
PART 1 GENERAL**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
1. Penetrations in fire-resistance-rated walls.
 2. Penetrations in horizontal assemblies.
 3. Penetrations in smoke barriers.
- B. Related Sections:
1. Division 1 Section "Sustainable Design Requirements".
 2. Division 7 Section "Fire-Resistive Joint Systems" for joints in or between fire-resistance-rated construction, at exterior curtain-wall/floor intersections, and in smoke barriers.

1.3 QUALITY ASSURANCE

- A. The work of this section shall be performed by a company which specializes in the type of penetration firestopping work required for this Project, with a minimum of 5 years of documented successful experience and shall be performed by skilled workmen thoroughly experienced in the necessary crafts.
1. Work shall be performed in compliance with Owner's insurance underwriters' requirements and UL approvals and testing for materials, assemblies and procedures.
- B. Manufacturer shall specialize in manufacturing the type of penetration firestopping specified in this section, with a minimum of 5 years of documented successful experience, and have the facilities capable of meeting all requirements of Contract Documents as a single-source responsibility and warranty.
- C. 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."
- C. 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.
- D. 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."
- E. Preinstallation Conference: Conduct conference at Project site.
- F. Manufacturer's identification tags or marks are not acceptable on surfaces which will remain exposed to view after installation.
1. Evidence of "patching" after removal of tags or marks is not acceptable.

1.4 SUBMITTALS

- A. Submit the following according to Conditions of the Construction Contract and Division 1 Specification Sections.
- B. Shop Drawings: Shall clearly indicate but not be limited to plans, elevations, sections, and details.
- C. Product Data: For each type of product indicated.

- D. LEED Submittal:
 - 1. Product Data for Credit EQ 4.1: For penetration firestopping, including printed statement of VOC content and chemical components.
- E. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.
 - 1. 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.
- F. Qualification Data: For qualified Installer.
- G. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.
- H. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for penetration firestopping.
- I. Hazardous Materials Notification: In the event no product or material is available that does not contain asbestos, PCB or other hazardous materials as determined by the Owner, a "Material Safety Data Sheet" (MSDS) equivalent to OSHA Form 20 shall be submitted for that proposed product or material prior to installation.
- J. Asbestos and PCB Certification: After completion of installation, but prior to Substantial Completion, Contractor shall certify in writing that products and materials installed, and processes used, do not contain asbestos or polychlorinated biphenyls (PCB), using format in Article 3 of General Conditions.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with General Conditions and Division1 Section "Product Requirements".

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.

1.8 WARRANTY

- A. Comply with General Conditions and Division1 Section "Product Requirements".

PART 2 PRODUCTS

2.1 UNAUTHORIZED MATERIALS

- A. Materials and products required for work of this section shall not contain asbestos, polychlorinated biphenyls (PCB) or other hazardous materials identified by the Owner.

2.2 ACCEPTABLE MANUFACTURERS

- A. Products of the manufacturers specified in this section establish the minimum functional, aesthetic and quality standards required for work of this section.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Hilti, Inc.
 - 2. Grace Construction Products.
 - 3. A/D Fire Protection Systems Inc.
 - 4. Johns Manville.
 - 5. Nelson Firestop Products.
 - 6. NUCO Inc.
 - 7. Passive Fire Protection Partners.
 - 8. RectorSeal Corporation.
 - 9. Specified Technologies Inc.
 - 10. 3M Fire Protection Products.
 - 11. Tremco, Inc.; Tremco Fire Protection Systems Group.
 - 12. USG Corporation.
- C. Substitutions: Comply with General Conditions and Division1 Section "Product Requirements" using form in Division1 Section "Substitution Request Form".

2.3 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 E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
 - 1. Fire-resistance-rated walls include fire walls, fire-barrier walls, smoke-barrier walls and fire partitions.
 - 2. 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 E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
 - 1. Horizontal assemblies include floors, floor/ceiling assemblies and ceiling membranes of roof/ceiling assemblies.
 - 2. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
 - 3. 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.
- 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. W-Rating: Provide penetration firestopping showing no evidence of water leakage when tested according to UL 1479.
- F. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E84.
- G. VOC Content: Provide penetration firestopping that complies with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Architectural Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.

- H. 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.

2.4 FILL MATERIALS

- A. 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.
- B. Pre-installed firestop devices containing built-in self-sealing intumescent inserts for use with data and communication cabling which allow for cable adds or changes without the need to remove or replace any firestop materials.
- C. Acrylic/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 either polyurethane firestop board material or 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. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
- J. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- K. Blocks/Plugs: Reusable and ready-to-use, intumescent flexible block based on a two-component polyurethane foam. Where exposed, cover openings with steel-reinforcing wire mesh to protect blocks from being easily removed.
- L. Fire Foams: Two-component, polyurethane-based fire stopping foam that, when mixed, expand and cure in place to produce a repenetrable, nonshrinking foam.
- M. 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.

2.5 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.

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.
- 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.
- B. Firestopping with No Penetrating Items:
 1. UL-Classified Systems: C-AJ-0001-0999.
- C. Firestopping for Metallic Pipes, Conduit, or Tubing:
 1. UL-Classified Systems: C-AJ- and W-L- 1001-1999.
- D. Firestopping for Nonmetallic Pipe, Conduit, or Tubing:
 1. UL-Classified Systems: C-AJ- and W-L-2001-2999.
- E. Firestopping for Electrical Cables:
 1. UL-Classified Systems: C-AJ- and W-L-3001-3999.
- F. Firestopping for Cable Trays with Electric Cables:
 1. UL-Classified Systems: C-AJ- and W-L-4001-4999.
- G. Firestopping for Insulated Pipes:
 1. UL-Classified Systems: C-AJ- and W-L-5001-5999.
- H. Firestopping for Miscellaneous Electrical Penetrants:
 1. UL-Classified Systems: C-AJ- and W-L-6001-6999.
- I. Firestopping for Miscellaneous Mechanical Penetrants:
 1. UL-Classified Systems: C-AJ- and W-L-7001-7999.
- J. Firestopping for Groupings of Penetrants:
 1. UL-Classified Systems: C-AJ- and W-L-8001-8999.

