

SECTION 078413 - PENETRATION FIRESTOPPING

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. This Section includes through-penetration firestop systems for penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items.
- B. Related Sections include the following:
 - 1. Division 07 Section "Fire-Resistive Joint Systems."
 - 2. Division 21 Sections specifying fire-suppression piping penetrations.
 - 3. Division 22 and 23 Sections specifying duct and piping penetrations.
 - 4. Division 26, 27, and 28 Sections specifying cable and conduit penetrations.

1.3 PERFORMANCE REQUIREMENTS

- A. General: For penetrations through [**the following**] fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration 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.
 - 1. Fire-resistance-rated walls including [**fire walls**] [**fire partitions**] [**fire barriers**] [**and**] [**smoke barriers**].
 - 2. Fire-resistance-rated horizontal assemblies including [**floors**] [**floor/ceiling assemblies**] [**and**] [**ceiling membranes of roof/ceiling assemblies**].
- 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 through-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 the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
 - a. Penetrations through floors located outside wall cavities.
 - b. Penetrations floors located outside fire-resistance-rated shaft enclosures.

- C. For through-penetration 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 for 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.
 - 3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
- D. For through-penetration firestop systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each through-penetration firestop system, show each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item. Include firestop design designation 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 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 through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.
- C. Through-Penetration Firestop System Schedule: Indicate locations of each through-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. Through-penetration firestop systems for each location identified by firestop design designation of qualified testing and inspecting agency.
- D. Qualification Data: For Installer.
- E. Product Certificates: For through-penetration firestop system products, signed by product manufacturer.
- F. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FMG according to FMG 4991, "Approval of Firestop Contractors."
- B. Installer Qualifications: A firm experienced in installing through-penetration 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 through-penetration firestop system 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-resistive joint systems**] in Project to a single qualified installer.
- D. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, through one source from a single manufacturer.
- E. Fire-Test-Response Characteristics: Provide through-penetration 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,] [OPL] [ITS,] <Insert name,> or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
 2. Through-penetration firestop systems are identical to those tested per testing standard referenced in "Part 1 Performance Requirements" Article. Provide rated systems complying with the following requirements:
 - a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
 - b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by the following:
 - 1) UL in its "Fire Resistance Directory."
 - 2) OPL in its "Directory of Listed Building Products, Materials, & Assemblies."
 - 3) ITS in its "Directory of Listed Products."
 - 4) <Insert name of qualified testing and inspecting agency.>
- F. Preinstallation Conference: Required submittals shall be reviewed and approved by the NIH before scheduling the preinstallation conference. Conduct conference at Project site to arrange for a "pilot" installation of each type of firestopping to be inspected and accepted by the NIH Division of the Fire Marshal before general installation begins.

1.6 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 multicomponent 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.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- C. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined by the NIH Division of the Fire Marshal.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, through-penetration firestop systems that may be incorporated into the Work include, but are not limited to, those systems indicated **[in the Through-Penetration Firestop System Schedule] [at the end of Part 3] [on Drawings] [.] [that are produced by one of the following manufacturers:]**
- B. Products: Subject to compliance with requirements, provide one of the through-penetration firestop systems indicated for each application **[in the Through-Penetration Firestop System Schedule] [at the end of Part 3] [on Drawings] [.] [that are produced by one of the following manufacturers:]**
 - 1. A/D Fire Protection Systems Inc.
 - 2. Grace, W. R. & Co. - Conn.

3. Hilti, Inc.
4. Johns Manville.
5. Nelson Firestop Products.
6. NUCO Inc.
7. RectorSeal Corporation (The).
8. Specified Technologies Inc.
9. 3M; Fire Protection Products Division.
10. Tremco; Sealant/Weatherproofing Division.
11. USG Corporation.
12. <Insert manufacturer's name.>

2.2 FIRESTOPPING, GENERAL

- A. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
- B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration 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.

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 referencing the types of materials described in this Article. Fill materials are those referred to in directories of 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 after cure do not re-emulsify 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.
- G. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- 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.
- 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.
- 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 other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.
 - 2. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
 - 3. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

2.4 MIXING

- A. For those products requiring mixing before application, comply with through-penetration 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.

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 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing through-penetration 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 through-penetration firestop systems.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration 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 through-penetration 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 through-penetration 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.

3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

- A. General: Install through-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. 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 Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

- A. Inspecting Agency: Engage a qualified, independent inspecting agency to inspect through-penetration firestopping. Independent inspecting agency shall comply with ASTM E 2174 requirements including those related to qualifications, conducting inspections, and preparing test reports.
- B. As indicated in Section 1, Contractor shall prepare an initial installation of each type of firestopping for inspection by the NIH Division of the Fire Marshal before general installation begins. If the work requires multiple components and initial components will be hidden by later components then the inspection shall be done in stages.
- C. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.
- D. Proceed with enclosing through-penetration firestop systems with other construction only after inspection and acceptance by the NIH Division of the Fire Marshal. 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.

3.5 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 through-penetration 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 through-penetration 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 through-penetration firestop systems immediately and install new materials to produce systems complying with specified requirements.

3.6 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to alpha-alpha-numeric designations listed in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. Where OPL-classified systems are indicated, they refer to alpha-numeric design numbers in OPL's "Directory of Listed Building Products, Materials, & Assemblies."

