

SECTION 07 84 13 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide work of this Section in accordance with requirements of the Contract Documents.
- B. This Section includes, but is not limited to the following:
 - 1. Penetrations in fire-resistance-rated walls.
 - 2. Penetrations in horizontal assemblies.
 - 3. Penetrations in smoke barriers.
- C. Related Work:
 - 1. Division 07, Section 07 84 46 "Fire Resistive Joint Firestopping" for joints in or between fire-resistance-rated construction, at exterior curtainwall/floor intersections, and in smoke barriers.
 - 2. Division 08, Section 08 40 00 "Exterior Enclosure System Requirements" for firesafing of exterior walls.
 - 3. Division 09, Section 09 21 00 "Gypsum Board Assemblies" for installation of fire rated sealant and putty pads at equipment penetrating fire rated drywall construction.
 - 4. Refer to Division 21, 22, 23, 26 MEPFP for penetration firestopping.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site. Include every trade involved in the Work and the fire resistive joint systems Installer, the Owner's representative, the commissioning Agent, and the Independent Testing and Inspecting Agency, the Contractor, and the Architect. Review and discuss the following:
 - 1. Installation clearances
 - 2. Framing around openings
 - 3. Minimum spacing of penetrants
 - 4. Correct opening sizes for penetrant systems to be used
 - 5. Penetrant materials permitted
 - 6. Maximum number of penetrants in each opening
 - 7. Access at both sides of penetrations for installation of fire resistive joint systems.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Submit manufacturer's literature, specifications and installation instructions describing the general properties of each material and accessory to be used in the Work.
- B. Sustainable Design Submittals:
 - 1. Building Product Disclosure and Optimization - Sourcing of Raw Materials:

- a. Leadership Extraction Practices
 - 1) Extended Producer Responsibility (EPR): Submit documentation indicating that manufacturers have a take back or recycling program for the product purchased.
 - 2) Recycled Content: For products having recycled content, indicate percentages by weight of post-consumer and pre-consumer recycled content.
 - a) Include statement indicating costs for each product having recycled content.
 - b. Sourcing of Raw Materials: For products that are required to comply with requirements for regional materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material.
 - 1) Include statement indicating distance to Project, cost for each regional material and the fraction by weight that is considered regional.
2. Indoor Environmental Quality, Low Emitting Materials: Building Products must be tested and compliant with the California Department of Public-Health (CDPH) Standard Method V1.1-2010, using the applicable exposure scenario.
- a. For paints, and coatings, wet applied, include printed statement of VOC content, showing compliance with the applicable VOC limits of the California Air Resources Board (CARB) 2007, Suggested Control Measure for Architectural Coatings or the South Coast Air Quality Management District (SCAQMD) Rule 113-2011.
 - b. Alternative tests for VOC include ASTM D2369-10, ISO 11890, ASTM D6886-03; or ISO 11890-2.
 - c. Methylene Chloride and perchloroethylene may not be added to paints, coating, adhesive, or sealants.
- C. Shop Drawings: For each penetration firestopping system, submit documentation, including illustrations, from a qualified testing and inspecting agency, showing each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item. Include firestop design designation of qualified testing and inspection agency that evidences compliance with requirements for each condition indicated.
- 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 system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.
- D. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.
- E. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, signed, and sealed approved by penetration firestopping system manufacturer's fire-protection engineer, licensed to practice in the State of the Project, as an engineering judgment or equivalent fire-resistance-rated assembly. Manufacturer shall pay for the Engineering Judgement. Obtain approval of authorities having jurisdiction prior to submittal.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Sustainable Design Submittals:
 - 1. Building Product Disclosure and Optimization - Environmental Product Declarations
 - a. Submit product specific type III EPDs or Industry wide (generic) EPDs, USGBC approved program declaration or products with a publicly available, critically reviewed life-cycle assessment conforming to ISO 14044 that have at least a cradle to gate scope.
 - 2. Building Product Disclosure and Optimization - Material Ingredients
 - a. Material Ingredient Reporting: Submit documentation confirming chemical inventory of products to at least 0.1 % (1000ppm) with at least one of the following:
 - 1) Submit published manufacturer inventory of ingredients identified by name and Chemical Abstract Service Registration Number (CASRN)
 - 2) Submit documentation that product has been certified as Cradle-to-Cradle v3 at the Bronze Level or better
 - 3) Submit Declare product label indicating that all ingredients have been disclosed down to 1000 ppm or designated as Red List Free or Declared
 - 4) Living Product Challenge
 - 5) Product Lens Certification
 - 6) USGBC approved program.
 - b. Material Ingredient Optimization: Submit documentation confirming chemical inventory of products to at least 0.01 % (100ppm) and/or that has a compliant material ingredient optimization report with at least one of the following:
 - 1) Submit GreenScreen V1.2 Benchmark: Third party report prepared by a licensed GreenScreen List Translator, or a full GreenScreen Assessment.
 - 2) Submit third-party verified documentation that product has been certified as Cradle-to-Cradle v3 at the Bronze Level or better
 - 3) Submit third-party verified Cradle to Cradle v3 Material Health certificate at the Bronze Level or better
 - 4) Submit third-party verified Declare product label indicating that all ingredients have been disclosed down to 100 ppm
 - 5) Submit third-party verified documentation that product is Living Product Challenge certified with a Red List Free or LBC Red List Free Declare label.
 - 6) Submit documentation that product has a manufacturer prepared action plan with material inventory to at least 1000 ppm.
- C. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.
- D. Test reports: Certified copies of test reports (conclusions and summary only) from approved independent testing laboratories showing compliance with the Contract Documents and including current system number per UL Listing for each type of penetration firestopping system to be utilized on the project.