3.8 SLEEVES, CUTTING, PATCHING AND FIRESAFING

- A. The Contractor shall be responsible for the timely placing of sleeves for all piping ductwork and conduit passing through walls and partitions, beams, floors, and roofs as noted below, while the same are under construction.
1. The Contractor shall provide sleeves through all concrete or masonry construction, wall construction where the penetration must be sealed airtight, fire rated wall construction, all penetrations when piping is supported on vibration isolators, all penetrations when piping is insulated and where indicated on the Drawings.
 2. A sleeve shall be one size larger than the size of pipe or conduit it serves, except where "Link Seal" casing seals are used in sleeves through walls below grade.
 3. Sleeves shall be sized such that the annular space between the sleeve and the pipe (or the pipe insulation if the pipe is insulated) or conduit will not be less than 1/2" or more than 1" for conduit unless otherwise required by the firestop system.
 4. All pipes or conduit passing through concrete or masonry walls above grade shall be at least 18 gauge galvanized steel sleeves.
 5. Sleeves shall be set flush with finished wall.
 6. All sleeves in floors shall extend a minimum of 2" above the finished floor, except sleeves for water closet waste piping within toilet chases.
 7. Sleeves installed in fire rated construction shall be of suitable length and diameter to accommodate the firesafing system used.
 8. Sleeves set in concrete floor construction which do not support piping shall be at least 16 gauge galvanized steel.
 9. Sleeves set in concrete floor construction supporting riser piping shall be standard weight steel pipe.
 10. Sleeves supporting riser piping 4" and larger shall have three (3) 6" long reinforcing rods welded at 120° spacing to the sleeve and shall be installed with the rods embedded in the concrete slab.
 11. Where the pipe or conduit passes through a sleeve, no point of the pipe or its insulation or conduit shall touch the sleeve and the pipe or conduit shall be centered in the sleeve.
- B. Seal all pipe, busway, conduit, conductor, cable or cable tray penetrations of fire rated construction with factory built devices or with manufactured fill, void, or cavity materials "Classified" by Underwriters Laboratories, Inc. for use as a Through-Penetration Firestop.
1. All firestop devices and systems shall be approved for such use by the authority having jurisdiction.
 2. The firestop system used shall maintain the fire resistance rating of the building component that is penetrated.
 3. Firestop systems and devices shall comply with ASTM E814 (UL 1479), NEC 300-21 and NEC 800-3(c) for all types of penetrations being sealed.
 4. Submittal data for firestop systems shall include the UL System Numbers listed in the UL Building Materials Directory under which the material was tested in accordance with ASTM E814 (UL 1479) for use in a "Through-Penetration Firestop System".
 5. The firestop system or device used shall not require de-rating the ampacity of electrical conductors or busway.
 6. Excessive shrinkage of the firestop materials which would permit the transmission of smoke or water prior to exposure to a fire condition is unacceptable.
 7. Where a mastic coating is used to seal the surface of the firestop, the mastic shall be non-hardening.
 8. The firestop system used shall accommodate expansion and contraction of the floating mechanical piping systems or the electrical raceway systems and busways without damaging the firestop or reducing its effectiveness as a smoke barrier or water seal.
 9. The firestop manufacturer's representatives shall instruct the Contractor's representatives in the proper installation procedure so that the penetrations on the Project will be installed in accordance with the UL listings and the manufacturer's recommendations.
 10. If it complies with these Specifications, firestop sealing component/system as manufactured by one of the following manufacturers will be acceptable:
 - a. Tremco Fire-Resistive Joint System using Dymeric sealant and Cerablanket-FS mineral filler.
 - b. Specified Technologies, Inc. SpecSeal Systems.
 - c. 3M Fire Barrier Penetration Sealing Systems.
 - d. GE Pensil Firestop Sealant by General Electric.
 - e. International Protective Coatings Corp. Flame-Safe Systems.
 - f. Thermal Ceramics FireMaster Firestop Fire Protection Systems.
- C. Except as may be required by the utility company, sleeves penetrating walls below grade shall be standard weight black steel pipe water seal with 1/4" thick steel plate secured to the pipe or conduit with continuous fillet weld.
1. The water seal plate shall be located in the middle of the wall and shall be 2" wider all around than the sleeve it encircles.
 2. The entire assembly shall be hot dipped galvanized after fabrication.

3. Seal off annular opening between pipe and sleeve with "Link Seal" casing seal as manufactured by Thunderline Corporation/Wayne, Michigan.
 4. The pipe or conduit sleeve shall be sized to accommodate the Thunderline casing seal.
 5. Casing seals shall be Series 300 for pipe or conduit sizes 3/4" through 4" and Series 400 for pipe or conduit sizes 5" through 24" and Series 500 for 30" and larger.
- D. If holes and/or sleeves are not properly installed and cutting and patching becomes necessary, it shall be done at no additional expense to the Owner.
1. The Contractor shall undertake no cutting or patching without first securing the Architect's written approval.
- E. All unused sleeves shall be sealed with firestop devices and systems to maintain the fire rating of the construction penetrated.

END OF SECTION