

## SECTION 078413

### FIRESTOPPING PENETRATIONS, FIRE-RESISTIVE JOINTS, and PERIMETER FIRE BARRIER SYSTEMS

#### 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. Provide firestop systems consisting of a material, or combination of materials, installed to retain the integrity of fire-resistance-rated construction by maintaining an effective barrier against the spread of flame, smoke, and/or hot gases through penetrations, blank openings, construction joints, or at perimeter fire containment in or adjacent to fire-resistance-rated barriers in accordance with the requirements of the Life Safety Code for this project.
- B. Firestop systems shall be used in locations including, but not limited to, the following:
  - 1. Penetrations through fire-resistance-rated floor and roof assemblies requiring protected openings including both empty openings and openings that contain penetrations.
  - 2. Penetrations through fire-resistance-rated wall assemblies including both empty openings and openings that contain penetrations.
  - 3. Membrane penetrations in fire-resistance-rated wall assemblies where items penetrate one side of the barrier.
  - 4. Joints in fire-resistance-rated assemblies to allow independent movement.
  - 5. Perimeter Fire Barrier System between a rated floor/roof and an exterior wall assembly.
  - 6. Joints, through penetrations and membrane penetrations in Smoke Barriers and Smoke Partitions.
- C. Related Sections include the following:
  - 1. Division 22 and 23 Sections specifying duct and piping penetrations.
  - 2. Division 26, 27, and 28 Sections specifying cable and conduit penetrations.
- D. References

ASTM E 84	Test Method for Surface Burning Characteristics of Building Materials
ASTM E 814	Fire Tests of Through Penetration Firestops
ASTM E 2174	Standard Practice for On-Site Inspection of Installed Fire Stops
ASTM E 2393	Standard Practice for On-Site Inspection of Installed Fire Stop Joint Systems
ASTM E 2307	Standard Test Method for Determining the Fire Endurance of Perimeter Fire Barrier Systems Using the Intermediate-Scale, Multi Story Test Apparatus
UL 1479	Fire Tests of Through-Penetration Firestop Systems
UL 2079	Tests for Fire Resistance of Building Joint Systems

### 1.3 PERFORMANCE REQUIREMENTS

- A. General: For penetrations through fire-resistance-rated constructions, including empty openings and openings containing penetrating items as well as membrane penetrations, provide firestop systems that are 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. All requirements for firestop systems as found in NFPA 101 (Life Safety Code) shall be adhered to.
  - 1. Where NFPA 101 exempts penetrations from requiring firestopping, such as filling annular space around non-metallic penetrations with grout or mortar, the exemption shall apply and not be subject to the firestopping provisions found in this Specification Section.
- B. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per **[ASTM E 814] [or] [UL 1479]**:
  - 1. F-Rated Systems: Provide penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
  - 2. T-Rated Systems: For penetrations through floors located outside wall cavities or fire-resistance-rated shaft enclosures, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings.
  - 3. L-Rated Through-Penetration Firestop Systems: Provide firestop systems with L ratings, **[in addition to F and T ratings,]** as determined per UL 1479, where indicated by Code.

4. **[W – Rated Through-Penetration Firestop Systems: Provide firestop systems with W Water Resistance ratings, in addition to F, T and L ratings, as determined per UL 1479, where indicated.]**
- C. Perimeter Fire Barrier Systems: Provide interior perimeter joint systems with fire-resistance ratings indicated, as determined per ASTM E 2307, but not less than the fire-resistance rating of the floor construction.
- D. Fire-Resistive Joints: Provide joint systems with fire-resistance ratings indicated, as determined per UL 2079, but not less than the fire-resistance rating of the construction in which the joint occurs.
- E. For firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.
  1. For piping penetrations of plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
  2. For floor penetrations with annular spaces exceeding 100 mm (4 in.) in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved, either by installing floor plates or by other means.

For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
- F. Firestop Materials for Specific Conditions
  1. Cabling for data and communication applications shall be sealed with re-enterable firestopping products. Devices must be capable of maintaining the fire resistance rating of the penetrated membrane at 0 percent to 100 percent visual fill of penetrants. Each device must be capable of retrofit applications. Firestopping devices shall allow for cable moves, additions or changes without the need to remove or replace any firestop materials.
    - a. Pillow/brick type materials are allowed for any data/communications firestop application.
    - b. **[Other specialized systems]**

## 1.4 SUBMITTALS

The contractor shall provide the following submittals to the project officer for review by the NIH Division of the Fire Marshal:

- A. Manufacturer Product Data Sheet: For each type of product indicated.
- B. Shop Drawings: For each firestop system, show each type of construction condition penetrated, relationships to adjoining construction and type of penetrating item. Include firestop design designation, including the assembly number, of qualified testing and inspecting agency that evidences compliance with requirements for each condition indicated.