- E. Inspection test reports: Submit copies of inspection test reports, prepared by an independent testing agency, for penetration firestop systems and perimeter fire barriers in accordance with report procedures as contained within ASTM E2174 and ASTM E2393 showing inspection results and remedial action taken, if any.
- F. Building Department Acceptance: If applicable submit a copy of the Building Department acceptance sheet for each penetration firestop system submitted for each specific condition on Project.
- G. Research/Evaluation Reports: For each type of fire-resistive joint system. Evidence of penetration firestop systems' compliance with ICBO ES AC30, from the ICBO Evaluation Service

1.5 CLOSEOUT SUBMITTALS

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

1.6 QUALITY ASSURANCE

- A. Fire Stop Manufacturer: Do not use fire stop material produced by any manufacturer who will not agree to send a direct employee as a qualified technical representative to the project site, during the initial installation and when requested, for the purpose of training appropriate installer personnel in proper selection and installation procedures and for rendering advice concerning the proper installation of materials.
 - 1. Acceptable Manufacturer shall employ trainers certified by one of the following associations:
 - a. FM Global
 - b. UL Qualified Firestop contractor Program Requirements".
 - c. Firestop Contractor's International Association (FCIA).
- B. 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", or individual subcontractors that are trained by manufacturers with certified trainers.
 - 1. Installation Responsibility: Assign installation and quality assurance of penetration firestopping systems and fire-resistive joint systems in Project to a single qualified installation contractor, or individuals trained by the manufacturer's certified trainers.
- C. Fire-Test-Response Characteristics: Provide penetration firestopping systems that comply with the following requirements and those specified in "Performance Requirements" Article:
 - 1. Firestopping assemblies shall be tested by a qualified testing agency. A qualified testing agency is UL, or another agency performing testing services for firestopping systems acceptable to authorities having jurisdiction in compliance with ASTM E814.
 - 2. Penetration firestopping systems are identical to those tested per testing standard referenced in "Performance Requirements" Article. Provide rated systems bearing classification marking of qualified testing and inspecting agency.

