

SECTION 07841

THROUGH-PENETRATION FIRESTOP SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes (unless specified elsewhere) through-penetration firestop systems for penetrations through, and at the top of, the following fire-resistance-rated assemblies, including both empty openings and openings containing penetrating items:
  - 1. Floors.
  - 2. Walls and partitions.
  - 3. Smoke barriers.
  - 4. Construction enclosing compartmentalized areas.

1.2 DEFINITIONS

- A. Firestops: Specially tested materials used to reestablish the integrity of a fire rated wall, floor, or other partition after the structure has been breached for the through-penetration of building.
- B. Through Penetration: Pipes, conduits, ducts, cable trays, cable, wire or other element passing completely through an opening in a fire rated barrier/assembly.
- C. Membrane Penetration: Penetration of a fire rated barrier that breaches on side, but does not pass completely through to the other side.
- D. System: The combination of specific materials and/or devices, including the penetrating item(s) required to complete the firestop, as tested by an independent third party test facility.
- E. Barrier/Assembly: A wall, floor, or other partition with a fire – smoke rating of 1, 2, or 3 hours.
- F. F-Rating: The time a firestop (penetrating item/building material/firestop material) can withstand direct flame without a burn through as tested to ASTM E814 / UL 1479.
- G. T-Rating: The amount of time a through-penetration firestop limits the temperature rise on the cold side (outside the test furnace) as tested to ASTM E814 / UL 1479.
- H. L-Rating: The L-Rating criteria determines the amount of air leakage, in cubic feet per minute, per square foot of opening (CFM/sq. ft). through the firestop system at ambient and/or 400 degrees F. air temperature at an air pressure differential of 0.30in. W.C. L-Ratings are used to determine the suitability of a firestop to stop smoke and toxic gases in accordance with NFPA Life Safety Code, 101.

### 1.3 PERFORMANCE REQUIREMENTS

- A. General: For the following constructions, 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 assembly penetrated.
  - 1. Fire-resistance-rated load-bearing walls, including partitions, with fire-protection-rated openings.
  - 2. Fire-resistance-rated non-load-bearing walls, including partitions, with fire-protection-rated openings.
  - 3. Fire-resistance-rated floor assemblies.
- B. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
- C. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, as determined per ASTM E 814, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
  - 1. Penetrations located outside wall cavities.
  - 2. Penetrations located outside fire-resistive shaft enclosures.
  - 3. Penetrations located in construction containing fire-protection-rated openings.
  - 4. Penetrating items larger than 4-inch- (100-mm-) diameter nominal pipe or 16 sq. in. (100 sq. cm) in overall cross-sectional area.
- D. 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 4 inches (100 mm) 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.
  - 4. For firestop systems exposed to view, provide acrylic based product for compatibility with finish painting.
- E. For through-penetration firestop systems exposed to view, provide products with flame-spread ratings of less than 25 and smoke-developed ratings of less than 450, as determined per ASTM E 84.
- F. VOC Requirements: Provide products with not more than 50 g/L. This may alter the selection of protection method to fulfill this requirement. Many spray and silicone products exceed VOC requirements.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of through-penetration firestop system product indicated. Literature shall indicate product characteristics, typical uses, performance and limitation criteria, and test data.
- B. Shop Drawings: For each through-penetration firestop system, show each kind of construction condition penetrated, relationships to adjoining construction, and kind of penetrating item. Include UL Tested System designation 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. Engineering Judgments: Where Project conditions require modification of qualified testing and inspecting agency's illustration to suit a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer.
- C. 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: An experienced installer who has completed through-penetration firestop systems similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in "Performance Requirements" Article:
  - 1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL 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 ASTM E 814. 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 "Fire Resistance Directory."
- C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
- D. Special Inspections: Allow for 1 of each type of firestopping system to be removed and inspected for conformance with approved submittals. All firestopping shall be inspected prior to the installation of ceilings.

- E. Above Ceiling review: Prior to the installation of ceilings, a review of construction completion shall be done for firestopping and other items that will not be visible when the ceilings have been installed.

#### 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. Notify Architect at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.
- D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until Architect and building inspector, if required by authorities having jurisdiction, have examined each installation.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Firestop Systems Inc.
  2. Grace Construction Products

3. Hilti Construction Chemicals, Inc.
4. International Protective Coatings Corp.
5. Isolatek International.
6. 3M Fire Protection Products.
7. Nelson Firestop Products.
8. RectorSeal Corporation (The).
9. Specified Technologies Inc.

## 2.2 FIRESTOP SYSTEMS, 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 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by the 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 as required by UL approved Through-Penetration Firestop System. Fill materials are those referred to in directories of the 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. **Firestopping Track Systems:** Head-of-wall drywall track system consisting of a slip track designed to allow an inflatable bag to be filled with cementitious fireproofing material to seal the track to deck condition a top of wall.
- D. **Latex Sealants:** Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.

- E. Elastomeric Spray: Single component, water-based elastomeric compound.
- F. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- G. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.
- H. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- I. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- J. 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.
- K. 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.
- L. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- M. Silicone Sealants: Moisture-curing, 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.
- N. Unfaced, Slag-Wool-/Rock-Wool-Fiber Board Insulation: ASTM C 612, maximum flame-spread and smoke-developed indices of 15 and 0, respectively; passing ASTM E 136 for combustion characteristics; and of the following density, type, thermal resistivity, and fiber color:
  - 1. Nominal density of 4 lb/cu. ft. (64 kg/cu. m), Types IA and IB, thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F (27.7 K x m/W at 24 deg C).
  - 2. Color: Natural.
  - 3. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Fibrex Insulations Inc.
    - b. Owens Corning.
    - c. Thermafiber.

## 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.
- B. 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 written recommendations of firestop system manufacturer and 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 "Performance Requirements" Article and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Provide through-penetration firestop systems for conditions specified whether or not firestopping is indicated.
  - 1. Through-Penetrations: Install through-penetration firestop systems in all open penetrations and in the annular space in all penetrations in fire-rated barriers.

2. Membrane-Penetrations: Install through-penetration firestop systems in rated walls. Where required by code, provide products that meet the requirements of third party time/temperature testing.
  3. Construction Joints/Gaps: Provide through-penetration firestop systems for the following locations:
    - a. Between the edges of floor slabs and exterior walls.
    - b. Between the tops of walls and the underside of floors or roofs.
    - c. In the control joints in masonry walls and floors.
  4. Smoke Stopping: Provide smoke stops for through-penetrations, membrane penetrations, and construction gaps with a material approved and tested for such applications.
- C. 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, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
- D. 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. Prior to installation of ceilings, inspect penetrations requiring firestopping to verify complete installation of firestopping materials. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued.
- B. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.
- C. Reinstall firestopping materials that have been removed for inspection.

### 3.5 IDENTIFICATION

- A. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:
  1. The words: "Warning--Through-Penetration Firestop System--Do Not Disturb. Notify Building Management of Any Damage."
  2. Contractor's name, address, and phone number.
  3. Through-penetration firestop system designation of applicable testing and inspecting agency.
  4. Date of installation.



5. Through-penetration firestop system manufacturer's name.
6. Installer's name.

### 3.6 CLEANING AND PROTECTION

- 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 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 through-penetration firestop systems complying with specified requirements.

END OF SECTION