1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each 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 firestop condition, submit illustration, with modifications marked, approved by firestop system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.
- C. **[Penetration Firestop System Schedule: Indicate locations of each penetration firestop system, along with the following information:**
1. **Types of penetrating items.**
  2. **Types of constructions penetrated, including fire-resistance ratings and, where applicable, thicknesses of construction penetrated.**
  3. **[F-rating] [T-rating],[L-rating]**
  4. **Penetration firestop systems for each location identified by firestop design designation of qualified testing and inspecting agency.]**
- D. Qualification data showing compliance with Quality Assurance article:
1. For Installer.
  2. **[For independent inspecting agency.]**

## 1.5 QUALITY ASSURANCE

- A. Installer Qualifications:
1. **[A firm that has FM Approval according to FM Standard 4991, "Approval of Firestop Contractors" or a UL qualified firestop contractor.]**
  2. A firm experienced in installing firestop systems 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 firestop system products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.
- B. Independent Inspecting Agency: Same as Installer Qualifications above, except substitute "inspect" for "install".
1. International Accreditation Service's Accreditation Criteria 291 (IAS AC291) may be substituted for 1.5.A.1 above for Inspecting Agency.
- C. Installation Responsibility: Assign installation of all firestop systems [and fire-resistive joint systems ] in Project to a single qualified installer.
- D. Source Limitations: Obtain firestop systems, for each kind of penetration and construction condition indicated, through one source from a single manufacturer.
- E. Product Characteristics: Provide firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:
1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is **[UL],[FM] [OPL] [ITS,] <Insert**

**name,**> or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.

## **1.6 DELIVERY, STORAGE, AND HANDLING**

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

## **1.7 PROJECT CONDITIONS**

- A. Environmental Limitations: Do not install firestop systems when ambient or substrate temperatures are outside limits permitted by firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate firestop systems per manufacturer's instructions or Safety Data Sheet.

## **1.8 COORDINATION**

- A. Coordinate construction of openings and penetrating items to ensure that firestop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate firestop systems.
- C. Do not paint or conceal firestop system installations until each installation has been approved by the NIH Division of the Fire Marshal.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Systems listed by approved testing agencies, as identified in part 1 above, may be used, providing they conform to the construction type, penetrant type, annular space requirements and fire rating involved in each separate instance.

### **2.2 FIRESTOPPING, GENERAL**

- A. Systems listed by approved testing agencies, as identified in part 1 above, may be used, providing they conform to the construction type, penetrant type, annular space requirements and fire rating involved in each separate instance.

- B. Compatibility: Provide firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating penetration firestop systems, under conditions of service and application, as demonstrated by firestop system manufacturer based on testing and field experience.
- C. Accessories: Provide components for each firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated.[ **Accessories include, but are not limited to, the following items:**]
  - 1. Permanent forming/damming/backing materials, including the following:
    - a. Slag-/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.

## **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 work.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 MIXING**

For those products requiring mixing before application, comply with firestop 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.

### **3.3 PREPARATION**

- A. Surface Cleaning: Clean out openings immediately before installing firestop systems to comply with firestop system 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 firestop systems.

2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestop systems. 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 firestop system 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 firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

### **3.4 PENETRATION FIRESTOP SYSTEM INSTALLATION**

- A. General: Install penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming/damming/backing 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 firestop systems.
- C. Install fill materials for firestop systems by proven techniques to produce the following results:
1. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### **3.5 FIRESTOP JOINT SYSTEMS INSTALLATION**

- A. General: Comply with the "System Performance Requirements" article in Part 1 and with the fire-stop manufacturer's installation instructions and drawings pertaining to products and applications indicated.
1. Install joint forming materials to provide support of firestop materials during application and at the position required to produce the cross-sectional shapes and depths of installed firestop material relative to joint widths that allow optimum sealant movement capability and develop fire-resistance rating required.
- B. Install tested and listed, classified systems and non-tested engineering judgments, EFRRAs that result in firestop materials:
1. Directly contacting and fully wetting joint substrates.
  2. Completely filling recesses provided for each joint configuration,
  3. Providing uniform, cross-sectional shapes and depths relative to joint width that optimize movement capability and meet tested and listed system requirements.

- C. Tool non-sag firestop materials immediately after their application and prior to the time skinning or begins. Form smooth, uniform beads of configuration indicated or required to:
  - 1. Produce fire-resistance rating
  - 2. Eliminate air pockets
  - 3. Ensure contact and adhesion with sides of joint

### **3.6 PERIMETER FIRE BARRIER SYSTEM INSTALLATION**

- A. General: Comply with “System Performance Requirements” article in Part 1 and with the firestop manufacture’s installation and drawings pertaining to products and applications indicated.
- B. Install metal framing, curtain wall insulation, mechanical attachments, safing materials and other firestop system components as applicable within the system design.

### **3.7 FIELD QUALITY CONTROL**

- A. **[Engage a qualified, independent inspecting agency to inspect firestopping. Independent inspecting agency shall comply with ASTM E 2174 or ASTM E 2393 requirements including those related to qualifications, conducting inspections, and preparing test reports.]**
- B. Enclose firestop systems with other construction only after inspection and acceptance by the NIH Division of the Fire Marshal **[and independent inspecting agency]**. If the firestopping will remain exposed then it can be inspected as part of the final acceptance (pre-occupancy) inspection performed by the NIH Division of the Fire Marshal.
  - 1. Inspection may include destructive demolition according to ASTM E 2174 or ASTM E 2393.
- C. Where deficiencies are found or a destructive demolition for inspection occurred, repair or replace firestop systems so they comply with requirements.

### **3.8 CLEANING AND PROTECTING**

- A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by firestop 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 firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestop systems immediately and install new materials to produce systems complying with specified requirements.

**END OF SECTION 078413**