- D. Provide through penetration firestops which have been tested and listed to meet every condition in the Work. Do not provide materials or systems that are not part of a tested system, suitable for the condition; or not certified by manufacturer as an engineered deviation suitable for the condition as approved by manufacturer's qualified Fire Protection Engineer.
 - 1. Where there is no specific third party tested and classified through penetration firestop system available for a particular configuration, the fire stop systems contractor shall submit an Engineering Judgment (EJ) or equivalent through penetration firestop rated assembly from the manufacturer's qualified Fire Protection Engineer licensed to practice in the project jurisdiction, based on an actual tested assembly. If a tested and rated through penetration firestop system exists from another manufacturer for the condition, manufacturer's engineered deviations shall not be permitted. Manufacturer shall pay for the Engineering Judgement.
- 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 Texas Building Code requirements for "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 project location.
- F. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems are installed according to specified requirements.
- G. Do not cover up penetration firestopping system installations that will become concealed behind other construction until each installation has been examined by Owner's inspecting agency and building inspector, if required by authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. General: Deliver penetration firestop system products and materials to the Project site in manufacturer's original, unopened containers or packaging with intact and legible manufacturers' labels identifying product and manufacturer, brand, type, and grade, date of manufacture, lot number, shelf life if applicable, qualified testing and inspection agency's classification marking applicable to the Project, curing time, and mixing instructions for multi-component materials.
- B. Store and handle materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes. Store in protected dry location off ground in accordance with manufacturer's instructions. Do not open packaging nor remove labels until time for installation.

1.8 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.

1.9 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.
- 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 penetration firestop system installations that will become concealed behind other construction until each installation has been examined by Owner's inspection agency and building inspector, if required by authorities having jurisdiction.

1.10 WARRANTY

- A. Special Warranty: Submit five (5) year written warranty signed by the manufacturer and Installer, agreeing to repair or replace Work which has shown any evidence of deterioration, failed to provide an airtight seal, failed to provide a watertight seal where required, failed in adhesion or cohesion, or otherwise failed as a result of defects in materials or workmanship. Upon notification of such defects, within the warranty period, make necessary repairs or replacement at the convenience of the Owner. Other warranties may not be substituted by the Contractor for the terms of this special warranty

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regional Materials: Provide a minimum of 20 percent of building materials (by cost) that are regionally extracted, processed and manufactured materials within a radius of 100 miles.
- B. 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."
- C. For 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 penetration firestop systems

2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved, either by floor plates or by other means.
 3. For penetrations involving insulated piping, provide penetration firestop systems not requiring removal of insulation.
 4. For penetration firestopping systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E84.
- D. Sealants: All sealants used in firestopping systems shall comply with ASTM G21 for a 0 rating for mold and mildew resistance.
- E. Source Limitations: Obtain penetration firestopping systems through one source from a single manufacturer for architectural, mechanical, electrical firestopping whether specified in this section or not.
- F. Low-Emitting Materials:
1. Adhesives and Sealants wet-applied inside the weather-proofing system must meet the VOC general emissions testing criteria of CDPH Standard Method v1.2.
 2. All adhesives and sealants wet-applied inside the weather-proofing system must have VOC content in compliance with the applicable VOC limits (g/L) found in tables in Division 01 Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C."

2.2 PENETRATION FIRESTOPPING SYSTEMS

- A. Penetration Firestopping Systems: Provide penetration firestopping systems that are produced and installed to resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Include both empty openings and openings containing penetrating items. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. 3M Fire Protection Products.
 - b. A/D Fire Protection Systems Inc.
 - c. Grace, WR & Co.
 - d. Hilti, Inc.
 - e. Johns Manville.
 - f. Nelson Firestopping Products.
 - g. NUCO Inc.
 - h. RectorSeal.
 - i. Specified Technologies, Inc.
 - j. Thermafiber, Division Owens Corning.
 - k. 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.
1. Fire-resistance-rated walls include fire walls, fire-barrier walls, smoke-barrier walls, and fire partitions.