- C. Where ITS-listed systems are indicated, they refer to design numbers listed in ITS's "Directory of Listed Products," "Firestop Systems" Section.
- D. Firestop Systems with No Penetrating Items[**FS-<#>**]:
1. [**Available**]UL-Classified Systems: [**C-AJ-**] [**C-BJ-**] [**F-A-**] [**W-J-**] [**W-L-**] **<Insert one or more four-digit numbers> [0001-0999]**.
 2. [**Available**]OPL-Classified Systems: FS **<Insert one or more OPL design numbers> [F] [W]**, Penetrating Item Type G.
 3. [**Available**]ITS-Listed Systems: **<Insert ITS design number(s)>**
 4. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Silicone sealant.
 - c. Intumescent putty.
 - d. Mortar.
- E. Firestop Systems for Metallic Pipes, Conduit, or Tubing[**FS-<#>**]:
1. [**Available**]UL-Classified Systems: [**C-AJ-**] [**C-BJ-**] [**C-BK-**] [**F-A-**] [**F-B-**] [**F-C-**] [**W-J-**] [**W-K-**] [**W-L-**] **<Insert one or more four-digit numbers> [1001-1999]**.
 2. [**Available**]OPL-Classified Systems: FS **<Insert one or more OPL design numbers> [F] [W]**, Penetrating Item Type A.
 3. [**Available**]ITS-Listed Systems: **<Insert ITS design number(s)>**
 4. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Silicone sealant.
 - c. Intumescent putty.
 - d. Mortar.
- F. Firestop Systems for Nonmetallic Pipe, Conduit, or Tubing[**FS-<#>**]:
1. [**Available**]UL-Classified Systems: [**C-AJ-**] [**C-BJ-**] [**F-A-**] [**F-B-**] [**F-C-**] [**W-J-**] [**W-L-**] **<Insert one or more four-digit numbers> [2001-2999]**.
 2. [**Available**]OPL-Classified Systems: FS **<Insert one or more OPL design numbers> [F] [W]**, Penetrating Item Type B.
 3. [**Available**]ITS-Listed Systems: **<Insert ITS design number(s)>**
 4. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Silicone sealant.
 - c. Intumescent putty.
 - d. Intumescent wrap strips.
 - e. Firestop device.
- G. Firestop Systems for Electrical Cables[**FS-<#>**]:
1. [**Available**]UL-Classified Systems: [**C-AJ-**] [**C-BJ-**] [**F-A-**] [**F-B-**] [**F-C-**] [**W-J-**] [**W-L-**] **<Insert one or more four-digit numbers> [3001-3999]**.

2. **[Available]OPL-Classified Systems:** FS **<Insert one or more OPL design numbers>** **[F] [W]**, Penetrating Item Type D.
3. **[Available]ITS-Listed Systems:** **<Insert ITS design number(s)>**
4. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Silicone sealant.
 - c. Intumescent putty.
 - d. Silicone foam.
 - e. Pillows/bags.

H. Firestop Systems for Cable Trays[**FS-<#>**]:

1. **[Available]UL-Classified Systems:** **[C-AJ-] [C-BJ-] [F-A-] [F-B-] [F-C-] [W-J-] [W-K-] [W-L-]** **<Insert one or more four-digit numbers>** **[4001-4999]**.
2. **[Available]OPL-Classified Systems:** FS **<Insert one or more OPL design numbers>** **[F] [W]**, Penetrating Item Type D.
3. **[Available]ITS-Listed Systems:** **<Insert ITS design number(s)>**
4. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Intumescent putty.
 - c. Silicone foam.
 - d. Pillows/bags.
 - e. Mortar.

I. Firestop Systems for Insulated Pipes[**FS-<#>**]:

1. **[Available]UL-Classified Systems:** **[C-AJ-] [C-BJ-] [F-A-] [F-C-] [W-J-] [W-L-]** **<Insert one or more four-digit numbers>** **[5001-5999]**.
2. **[Available]OPL-Classified Systems:** FS **<Insert one or more OPL design numbers>** **[F] [W]**, Penetrating Item Type C.
3. **[Available]ITS-Listed Systems:** **<Insert ITS design number(s)>**
4. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Intumescent putty.
 - c. Silicone foam.
 - d. Intumescent wrap strips.

J. Firestop Systems for Miscellaneous Electrical Penetrants[**FS-<#>**]:

1. **[Available]UL-Classified Systems:** **[C-AJ-] [F-A-] [W-L-]** **<Insert one or more four-digit numbers>** **[6001-6999]**.
2. **[Available]OPL-Classified Systems:** FS **<Insert one or more OPL design numbers>** **[F] [W]**, Penetrating Item Type E.
3. **[Available]ITS-Listed Systems:** **<Insert ITS design number(s)>**
4. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Intumescent putty.

c. Mortar.

K. Firestop Systems for Miscellaneous Mechanical Penetrants[**FS-<#>**]:

1. [**Available**]UL-Classified Systems: [**C-AJ-**] [**F-C-**] [**W-J-**] [**W-L-**] **<Insert one or more four-digit numbers> [7001-7999]**.
2. [**Available**]ITS-Listed Systems: **<Insert ITS design number(s).>**
3. Type of Fill Materials: One or both of the following:
 - a. Latex sealant.
 - b. Mortar.

L. Firestop Systems for Groupings of Penetrants[**FS-<#>**]:

1. [**Available**]UL-Classified Systems: [**C-AJ-**] [**C-BJ-**] [**F-A-**] [**F-C-**] [**W-J-**] [**W-L-**] **<Insert one or more four-digit numbers> [8001-8999]**.
2. [**Available**]ITS-Listed Systems: **<Insert ITS design number(s).>**
3. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Mortar.
 - c. Intumescent wrap strips.
 - d. Firestop device.
 - e. Intumescent composite sheet.

END OF SECTION 078413