barriers.

- B. Related Requirements:

Retain subparagraph below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections. Section 078443 to be provided by consultant if needed.

- 1. Section 078443 "Joint Firestopping" for joints in or between fire-resistance-rated construction, at exterior curtain-wall/floor intersections, and in smoke barriers.

#### **1.3 ACTION SUBMITTALS**

- A. Product Data: For each type of product.

- B. Product Schedule: For each penetration firestopping system. Include type of barrier being penetrated (with rating), size and type of penetrating material, UL System Number, and firestop product name.

- C. UL System Detail: For each penetrating firestopping system.

- 1. Where project conditions require modification to a qualified testing and inspecting agency's illustration for a particular firestop condition, submit illustration, with modifications marked, approved by firestop system manufacturer's fire-protection engineer as an engineering judgement or equivalent system.

- D. Qualification Data: For Installer(s). Provide manufacturer's training certificates for all installers.

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Retain "Installer Qualifications" Paragraph below if Section 1.5 Quality Assurance will remain, otherwise delete.

- E. Installer Qualifications: For firm. Provide certificate of compliance with FM Approval FM Approval 4991, "Approval Standard for Firestop Contractors," or UL "Qualified Firestop Contractor Program Requirements" approval.
- F. All project penetrations shall be combined into a single Penetration Firestopping submittal. Partial submittals will be rejected.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

#### 1.5 QUALITY ASSURANCE

Retain "Installer Qualifications" Paragraph below, or delete this article if allowing each trade to firestop penetrations they create is acceptable. If retaining, verify that installers are available to perform work in Project location. A list of FM Approvals-approved firestop contractors may be found on [www.fmapprovals.com](http://www.fmapprovals.com), and a list of UL-qualified firestop contractors may be found on [www.ul.com/contractor](http://www.ul.com/contractor). A list of firestop contractors who are approved or qualified and are also members of Firestop Contractors International Association may be found at [www.fcia.org](http://www.fcia.org).

- A. Installation Responsibility: Assign installation of all firestop systems [and fire-resistive joint systems] in project to a single qualified installer.
- B. Installer Qualifications: A firm that has been approved by FM Approval according to FM Approval 4991, "Approval Standard for Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

#### 1.6 PROJECT CONDITIONS

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

#### 1.7 COORDINATION

- A. CM/GC to coordinate location and sizing of sleeves, openings, and penetrating items to ensure that penetration firestopping systems can be installed according to the approved firestopping system design.
- B. Do not paint or conceal any firestopping system until installation has been approved by the UMB Fire Marshal.

## **PART 2 - PRODUCTS**

### 2.1 PERFORMANCE REQUIREMENTS

#### A. Fire-Test-Response Characteristics:

1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
  - a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.
    - 1) UL in its "Fire Resistance Directory."
    - 2) Intertek Group in its "Directory of Listed Building Products."
    - 3) FM Approval in its "Approval Guide."

### 2.2 PENETRATION FIRESTOPPING SYSTEMS

#### A. Penetration Firestopping Systems: Systems that resist spread of fire, 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.

1. Manufacturer's: Subject to compliance with requirements, provide products by one of the following:
  - a. 3M Fire Protection Products
  - b. Hilti, Inc.
  - c. Tremco, Inc.

#### B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E814 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: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).

1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.

2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.

Retain "Penetrations in Smoke Barriers" Paragraph below if smoke barriers are included in Project, and indicate locations on Drawings. Coordinate with the Penetration Firestopping System Schedule.

- D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg (74.7 Pa).

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. (0.025 cu. m/s per sq. m) of penetration opening at and no more than 50-cfm (0.024-cu. m/s) cumulative total for any 100 sq. ft. (9.3 sq. m) at both ambient and elevated temperatures.

- E. 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 system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.

Retain accessories in subparagraphs below required.

1. Permanent forming/damming/backing materials.
2. Substrate primers.
3. Collars.

- F. Fire and Fire/Smoke Dampers: The annular space around fire and fire/smoke dampers shall be sealed according to the manufacturer's installation instructions. Firestopping may or may not be required, as recommended by the damper manufacturer.

## 2.3 PENETRATIONS IN HORIZONTAL ASSEMBLIES

- A. Pipe sleeves are required for all new penetrations floor penetrations. Sleeve must be black steel and extend at least 1" above finished floor surface. GC is responsible for coordinating the installation of pipe sleeves prior to installing penetrating item.
- B. Provide a UL Class 1 W-Rated firestop system for all new and existing floor penetrations.

## 2.4 PENETRATIONS IN VERTICAL ASSEMBLIES

- A. Pipe sleeves are required for all new penetrations in fire rated walls.
- B. Pipe sleeves are required at all penetrations in CMU walls (both rated and nonrated).
- C. Pipe sleeves installed in walls must be installed flush with both sides of the wall that is penetrated. Sleeves shall be black steel.
- D. GC is responsible for coordinating the installation of pipe sleeves prior to installing penetrating item.

## 2.5 FILL MATERIALS

If fill materials are Contractor's choice, retain only those paragraphs below that suit Project. If retaining fill materials in the Penetration Firestopping System Schedule, coordinate paragraphs with materials specified in schedule.

- A. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- B. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- C. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.
- D. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.
- E. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- F. 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.
- G. 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.
- H. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- I. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

## 2.6 MIXING

Retain this article if products are specified that require mixing before application.

- A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system 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.

### **3.2 PREPARATION**

- A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately 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 materials.
  - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
  - 3. Remove laitance and form-release agents from concrete.

Retain paragraph below if products selected require priming.

- B. 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.

### **3.3 INSTALLATION**

- A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.
- 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.
  - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
- C. Install fill materials by proven techniques to produce the following results:
  - 1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.

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. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "X HOUR FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches (76 mm) high and with minimum 0.375-inch (9.5-mm) strokes. Replace X with 1, 2, or 3 hr fire rating.
1. Locate in accessible concealed floor, floor-ceiling, or attic space at 10 feet (4.57 m) from end of wall and at intervals not exceeding 20 feet (9.14 m).
  2. In mechanical equipment rooms, electrical rooms, tele data rooms and utility shaft areas without ceilings, wall identification shall occur at 15 ft intervals at a height of 10 ft above finished floor level.

Retain "Penetration Identification" Paragraph below if required. Individual joint penetration labeling may not be required by authorities having jurisdiction if wall is identified, but labeling is useful if penetration firestopping systems must be replaced.

- B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 4 inches (150 mm) of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. 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. Firestop contractor's name.
  3. UL Design No. of firestop assembly.
  4. Date of installation.
  5. Manufacturer's name.
  6. Installer's name.

### 3.5 FIELD QUALITY CONTROL

If required, inspection of penetration firestopping systems in this article is performed according to ASTM E2174, "On-Site Inspection of Installed Fire Stops." To prevent conflicts of interest, ASTM E2174 precludes making Contractor responsible for engaging the testing agency. Inspectors may verify compliance by destructive examination of some completed installations.

- A. University will engage a qualified testing agency to perform tests and inspections according to ASTM E2174.

- B. Where deficiencies are found or penetration firestopping systems are damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.
- D. Contractor shall be responsible for ensuring all penetrations are correctly firestopped prior to requesting the qualified testing agency inspection. Costs for re-inspections and repeat site visits will be at the contractor's expense.

### 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 system 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 systems are 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 material and install new materials to produce systems complying with specified requirements.

END OF SECTION 078413