2. F-Rating: Provide penetration firestopping systems with F-ratings indicated, but 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.
 1. Horizontal assemblies include floors, floor/ceiling assemblies, and, ceiling membranes of roof/ceiling assemblies.
 2. F-Rating: Provide penetration firestopping systems with F-ratings of at least one hour, but not less than the fire-resistance rating of constructions penetrated.
 3. T-Rating: Provide penetration firestopping systems with T-ratings of 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. Provide T-rated systems as well as F-ratings where systems protect penetrating items exposed to potential contact with materials in occupiable floor areas in the following locations:
 - a. Penetrations located outside wall cavities.
 - b. Penetrations located outside fire-resistance rated shaft enclosures.
 4. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.
- 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.
 1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at and no more than 50-cfm cumulative total for any 100 sq. ft. at both ambient and elevated temperatures.
- E. Exposed Penetration Firestopping Systems: For penetration firestopping 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 penetration firestopping systems.
 2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestopping systems capable of supporting floor loads involved, either by installing floor plates or by other means.
 3. For penetrations involving insulated piping, provide penetration firestopping systems not requiring removal of insulation.
 4. Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E84.
- F. VOC Content: Penetration firestopping sealants and primers comply with the following limits for VOC Content:
 1. Architectural 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 system manufacturer and approved by qualified testing and inspecting agency for conditions 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.
- H. Sealants: All sealants used in firestopping systems shall comply with ASTM G21 for a 0 rating for mold and mildew resistance.

2.3 FILL MATERIALS

- A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer sleeve made of polypropylene materials lined with an intumescent strips within device and fire rated cloth closures that allow for future reconfiguration of cables and addition of future cabling without the need to demolish, remove or replace firestop, and a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket. Only fully tested and approved cast-in-devices will be considered.
- B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.
- E. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.
- F. Intumescent Putty Pads: Moldable non-curing one component, intumescent, fire-rated material for through-penetration fire stop systems and sound attenuation systems; self-adhering; 1/8 inch (3 mm) thick minimum intumescent putty pads for molding around electric boxes and other equipment items embedded in fire rated construction.
- 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. 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.
- L. Fire Rated Cable Management Devices: Factory assembled round metallic sleeve device for use with cable penetrations, containing an integrated smoke seal fabric membrane that can be opened and closed for re-penetration.
- M. Drop-In Firestop Device: Pre-formed firestop devices for use with noncombustible and combustible pipes (closed and open systems), conduit, or cable bundles penetrating concrete floors.

2.4 MIXING

- 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. Verification of Conditions: 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. Remedy conditions detrimental to the proper and timely completion 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.

- 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.
- 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 systems to comply performance requirements, and with manufacturer's written installation instructions and published drawings for products and applications.
- 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.
 - 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.
- D. Install intumescent putty pads over all electrical and other type of device boxes and other items penetrating fire-rated walls, including but not necessarily limited to electrical junction boxes, electrical switch boxes, power outlet receptacle boxes, thermostat control boxes, telephone outlet boxes, exit sign boxes, building clock boxes, and television cable or antenna outlet boxes.

3.4 IDENTIFICATION

- A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.
 - 1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.
- B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches 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. 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. **Manufacturer's Field Service:** At the start of the installation, periodically as the Work progresses, and after completion, furnish the services of the firestop material manufacturers' technical representative at the job site as necessary to advise on every phase of the Work. As a minimum, furnish representative's attendance during the first day of installation for each major type of firestop material, and furnish technical assistance to the Installer as may be required.
- B. **Inspecting Agency:** Owner will engage a qualified independent inspection and testing agency to perform tests and inspections according to ASTM E2174 requirements for fire resistive joint systems and according to ASTM E2393 for perimeter fire barriers including those related to qualifications, conducting inspections, preparing test reports.
 1. Owner's inspection agency shall monitor the Contractor's Quality Control program. Monitoring activities are at the independent inspection agent's discretion and shall in no way relieve the contractor of sole responsibility for the Work
 2. Inspections of firestopping work shall comply with the local jurisdiction's Building Code "Special Inspections" statutory requirements for component materials and installation.
 3. The independent inspection agency shall verify that firestopping systems have been constructed in compliance with the submitted designs for fire rating required by the Contract Documents and are acceptable to Authorities having jurisdiction.
 4. The firestop installer shall not proceed with installation of joint systems for the next area unit inspecting agency determines work shows compliance with requirements.
 5. Inspections shall include:
 - a. Visual inspection of substrates before installation of firestopping to ascertain that preparation has been performed in accordance with the Contract Documents.
 - b. Visual inspection of completed work including removal of damming materials if used to ensure an adequate and complete fire and smoke seal.
 - c. Final inspection after other trades have completed Work in contact with firestopping material, but before firestopping material is covered.
- C. The installer shall remove and replace firestop systems where inspections indicate that they do not comply with specified requirements.
- D. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- E. The installer may only proceed with enclosing penetration firestopping systems 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 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.

3.7 PENETRATION FIRESTOPPING SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. Where Intertek Group-listed systems are indicated, they refer to design numbers in Intertek Group's "Directory of Listed Building Products" under "Firestop Systems."
- C. Where FM Global-approved systems are indicated, they refer to design numbers listed in FM Global's "Building Materials Approval Guide" under "Wall and Floor Penetration Fire Stops."
- D. Firestop System **FS-1**: Penetration firestopping systems with no penetrating items through concrete penetrations as follows:
 - 1. UL-Classified Systems: C-AJ- 0001-0999.
 - 2. F-Rating: As specified for fire-resistance rated walls and horizontal assemblies.
 - 3. T-Rating: As specified for horizontal assemblies.
 - 4. L-Rating: As specified for smoke barriers.
 - 5. W-Rating: No leakage of water at completion of water leakage testing. For horizontal assembly locations as specified
 - 6. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Silicone sealant.
 - c. Intumescent putty.
 - d. Mortar.
- E. Firestop System Type **FS-1A**: Penetration firestopping systems for no penetrating items through gypsum board framed walls as follows:
 - 1. UL Classified Systems: W-L-0001-0999.
 - 2. F-Rating: As specified for fire-resistance-rated walls.
 - 3. L-Rating: As specified for smoke barriers.
 - 4. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Silicone sealant.
 - c. Intumescent putty.
- F. Firestop System Type **FS-2**: Penetration firestopping systems for metallic pipes, conduit, or tubing through concrete as follows:

1. UL-Classified Systems:
 - a. Wall/Floor Combination: Floor 5" or less, Walls 8 " or less: C-AJ-1001-1999.
 - b. Wall/Floor Combination: Floor over 5", Walls 8" or less: C-BJ-1001-1999.
 - c. Wall Penetrations 5" or less: F-A-1001-1999.
 2. F-Rating: As specified for fire-resistance-rated walls and horizontal assemblies.
 3. T-Rating: As specified for horizontal assemblies.
 4. L-Rating: As specified for smoke barriers.
 5. W-Rating: No leakage of water at completion of water leakage testing. For horizontal assembly locations as specified
 6. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Silicone sealant.
 - c. Intumescent putty.
 - d. Firestop device
- G. Firestop System Type **FS-2A**: Penetration firestopping systems for metallic pipes, conduit, or tubing through gypsum board framed walls; as follows:
1. UL-Classified Systems: W-L-1001-1999.
 2. F-Rating: As specified for fire-resistance-rated walls.
 3. L-Rating: As specified for smoke barriers.
 4. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Silicone sealant.
 - c. Intumescent putty.
 - d. Firestop device
- H. Firestop System FS-2B: For Penetration Firestopping Systems for metallic pipe nominal 30-inch diameter, conduit nominal 4-inch diameter, or tubing nominal 6 inch diameter, or metal sleeves 32 inch diameter of Penetrants through reinforced lightweight concrete walls:
1. UL-Classified Systems: W-J-1000-1999.
 2. F-Rating: As specified for fire-resistance-rated walls.
 3. Type of Fill Materials: One or more of the following:
 - a. Latex sealant
 - b. Intumescent wrap strips.
 - c. Firestop device.
 - d. Intumescent composite sheet.
 - e. Firestop blocks/plugs.
- I. Firestop System Type **FS-3**: Penetration firestopping systems for nonmetallic pipe, conduit, or tubing; through concrete, as follows:
1. UL-Classified Systems: C-AJ-2001-2999.
 2. F-Rating: As specified for fire-resistance-rated walls and horizontal assemblies.
 3. T-Rating: As specified for horizontal assemblies.
 4. L-Rating: As specified for smoke barriers.
 5. W-Rating: No leakage of water at completion of water leakage testing. For horizontal assembly locations as specified

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6. Type of Fill Materials: One or more of the following:
- Latex sealant.
 - Silicone sealant.
 - Intumescent putty.
 - Firestop device.
- J. Firestop System Type **FS-3A**: Penetration firestopping systems for nonmetallic pipe, conduit, or tubing through framed gypsum board walls as follows:
- UL-Classified Systems: W-L-2001-2999.
 - F-Rating: As specified for fire-resistance-rated walls.
 - L-Rating: As specified for smoke barriers.
 - Type of Fill Materials: One or more of the following:
 - Latex sealant.
 - Silicone sealant.
 - Intumescent putty.
 - Intumescent wrap strips.
 - Firestop device.
- K. Firestop System Type **FS-4**: Penetration firestopping systems for electrical cables, through concrete as follows:
- UL-Classified Systems: C-AJ-3001-3999.
 - F-Rating: As specified for fire-resistance-rated walls and horizontal assemblies.
 - T-Rating: As specified for horizontal assemblies.
 - L-Rating: As specified for smoke barriers.
 - W-Rating: No leakage of water at completion of water leakage testing. For horizontal assembly locations as specified.
 - Type of Fill Materials: One or more of the following:
 - Latex sealant.
 - Silicone sealant.
 - Intumescent putty.
 - Silicone foam
 - Pillows/bags.
 - Firestop device.
 - Firestop blocks/plugs.
- L. Firestop System **FS-4A**: Penetration firestopping systems for electrical cables through framed gypsum walls:
- UL-Classified Systems: W-L-3001-3999.
 - F-Rating: As specified for fire-resistance-rated walls.
 - L-Rating: As specified for smoke barriers.
 - Type of Fill Materials: One or more of the following:
 - Latex sealant.
 - Silicone sealant.
 - Intumescent putty.
 - Silicone foam
 - Pillows/bags.
 - Firestop device.
 - Firestop blocks/plugs.

- M. Firestop System **FS-5**: Penetration firestopping systems for cable trays with electric cables through concrete:
1. UL-Classified Systems: C-AJ-4001-4999.
 2. F-Rating: As specified for fire-resistance-rated walls and horizontal assemblies.
 3. T-Rating: As specified for horizontal assemblies.
 4. L-Rating: As specified for smoke barriers.
 5. W-Rating: No leakage of water at completion of water leakage testing. For horizontal assembly locations as specified.
 6. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Intumescent putty.
 - c. Silicone foam.
 - d. Pillows/bags.
 - e. Firestop device.
 - f. Firestop blocks/plugs.
- N. Firestop System **FS-5A**: Penetration firestopping systems for cable trays with electric cables through framed gypsum board walls:
1. UL-Classified Systems: W-L-4001-4999.
 2. F-Rating: As specified for fire-resistance-rated walls.
 3. L-Rating: As specified for smoke barriers.
 4. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Intumescent putty.
 - c. Silicone foam.
 - d. Pillows/bags.
 - e. Firestop device.
 - f. Firestop blocks/plugs.
- O. Firestop System **FS-6**: Penetration Firestopping Systems for Insulated Pipes through concrete; as follows:
1. UL-Classified Systems: C-AJ-5001-5999.
 2. F-Rating: As specified for fire-resistance-rated walls and horizontal assemblies.
 3. T-Rating: As specified for horizontal assemblies.
 4. L-Rating: As specified for smoke barriers.
 5. W-Rating: No leakage of water at completion of water leakage testing. For horizontal assembly locations as specified
 6. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Intumescent putty.
 - c. Silicone foam.
 - d. Intumescent wrap strips.
 - e. Firestop device.
 - f. Firestop blocks/plugs.
- P. Firestop System **FS-6A**: Penetration firestopping systems for insulated pipes through framed gypsum board walls:
1. UL-Classified Systems: W-L-5001-5999.

2. F-Rating: As specified for fire-resistance-rated walls.
3. L-Rating: As specified for smoke barriers.
4. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Intumescent putty.
 - c. Silicone foam.
 - d. Intumescent wrap strips.
 - e. Firestop device.
 - f. Firestop blocks/plugs.

Q. Firestop System **FS-7**: Penetration Firestopping Systems for Miscellaneous Electrical Penetrants through concrete as follows:

1. UL-Classified Systems: C-AJ- 6001-6999 for electrical busways.
2. F-Rating: As specified for fire-resistance rated walls and horizontal assemblies.
3. T-Rating: As specified for horizontal assemblies.
4. L-Rating: As specified for smoke barriers.
5. W-Rating: No leakage of water at completion of water leakage testing. For horizontal assembly locations as specified.
6. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Intumescent putty.
 - c. Firestop device
 - d. Firestop blocks/plugs.

R. Firestop System **FS-7A**: Penetration firestopping systems for miscellaneous electrical penetrants through framed gypsum walls:

1. UL-Classified Systems: W-L- 6001-6999 for electrical busways.
2. F-Rating: As specified for fire-resistance rated walls.
3. L-Rating: As specified for smoke barriers.
4. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Intumescent putty.
 - c. Firestop device
 - d. Firestop blocks/plugs.

S. Firestop System **FS-8**: Penetration firestopping systems for miscellaneous mechanical penetrants through concrete walls and floors:

1. UL-Classified Systems: C-AJ-7001-7999.
2. F-Rating: As specified for fire-resistance rated walls and horizontal assemblies.
3. T-Rating: As specified for horizontal assemblies.
4. L-Rating: As specified for smoke barriers.
5. W-Rating: No leakage of water at completion of water leakage testing. For horizontal assembly locations as specified.
6. Type of Fill Materials: The following:
 - a. Latex sealant.

- T. Firestop System **FS-8A**: Penetration firestopping systems for miscellaneous mechanical penetrants through framed gypsum board walls:
1. UL-Classified Systems: W-L-7001-7999.
 2. F-Rating: As specified for fire-resistance rated walls.
 3. L-Rating: As specified for smoke barriers.
 4. Type of Fill Materials: The following:
 - a. Latex sealant.
- U. Firestop System **FS-9**: Penetration firestopping systems for groupings of penetrants through concrete:
1. UL-Classified Systems:
 - a. Combination Floors/Walls; with Floors 5" or less and Walls 8" or less
 - 1) C-AJ-8001-8999 for combinations.
 - 2) C-AJ-2000-2999 for plastic pipes.
 - 3) C-AJ-6000-6999 for electric busways.
 - b. Floors 5 inch or less F-A-1000-1999 for floors 5 inch or less and metal pipes.
 2. F-Rating: As specified for fire-resistance-rated walls and horizontal assemblies.
 3. T-Rating: As specified for horizontal assemblies.
 4. L-Rating: As specified for smoke barriers.
 5. W-Rating: No leakage of water at completion of water leakage testing. For horizontal assembly locations as specified.
 6. Type of Fill Materials: One or more of the following:
 - a. Latex sealant
 - b. Intumescent wrap strips.
 - c. Firestop device.
 - d. Intumescent composite sheet.
 - e. Firestop blocks/plugs.
- V. Firestop System **FS-9A**: For Penetration Firestopping Systems for Groupings of Penetrants through framed gypsum board walls:
1. UL-Classified Systems: W-L-8001-8999 for combinations.
 2. F-Rating: As specified for fire-resistance-rated walls.
 3. L-Rating: As specified for smoke barriers.
 4. Type of Fill Materials: One or more of the following:
 - a. Latex sealant
 - b. Intumescent wrap strips.
 - c. Firestop device.
 - d. Intumescent composite sheet.
 - e. Firestop blocks/plugs.

END OF SECTION